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Socio-environmental disasters in Brazilian soil – is it possible to avoid them when the issue is associated with urban waters?

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Desastres socioambientais em solo brasileiro – é possível evitar quando o tema se associa às águas urbanas?

RESUMO

Objetivo – Debater o tema dos desastres socioambientais, explorando sua relação com as águas urbanas e enfatizando a importância de salvaguardar sistemas de água e saneamento diante das transformações climáticas, visando a promoção de cidades saudáveis e prósperas.

Metodologia – Fundamenta-se em um percurso de leituras teóricas, documentais e informativas, adotando uma abordagem exploratória que reúne percepções, reflexões e experiências sobre o planejamento territorial e a gestão urbana frente aos riscos e problemas socioambientais.

Originalidade/relevância – O estudo insere-se no contexto do enfrentamento das crises climática e ambiental, abordando a lacuna teórica relativa à integração das águas urbanas como elemento central no planejamento territorial e na mitigação de riscos socioambientais, articulando dimensões de vida, educação, paisagem e justiça socioambiental.

Resultados – A análise apontou a necessidade de estratégias de planejamento que incorporem, de forma articulada, instrumentos capazes de responder aos desafios impostos pelos eventos extremos e pelas desigualdades socioterritoriais, reforçando uma cultura de cuidados e novas formas de viver nas cidades.

Contribuições teóricas/metodológicas – Amplia a compreensão do planejamento urbano-ambiental integrado às águas urbanas como componente estruturante, fornecendo subsídios para novas abordagens interdisciplinares e para a incorporação de indicadores socioambientais no processo decisório.

Contribuições sociais e ambientais – Aponta caminhos para políticas públicas que priorizem a equidade socioterritorial, a resiliência urbana e a proteção dos sistemas hídricos, promovendo melhorias concretas na qualidade de vida e no equilíbrio ambiental das cidades.

PALAVRAS-CHAVE: Desastres socioambientais. Planejamento territorial. Águas Urbanas.

Socio-environmental disasters on Brazilian soil – is it possible to avoid them when the issue is associated with urban waters?

SUMMARY

Objective – To discuss the issue of socio-environmental disasters, exploring their relationship with urban waters and emphasizing the importance of safeguarding water and sanitation systems in the face of climate change, with the goal of promoting healthy and prosperous cities.

Methodology – Based on theoretical, documentary, and informational readings, adopting an exploratory approach that brings together perceptions, reflections, and experiences on territorial planning and urban management in the context of socio-environmental risks and problems.

Originality/relevance – The study is situated in the context of addressing climate and environmental crises, tackling the theoretical gap regarding the integration of urban waters as a central element in territorial planning and in mitigating socio-environmental risks, while articulating dimensions of life, education, landscape, and socio-environmental justice.

Results – The analysis pointed to the need for planning strategies that incorporate, in an articulated manner, instruments capable of responding to the challenges posed by extreme events and socio-territorial inequalities, fostering a culture of care and new ways of living in cities.

Theoretical/methodological contributions – Expands the understanding of integrated urban-environmental planning with urban waters as a structuring component, providing inputs for new interdisciplinary approaches and for the incorporation of socio-environmental indicators into decision-making processes.

Social and environmental contributions – Suggests pathways for public policies that prioritize socio-territorial equity, urban resilience, and the protection of water systems, promoting concrete improvements in quality of life and environmental balance in cities.

KEYWORDS: Socio-environmental disasters. Territorial planning. Urban Waters.

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Desastres socioambientales en suelo brasileño: ¿es posible evitarlos cuando el problema está asociado a aguas urbanas?

RESUMEN

Objetivo – Debatir el tema de los desastres socioambientales, explorando su relación con las aguas urbanas y destacando la importancia de salvaguardar los sistemas de agua y saneamiento frente a los cambios climáticos, con el objetivo de promover ciudades saludables y prósperas.

Metodología – Basado en lecturas teóricas, documentales e informativas, adoptando un enfoque exploratorio que reúne percepciones, reflexiones y experiencias sobre la planificación territorial y la gestión urbana ante riesgos y problemas socioambientales.

Originalidad/relevancia – El estudio se sitúa en el contexto del enfrentamiento de las crisis climática y ambiental, abordando la brecha teórica relacionada con la integración de las aguas urbanas como elemento central en la planificación territorial y en la mitigación de riesgos socioambientales, articulando dimensiones de vida, educación, paisaje y justicia socioambiental.

Resultados – El análisis señaló la necesidad de estrategias de planificación que incorporen, de manera articulada, instrumentos capaces de responder a los desafíos planteados por eventos extremos y desigualdades socioterritoriales, fomentando una cultura de cuidados y nuevas formas de vivir en las ciudades.

Contribuciones teóricas/metodológicas – Amplía la comprensión de la planificación urbano-ambiental integrada con las aguas urbanas como componente estructurante, aportando insumos para nuevos enfoques interdisciplinarios y para la incorporación de indicadores socioambientales en los procesos de toma de decisiones.

Contribuciones sociales y ambientales – Señala caminos para políticas públicas que prioricen la equidad socioterritorial, la resiliencia urbana y la protección de los sistemas hídricos, promoviendo mejoras concretas en la calidad de vida y en el equilibrio ambiental de las ciudades.

