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The municipality role in Brazilian wetlands conservation: the establishment of connections among the Master Plan, the National Hydric Resources Policy and two international strategic plans

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ABSTRACT

Wetlands are among the most threatened ecosystems nowadays, however, in Brazil this situation is exacerbated by the absence of a robust ecological approach dealing with wetlands in the Native Vegetation Protection Law (Federal Law 12,651/12). Agribusiness and urbanization process is the main degradation factors of wetlands ecosystems, given the Brazilian scenario. The Master Plan is an instrument that can promote the environmental planning and development process without wetlands commitment. Considering the environmental status of Brazilian wetlands, this work aimed to verify existent relations among the Master Plan, the National Hydric Resources Policy, the Strategic Plan for Biodiversity 2011 - 2020 and the Ramsar Strategic Plan 2016 - 2024. We found that Master Plan is a tool that can contribute to wetlands protection, among the contributing mechanisms for this goal, stands out preemption right, consortia urban operations, zonings, and special areas creation.

Key-words: Aquatic ecosystems; Public Policies; Local Development; Planning.

O papel do município na conservação de áreas úmidas: estabelecimento de conexões entre o Plano Diretor, a Política Nacional de Recursos Hídricos e dois planos estratégicos internacionais

RESUMO

As áreas úmidas situam-se entre os ecossistemas mais ameaçados na atualidade, entretanto, no Brasil essa situação é exacerbada pela ausência de uma abordagem ecológica robusta lidar com as áreas úmidas na Lei de Proteção da Vegetação Nativa (Lei Federal 12.651/12). O agronegócio e o processo de urbanização são os principais fatores de degradação dos ecossistemas de áreas úmidas no cenário brasileiro. O Plano Diretor é um instrumento que pode promover o planejamento ambiental e o processo de desenvolvimento sem o compromisso das áreas úmidas. Considerando o *status* ambiental das áreas úmidas brasileiras, este trabalho buscou verificar as relações existentes entre o Plano Diretor com a Política Nacional de Recursos Hídricos, o Plano Estratégico para a Biodiversidade 2011 - 2020 e o Plano Estratégico Ramsar 2016 - 2024. Constatamos que o Plano Diretor é uma ferramenta que pode contribuir para a proteção das áreas úmidas, dentre os mecanismos que contribuem para esse objetivo, destacam-se os direitos de preempção, consórcios de operações urbanas, zoneamento e criação de áreas especiais.

Keywords: Ecossistemas Aquáticos; Políticas Públicas; Desenvolvimento Local; Planejamento.

Introduction

The wetlands are among the most productive natural ecosystems worldwide, however, market mechanisms resulted in the adoption of management and development practices that contributed to these ecosystems conversion and degradation (Zhang et al., 2017). Looking for actions to deal with this situation, The Wetlands Convention (Ramsar) was created in 1971 to promote the conservation and wise use of

all wetlands, contributing in that way to the sustainable development (Ramsar Convention Secretariat, 2016). Aiming to protect the biodiversity and the associated natural ecosystems, the Convention on Biological Diversity (CBD) was created in the '80s to formulate strategies to safeguard the biodiversity and its natural habitats, including wetlands (CBD, 2010).

Considering the practice, there are still deficiencies caused by economic exploitation, a

situation that does not allow the achievement of expected sustainability results, as advocated by formulated policies and management measures (Chiaravalloti et al., 2017).

At the global level, the Ramsar Commission and CBD have established management and policy guidelines to ensure the wetlands protection; although the local governance failures have not been fully addressed, necessitating the development of environmental management tools and local-level strategies adoption (Hittiarachchi et al., 2015) to deal with the protection issues of these systems.

In Brazil, the National Hydric Resources Policy (NHRP) was approved to promote the rational water use, the systematic management of hydric resources and its integration to the planning sphere, what includes the landscape cover ordination and the land use adequation front the environmental characteristics of each region in the country (i.e. ecoregions) (Brasil, 1997).

However, the Native Vegetation Protection Law