PALABRAS CLAVE: Desastres socioambientales. Planificación territorial. Aguas Urbanas.

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1 INTRODUCTION

The initiation to the environmental issue, in line with what Dias (2016) presented in his *work Antropoceno Iniciação à temática ambiental,* now requires knowledge about the climatic changes that occur in the world due to human action. The panorama that weaves the plot that involves the issue implies understanding, before the contemporary crises, the intertwining of issues such as income inequality, opportunities, consumerism, wealth, prestige and power, as well as values, beliefs and social practices. The impact of multiple and interconnected crises faced by the world population tends to raise the political, environmental, economic and social consequences.

According to studies by Steffen *et al.* (2015), four of the nine planetary borders have been exceeded, including climate change and biodiversity loss, the impacts of which can compromise the terrestrial system and lead to a general collapse. In several regions, phenomena such as heat waves, extreme cold, fires and floods are observed, events that become increasingly frequent and whose duration and intensity should increase throughout this century. This indicates not only a risk to human survival, but also a large-scale "ecocide" potential (Alves, 2019).

New meanings are attributed to concern for the environment, focusing not only on the emergency bias, but above all on the need to face the challenges posed, associated with urban-environmental problems, with a political project that reveals itself, within the scale and circumstances attributed to it, as a commitment to sustainability and inclusion. For the geographer Lívia de Oliveira (2017), the meaning that today is attributed to the term "environment" is revealed not only as inseparable from people, but must also be understood as a result of their experiences and living, of emotional and affective character, from the perspective of a subject environment, and no longer object.

The relationship between the human being and the environment has been transformed over time. What was once a harmonious and respectful coexistence, in which societies recognized their dependence on nature for survival, evolved into a dynamics of domination, in which man exploits natural resources under the belief that they are unlimited. This approach resulted in a series of problems, creating a conflicting relationship between the human being and the environment. Studies on environmental perception are a way to re-examine this relationship, seeking to promote a more respectful bond and serving as a tool for cultural preservation, contributing to the identity and culture of peoples.

Historically, the environment was seen from a "traditional" geographical perspective, positivist, focused on its physical and spatial characteristics. However, in the 1970's, the studies of humanistic geography gained strength, introducing concepts related to perception in the debate on the environment, addressed by several professionals from different areas. The geographer Yi-Fu Tuan was one of the pioneers in this field, defining the term "topophilia" as the "affective link between the person and the place or physical environment" (Tuan, 2012), fostering the articulation between different fields of knowledge.

From these ideas, the research on how people relate and perceive the environment was expanded. Individuals and groups understand the environment through a wide variety of factors, but, in short, their perceptions are shaped by their experiences of life, culture, beliefs and personal experiences. Thus, they are not mere observers, but active participants of the scenario

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in which they are inserted, belonging to the landscape.

In this perspective, addressing the issue of socio-environmental disasters in the context of urban waters is very pertinent. According to Krenak (2022, page 12), the "river is a path within the city." For the author, we have always been very close to the rivers, but this proximity was not always the object of teaching, care, respect. It was often chosen to silence the noise of its waters, to subtract the displacement of its waters from the urban landscape, making its course invisible, mixing its waters with the waters of the sky and the waters of the city. All together and mixed! A real mutilation of water bodies for the development and growth of cities.

In the search for space for automotive development, there was a need to expand the road system with new roads, avenues and streets. At the same time, the increasing demand for housing led society to seek more and more residences in cities. In this context, some groups were privileged to the detriment of others, who began to inhabit the outskirts, occupying vulnerable areas and pouring domestic sewage into water bodies, all with the omission of the public power in housing planning (Gorski, 2012).

Thus, rivers began to be considered obstacles to urban development, occupying spaces that, in the view of the time, should be eliminated to give way to streets and dwellings. Since the 1930's, in Brazilian cities that faced an intense urbanization process, such as Rio de Janeiro and São Paulo, the channeling and rectification of rivers began, many of which were buried and removed from urban space, in the name of public health and flood control. This process intensified along with increasing urbanization, and, contrary to what was thought, the channeling of rivers had harmful effects, radically altering their morphological, environmental and biological characteristics.

Channeling decreases the natural biodiversity of rivers, eliminates the typical banks riparian vegetation and threatens the aquatic life, exposed to high temperatures. In addition, the rectification removes natural sinuosities from the riverbeds, increasing the speed of water and compromising its drainage capacity. The replacement of natural edges by concrete structures increases impermeability and erosion, in addition to removing the fertile soil that sustains aquatic life, contributing to silencing and other consequences that denaturalize the rivers and compromise their social and ecological role, integrated to the hydrological cycle and the watershed (Riley, 1998).

The so-called "gray infrastructure", which covers traditional engineering actions and techniques, such as plumbing, is inadequate to solve in isolation the problems that arise with urbanization and land occupation, often disregarding environmental and urban planning. Although necessary, this infrastructure, which uses artificial systems that ignore existing ecosystems, reflects an outdated view of human domain on nature, as if it were possible to control its natural processes.

This extractivist perspective, which favors the technique to the detriment of natural balance, contributed to the urban-environmental crises we face. In line with the 2030 Agenda guidelines and the Sustainable Development Goals (SDGs), it is essential to adopt a vision that recognizes and values nature, allowing its active role in the cities' development without subjugating it.

In search of more resilient and sustainable cities that provide better quality of life, safety and health for their populations, in 2015, the United Nations General Assembly, composed of

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193 member states, established 17 Sustainable Development Goals (SDGs) (Figure 1) and 169 global goals covering social, environmental, environmental, economic and institutional aspects. Known as Agenda 2030, this initiative proposes global actions adaptable to the particularities of each country or locality, meeting their specific needs.

Figure 1 – Sustainable development objectives

Source: IDIS (2023).

In Brazil, solutions to mitigate the impacts of extreme events on urban infrastructure systems often emerge from a concern for economic losses, rather than recognizing the importance of nature and the dependence that all living beings have on it.

According to the World Bank report (Browder, 2021[1]), cities do not want to urgently choose strategies for adaptation and resilience before current climate change. For the institution and its experts, the climate crisis is revealed as a water crisis, reverberating in the actions associated with urban development. The triad climate, floods and droughts tend to boost both water resource management and disaster risk management. Following the line of the report, sustainable landscapes require resilient, water-sensitive cities. And, from this perspective, there is a need to safeguard water and sanitation systems, driven substantially by targeting healthy and prosperous cities.

The tragedy that the municipality of Petrópolis experienced in 2022 can be characterized as a socio-environmental disaster, of great proportion to the municipality, which caused floods,

[1] Available at: https://blogs.worldbank.org/en/water/time-adapt-changing-climate-what-does-it-mean-water?CID=WAT_TT_Water_EN_EXT. Access at: 27 Aug. 2024.

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landslides and left hundreds of dead and[2]disappeared. A mountainous city, with inhabited valleys slithering water resources, which never seems to be responsible for the effects of landslides and heavy rains, highlighting the strong relationship of nature, culture and inequalities associated with the territory and its occupation process. Above all, because, often, such events happen requiring solutions that protect their population and insistently exposing the need for planning that will address, in an integrated way, the problems of inequalities and the challenges imposed by environmental and climate crises.

Experts point out that the scenario of the tragedy that can be witnessed in Morro da Oficina, in 2022 (Figure 2), in the neighborhood of Alto da Serra and throughout the city of Petrópolis, was a reflection of disorderly occupation. In the history of Petrópolis city, Morro da Oficina is the first irregular settlement to occupy the slopes of the city. In an understanding, which would be built only from the 20th century, the Koeler Plan[3] preserved the slopes and the environment.

Petrópolis holds the title of the first planned city in Brazil. The plan drawn up by engineer Julius Friedrich Koeler intended to protect the rivers and avoid possible landslides from the slopes, since the tenuous wooded cover of many steep and rocky terrains made them predisposed to erosion when subjected to torrential summer rains.

Figure 2 – Socio-environmental disaster Petrópolis – Morro da Oficina – 2022

Source: Petrópolis (2022). Photo: Marcos Serra Lima/G1.

In this sense, faced with the deforestation of the vegetation cover and the fragility of the soil, such areas became areas of risk before strong storms and landslides. Such a condition is aggravated with extreme events, due to climate change. After the event, the debate, which involved public agents, experts and society in general, was focused on how to avoid tragedies of this magnitude in the region. A branch of experts pointed out an approach to prevention and evacuation of these areas with irregular occupations. In line with this gesture, the planning of a

[2] The full news can be found at: https://g1.globo.com/rj/regiao-serrana/noticia/2022/02/20/petropolis-imagens-da-tragedia.ghtml. Access at: May 20th 2024.

[3] The project, created by German engineer Julius Friedrich Koeler in 1843 at the request of Emperor Dom Pedro I, was the urban plan that guided the foundation of Petrópolis in Rio de Janeiro. The plan highlighted the importance of respecting the rugged relief and guiding the region water courses. Koeler's guidelines predicted the preservation of the river banks and the control of occupation on slopes, seeking to integrate urban growth with natural conditions, in order to guarantee the slopes and water conditions of the new city.

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housing policy was indicated aimed at technically instructing such constructions about the appropriate precautions. Another aspect of experts stressed the need to improve existing social policies based on rapid policies, aiming to create a protective framework in the face of the urban environmental problem treated as temporary.

For Garcia (2022), the socio-environmental disaster cannot be classified as natural. Although the importance of natural components should not be ruled out, the public power discourse is based exclusively on the notion of "natural" disaster. It is then created the perception that public management has no responsibility, thus exempting itself from its obligation in relation to what happened. It is necessary to debate social inequality, contextualize the reason why these people occupy such spaces, understand what forces push them to risk areas and how the public authorities operate their water monitoring and management systems so that the risk does not turn into tragedy.

According to the Civil Defense of the municipality, since 1850, floods were already registered in almost all summer seasons in the city. The first reports of fatal victims date back to 1966, when floods caused 80 deaths, followed by significant disasters in 1988, with 171 deaths, and in 2011 with 73 victims.

Due to the occurrence of socio-environmental tragedies in the municipality, the Secretariat of Civil Defense of Petrópolis operates with some policies of curtailment. The policies involve the Housing Secretariat with the Municipal Risk Reduction Plan (PMRR[4]) of 2017. Once the Plan is regulated in reference, it was expected the adoption of physical interventions and organizational and regulatory actions with the objective of developing mitigating and preventive initiatives in the face of the possible impacts of natural disasters. Among its responsibilities, the mapping of risk areas in Petrópolis stands out, fundamental to subsidize the reduction of socio-environmental vulnerability.

The public policy of the PMRR, developed by the Petrópolis Housing Secretariat, was designed to structure and ensure resources of the extinct Ministry of Cities for land regularization. The first version of the plan, from 2007, and its revision, from 2017, identified Morro da Oficina as a high risk area for landslides. The 2017 review showed a greater urgency due to the increase in occupations and the disorderly growth of urbanization in the region.

The document hierarchized the occupations of higher risk, predicting resettlements, housing improvements, infrastructure improvements, urbanization, recovery of degraded areas and basic sanitation (Petrópolis, 2017). However, despite the elaboration of the document and the data elaborated and pointed out, the structuring actions did not occur. No public action has been put into practice to avoid the mapped risks.

Extreme events represent socio-environmental and political challenges simultaneously. This is a moment that does not foresee a glance, a time-consuming and slow observation. It requires urgency, but it also requires planning. According to the National Center for Monitoring and Alerts of Natural Disasters – Cemaden ,[5]2023 set record records of occurrences of socio-

[4] Available at: https://www.petropolis.rj.gov.br/pmp/index.php/defesa-civil/plano-municipal-de-reducao-de-risco. Access at: May 20th 2024.

[5] National Center for Monitoring and Alerts of Natural Disasters.

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environmental disasters, such as river overflows and landslides[6], worrying scenario for the city of Petrópolis, that leads the ranking of environmental disaster alerts issued by the said center over the past year.

Sao Sebastião, on the coast of São Paulo state, and Manaus were the cities affected with extreme weather events and, in the context of metropolitan regions, Porto Alegre, more precisely the region that integrates the Taquari Valley, in Rio Grande do Sul state, and in the Itajaí Valley, in Santa Catarina state, were also subject to alerts and experienced situations of extreme vulnerability before the invasion of the waters in 2023. Rio Grande do Sul state recently experienced an unprecedented environmental tragedy in May 2024, with devastating floods that impacted neighborhoods and entire cities, which were submerged and destroyed, forcing many people to move to shelters, with immeasurable ecological, social and economic impacts. This situation, in addition to widespread commotion throughout the country, has created an alert for tragedies of this size, increasingly frequent nowadays, leading to the question: what can we do to avoid and reduce the damage?

To adopt an integrated planning approach, which articulates and combines structural and non-structural measures, which offer, on the one hand, rapid solutions and, on the other, solutions that choose strategies to deal with extreme weather effects. To think about the adaptations and adaptations of cities regarding the impacts of climate change and its scalar and frequency relationship seems to point to the reduction of damage caused by floods, both in Rio Grande do Sul state and in other areas in the country. With planning, ongoing investments and training of public and private agents, we will be able to protect lives, properties and the environment more and better. The fact is that heavy investments in the area of risk and disaster containment need to be addressed and absorbed by states and municipalities as soon as possible, requiring adequacy and commitment of our political system. Measures such as Mapping of Risk Areas; Investment in Infrastructure; Preservation of Green and Damping Areas; Education and Awareness of the different segments of the population; Monitoring and Early Warning Systems; Land Use Planning and Suitable and Resilient Urban Occupation; and Strengthening of Local Stakeholders present themselves as a positive roadmap to address the problem of floods.

Urban water management can be understood in a context of socio-environmental disasters. However, we must emphasize that, in the debate of environmental and climate crises, Brazilian municipalities still treat rivers as subjects devoid of rights, from a purely technical vision that prays the capping of water bodies, decharacterizing and removing their enjoyment of human conviviality. In the current stage of capitalist society, looking at the transformations that occurred in the Forest Code, it is possible to perceive the loss of protection of riparian forests, where the size of the protection bands was reduced. Now, it is also possible that owners of areas with deforested riparian forests can regularize their situation through compensations, such as planting new vegetation areas and flexibilization of uses.

Acosta (2016) defends the recognition of nature as a subject of rights, attributing the same

[6] It can be seen in the article entitled *"Petrópolis lidera ranking de alertas de desastres ambientais emitidos pelo Cemaden".* The Center was created in 2011 and since its inception, 2023 is emerging as the year with the highest incidence of alerts. Available at: https://tribunademinas.com.br/noticias/brasil-e-mundo/24-01-2024/petropolis-alertas-desastres-ambientais-cemaden.html. Access at: May 22nd 2024.

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dignity and consideration that are given to human beings, allowing ecosystems to be protected and perceived not only by their economic value, but by their own intrinsic value, in which nature, instead of being treated merely as a resource to be exploited, it must be seen as an entity that has rights to exist, remain alive and regenerate.

Applying such recognition to water management proposes that rivers, lakes and aquifers have rights to ecological integrity, being able to maintain their essential functions, such as regulation of the hydrological cycle, support of biodiversity, water quality and human use; as well as caution to avoid irreversible damage.

Porto-Gonçalves (2006), in turn, postulated water bodies as fundamental elements to human experience, emphasizing that they go far beyond mere natural resources, are also territorial and social milestones. He argues that such systems in urban space play a crucial role in the territorial organization of cities, both from an ecological and social point of view. These systems have the ability to shape the urban space, influence the distribution of economic activities and their interference directly affects the quality of life of different populations

This gesture and shared glances observe cities in search of alternatives and to monitor what is happening in them, to understand how physical and social spaces articulate and are responsible for unequal social and ecological relationships.

It is true that the city was not created, in its essence, to be a void. But it is essential that, associated with its creation, universal rights such as housing, sanitary measures, mobility and environmental comfort of water management, must be linked to the risks arising from the urgency of climate change.

2 OBJECTIVES

Recent practices[7] in cross-sectional study fields show new ways in which environmental changes are sensitized and faced. Looking at the stories of cities, the field of territorial planning seeks to understand the transformations experienced by environmental systems, in which the dynamics and experience of abiotic and biotic means are placed as an intrinsic part of environmental urban planning. Based on this understanding, this article aims to present the discussion of the issue of territorial planning aligned with urban management, highlighting articulated aspects that are guided by investing in a new way of living, by awakening to a culture of care and that understand the inseparability of life, education, landscape and socio-environmental risk as urban environmental problems of our time

3 METHODOLOGY

[7] Among the practices, in the field of environmental engineering, some can be pointed out. Sustainable Urban Drainage Systems (SUDS) are essential solutions for the efficient management of rainwater in urban areas, mitigating environmental and urban impacts caused by floods and runoff. Elements such as wells and infiltration trenches facilitate the recharge of aquifers, allowing rainwater to infiltrate the soil, while infiltration basins and detention basins temporarily store excess water, avoiding flooding. Treatment systems applied to drainage networks, such as filter strips and bioretention systems, help filter and purify rainwater before its return to the environment, increasing water quality. In addition, permeable floors and ditches coated with vegetation cover (*Swales)*play an important role in promoting infiltration and reducing surface runoff, complementing the function of storage and attenuation tanks. Finally, natural or artificial wetlands (Wetlands) function as purification systems, removing pollutants and acting on water retention, promoting an ecological response to the urban climate crisis.

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The methodological course was guided by theoretical, documentary and informative readings resulting from a literature review conditioned to the issue of socio-environmental disasters, evaluating their compliance with the aspects associated with urban waters, seeking the contribution of stakeholders who understand the issue of the requalification of urban environmental systems as a social measure in the contemporary perspective of urban space. This approach includes the analysis of normative documents, which allows a more in-depth understanding of the problem and seeks case studies that associate the practices instrumentalized for the state of the art.

As a reflective essay, the methodology sought to explore investigations that offered definitions and strategies of disaster prevention and recovery of urban areas and their river environments in a path that sought to identify new ways of building relationships between nature and society. Aligning the perspective in the debate presented, by associating a culture of approximation and coexistence, by a critical bias, seeks to awaken the greater awareness about environmental issues and their interrelations associated with the dimension of life, education, urban landscape and urban and environmental risks. This is a conciliatory trajectory between territorial planning, socio-environmental disasters and urban water management, with challenges and possibilities.

4 RESULTS

It is important to note that the current studies on the issue of urban waters prospectus its importance also in the search for the healthy city. The health of river basins, considering that rivers and adequate sanitation, corroborates the aim of the well-being of the population. As Tucci states (2007, page 3), "(...) today's problems are reflected in the health of the population, frequent flooding, the loss of rich and diverse environment in many regions." According to the author, it is necessary to break with the cycle that has been perpetuating in our cities – to recognize the passive and do nothing to transgress this order. It is concluded that, in view of the author's contributions, it is possible that the country reaches sustainability goals, observing, for example, the SDGs of the UN Agenda 2030, the expansion of access to supply and the attendance of sewage collection and treatment, for this purpose, it is necessary that investments be made in the sector from the vision of an integrated management, based mainly on the interface among the various systems involved. The arrangement suggested by the author is presented as a possibility for water systems in urban areas, due to an efficient and integrated management, to act in a preventive way in urban development, contributing to the reduction of costs to solve problems related to urban water planning and management. In addition, the articulation of relevant legislation, planning and management systems of cities should be considered, as consecrated by Peixoto *et al.* (2016). Thus, the results obtained by the research, so far, suggest measures for cities to become sensitive to their waters, shaped in an ecologically oriented urbanism to the approximation of the city to nature. These measures aimed at mitigating floods, increasing biodiversity, removing pollutants, increasing green areas, assisting in regulating the water cycle and boosting the increase of fauna, always in the perspective of the well-being of the population.

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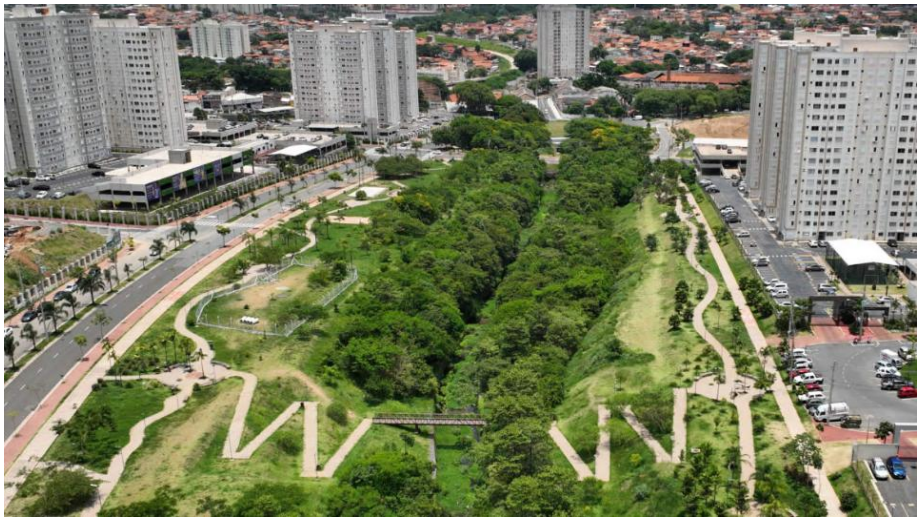
In this context, we can highlight, as a relevant practice, the linear park of Ribeirão das Pedras, in Campinas-SP (Figure 3). This case can be cited as an example of a mitigating measure – which makes use of a network of open spaces and vegetated areas with green and flooded corridors, parks and forests preserved or planted and counting on the microscale with infiltration gardens, with native species, bioswale and other rainwater infiltration measures – aiming at low impact urban interventions and incorporating sustainable water management practices.

The project, executed in 1998, awarded as the best practice in Urban Environmental Management by the Secretariat of Water Resources and Urban Environment of the Department of Revitalization of Basins of the Ministry of Environment, Segundo Costa (2011, p. 65), it began its recovery from the initiative of two community residents associations, in 1993, who asked the city to urbanization the square of the Alto Taquaral neighborhood, where the source of Ribeirão das Pedras was located. The environmental recovery project of an intensely urbanized area, carried out in a public-private partnership, resulted in the recovery of much of the riparian forest and the creation of an ecological corridor that extends through 23 neighborhoods of the municipality of Campinas. This showed that, with political will and articulation among social stakeholders involved, it is possible to align territorial planning and environmental urban management, with urban waters as the motto.

Figure 3 – View of Ribeirão das Pedras Linear Park, in Campinas-SP



Source: RMC Urgente (2024).

In the wake of its actions, the construction of a Sewage Treatment Plant (ETE) improved water quality, and the creation of detention and retention basins contributed to solving flooding problems in several stretches along the river. These basins were also well used by the native fauna. There was also an improvement in the ecosystem of the region, because the planting of more than 50,000 seedlings of native trees for recovery of the riparian forest allowed shelter and food for wild fauna. With this, the implementation of this system of linear parks was capable of involving the remaining green spots in these neighborhoods, also equipped with cycle paths along the way from the river source.

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Another example to be highlighted, the result of the investigative process, reveals mitigating actions observed in the Iguaçú Project, located in the Baixada Fluminense Region, in the State of Rio de Janeiro. It is a river revitalization project that includes the improvement of water quality (with measures related to the treatment of river water), the geomorphological recovery (with the removal of singularities, recovery of riverine vegetation and implementation of river park), the reduction of risk of flooding (with measures to improve the management of rainwater, the creation of urban park and the control of human occupation) and the improvement of river ecosystems (with the implementation of the river park and the creation of areas that project the existing natural habitats).

The project is quite extensive, and covers the municipalities of Duque de Caxias, São João de Meriti, Belford Roxo, Nilópolis, Mesquita, Nova Iguaçu and part of the West Zone of Rio de Janeiro (Figure 4), and invests in improvements for the macro and mesodrainage of the basins of the Iguaçú, Botas and Sarapuí rivers. Its focus is on the recovery of marginal areas and the installation of parks along the waterfront, planting of riparian vegetation along the river, reforestation of spring areas, preservation of flood damping spaces, renaturalization of watercourses, among others. In addition, the project includes relocation of housing and measures related to garbage collection and other educational measures.

Figure 4 – Extension of the Iguaçú project

Source: Studio Filmes (2011).

The project was divided into phases. Phase 1, already implemented, carried out the execution of macrodrainage works (recovery of floodgates system, plumbing, protection of river banks, among others), the desilting of 40km of main rivers of the basin, construction of 3,000 houses for resettlement of families removed from the marginal areas of the rivers, implementation of leisure areas, cycle paths, urbanization and landscaping, recovery of degraded margins and reforestation of 800 hectares of areas of the basin's spring.

We found that much progress has been made, at the international and national level, when we associate urban waters with the plans and practices in progress, whether improving knowledge about the water cycle, or providing opportunities for debate and reflections on case studies, such as those described above or, still, revealing, in the experiments investigated, definitions that have been incorporated by planners – such as blue-green infrastructure, low

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impact development, sponge cities, biophilic cities, water sensitive cities, nature-based solutions, water-sensitive cities, and natural-based solutions. among others. It is a real paradigm shift (*urban water transitions framework*), not counting on the mapping of flooded, fragile and potential areas. However, all this effort highlights the fundamental role played by urban waters and the transformations through which they passed and continue passing along the cities. Natural solutions begin to reverberate according to the vision of a water-sensitive city. Seeing water as part of the green infrastructure is important to think about the benefits that this can lead to more resilient and sustainable cities. The environmental and climate crisis has been crucial to accelerating action. Extreme events are pushing cities to review water management, focusing on the entire watershed in light of multifunctionality. With an integrated and integral look, the formulation of public policies should be adapted to the spatiality of the watershed. Basin plans should, according to the most recent literature, offer a menu of options to municipal planning, treating legal instruments such as those that can enable ecosystem solutions. But, not in isolation, such instruments should reinforce that cities need an urban design that allows the inhabitants to develop activities and maintain their lifestyle as close to nature, a true learning. The management of urban waters, as stated by Tucci (2007), allows to regenerate the ecosystem functions of the territory and is shown as an important attribute for territorial planning to deal with extreme events and avoid, or even prepare, for socio-environmental disasters, in which nature presents itself as a solution. A true repertoire of lessons learned, practices and experiments can be very useful to learn how to manage risks, to provide investments and practices of coexistence of the water wealth that surrounds our cities.

5 CONCLUSION

Given the challenges posed by extreme events, the aim was to articulate a strategy that included urban waters as risks and resulting socio-environmental problems. Thus, it is conformed the referral of this article to a strategy that includes the alignment of territorial planning to urban management, in a format capable of, with a certain degree of creative and consistent autonomy, to value the intertwining of knowledge about social and nature aspects with the urgency of the risks posed by socio-environmental disasters.

The interaction among human beings, nature and landscape is intrinsically complex and constantly evolving. Historically, humans have transformed the natural environment to meet their needs and desires. At first, these transformations were limited to specific areas, but as technology advanced, human impact became more comprehensive and meaningful. Rapid urbanization, the growth of agriculture and industry, the rampant exploitation of resources and pollution are examples of how human activities have reshaped ecosystems, resulting in loss of biodiversity, soil and water degradation, as well as causing climate change. This dynamic radically transforms the landscape, creating new environmental, climate, aesthetic and social conditions.

Faced with global environmental challenges, such as climate change, biodiversity reduction and resource scarcity, it is crucial to adopt a landscape management approach that prioritizes sustainability. This involves seeking a balance between human needs and the protection of ecosystems, through the implementation of land use practices and environmental policies that preserve and restore natural resources while respecting cultural diversity and the

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rights of local communities. Recognizing this interconnection and promoting integrated management of natural and cultural resources is essential to ensuring both human well-being and the planet's health.

When considering the issue of urban waters as fundamental in the harmonization between the different normative instruments produced, either for the legal city, so that they can adapt to the new realities of cities that undergo constant transformations, or for the real city, it is expected to delegate to the municipalities more autonomy to be able to operate the waters within their territory. It is with this purpose that this article sought to present detailed debate on the aspect of socio-environmental disasters based on theoretical-practical investigations. What was presented here does not intend to exhaust the issue, but rather to situate it as relevant before the reality of the problems that surround the cities, especially the Brazilian cities, in contemporary times. And, as proclaimed by Tucci (2007), we emphasize that much still needs to be done in the confrontation of the issue by the cities. Challenges are shown to be urgent, how to effectively integrate the goals of Water Resources Management to Environmental Sanitation and articulate the river basin plans and the framework of rivers to the actions of cities in relation to the control of urban effluents, with clear and desirable goals. From the reading, although the issue of water presents itself as fascinating, it is evident the need to reinvent management, restoring the health of the river basins and considering the systemic relationships that involve issues such as urban growth, legislation, water management and densification. By prospecting possible paths, faced with the challenges posed, about extreme events, articulating a strategy that includes urban waters, as associated socio-environmental risks and problems, involves the deepening of practical and feasible solutions, which still deserves and can be further discussed in future investigations.

6 REFERENCES

ACOSTA, A. **O bem viver**: uma oportunidade para imaginar outros mundos. Tradução de Tadeu Breda. São Paulo: Editora Elefante, 2016.

ALVES, J. A vida na Terra tem duas ameaças vitais: mudanças climáticas e ecocídio. **Ecodebate**, [*S. l.*], 2019. Disponível em: https://www.ecodebate.com.br/2019/06/19/a-vida-na-terra-tem-duas-ameacas-vitais-mudancas-climaticas-e-ecocidio-artigo-de-jose-eustaquio-diniz-alves/. Acesso em: 25 abr. 2024.

BROWDER, G. Time to adapt to changing climate: what does it mean for water? worldbank.org **World Bank Blogs**, 7 dez. 2018. Disponível em: https://blogs.worldbank.org/en/water/time-adapt-changing-climate-what-does-it-mean-water?CID=WAT_TT_Water_EN_EXT. Acesso em: 27 ago. 2024.

COSTA, R. C. **Parques fluviais na revitalização de rios e córregos urbanos**. 2011. Dissertação (Mestrado em Geografia) –Instituto de Ciências Humanas e da Informação, Programa de Pós-Graduação em Geografia, Universidade Federal do Rio Grande, Rio Grande do Sul, 2011.

DIAS, G. F. **Antropoceno** – Iniciação à temática ambiental. São Paulo: Editora Gaia, 2016.

GARCIA, J. A tragédia petropolitana e a ignorância como estratégia do discurso capitalista. **Stylus – Revista de Psicanálise**, São Paulo, n. 45, p. 59-69, dez. 2022.

GILDING, P. **A grande ruptura** – Como a crise climática vai acabar com o consumo e criar um novo mundo? Tradução de Renato Aguiar. 1ª. ed. Rio de Janeiro: Apicuri, 2014.

ISSN 2318-8472, v. 13, n. 88, 2025

GORSKI, M. C. B. **Rios e cidades**: ruptura e conciliação. São Paulo: Editora Senac, 2010.

IDIS. O que são ODS e o que eles têm a ver com impacto social. São Paulo, 2023. Disponível em: https://www.idis.org.br/o-que-sao-ods-e-o-que-eles-tem-a-ver-com-impacto-social/?gad_source=1&gclid=EAIaIQobChMI_8Ohxs3ugwMV0mFIAB2a-QMgEAAYASAAEgK4nPD_BwE. Acesso em: 27 mar. 2023.

KRENAK, A. **Futuro ancestral**. 1ª. ed. São Paulo: Companhia das Letras, 2022.

LEVIN, K.; BOEHM, S.; CARTER, R. Impacto das mudanças climáticas: 6 descobertas do relatório do IPCC de 2022 sobre adaptação. **WRI Brasil**, São Paulo, 3 mar. 2022. Disponível em: https://www.wribrasil.org.br/noticias/impacto-das-mudancas-climaticas-6-descobertas-do-relatorio-do-ipcc-de-2022-sobre-adaptacao. Acesso em: 4 nov. 2021.

OLIVEIRA, L. de. **Percepção do meio ambiente e geografia**: estudos humanistas do espaço, da paisagem e do lugar. [*S. l.*]: Cultura Acadêmica, 2017

PEIXOTO, Filipe da Silva; STUDART, Ticiana Marinho de Carvalho; CAMPOS, José Nilson Be-zerra. **Gestão das águas urbanas: questões e integração entre legislações pertinentes**. REGA, Porto Alegre - RS, v. 13, n. 2, p. 160-174, jul./dez. 2016

PETRÓPOLIS. Plano municipal de redução de risco. Petrópolis, 2017.

PETRÓPOLIS: imagens da tragédia. **G1**, [*S. l.*], 20 fev. 2022. Disponível em: https://g1.globo.com/rj/regiao-serrana/noticia/2022/02/20/petropolis-imagens-da-tragedia.ghtml. Acesso em: 20 mai. 2024.

PORTO-GONÇALVES, C. W. **A globalização da natureza e a natureza da globalização**. Rio de Janeiro: Civilização Brasileira, 2006.

RMC Urgente : Campinas avança com o programa de implantação de parques lineares. 07/10/2024. Disponível em : https://portal-api.campinas.sp.gov.br/node/109538. Acesso em: 20 mai. 2024

RILEY, A. L. **Restoring streams in cities, a guide for planners, policymakers, and citizens.** Washington, D.C.: Island Press, 1998.

STEFFEN, W. *et al*. Planetary boundaries: guiding human development on a changing planet. **Science**, Washington, D.C., v. 347, n. 6223, 2015. Disponível em: https://science.sciencemag.org/content/347/6223/1259855. Acesso em: 10 maio 2024.

TUAN, Y.-F. **Topofilia**: um estudo da percepção, atitudes e valores do meio ambiente. Tradução de Lívia de Oliveira. Londrina: Eduel, 2012.

TUCCI, C. Diretrizes estratégicas para ciência e tecnologia em recursos hídricos no Brasil. **Rega**, Porto Alegre, v. 1, n. 1, p. 21-35, 2004.

TUCCI, C. **Inundações urbanas**. Porto Alegre: ABRH; Rhama, 2007. v. 11.

UFSC. **Atlas brasileiro de desastres naturais**. Florianópolis: Ceped UFSC, 2011. p. 1-63.

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STATEMENTS

CONTRIBUTION OF EACH AUTHOR

The conception and Design of the study **as well as** the curatorship of data **was the result of the joint work of the three authors who sign this** article. In this sense, the formal data analysis was the result of the collaboration among the authors

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DECLARATION OF CONFLICTS OF INTEREST

We, Jaime Massaguer Hidalgo Junior, Gabriella Rodrigues Bertero Soto e Eloisa de Araujo Carvalho, hereby state that the manuscript *entitled "* Socio-environmental disasters in Brazilian soil – is it possible to avoid when the issue is associated with urban waters?" has **no Financial Bonds** that can influence the results or the work interpretation. Either with no institution or funding entity.

We further state that in the scope of **Professional Relationships** we do not have professional relationships that may impact the analysis, interpretation or presentation of the results**.** As for **Personal Conflicts,** we do not have conflicts of personal interest related to the content of the manuscript that could influence the objectivity of the study.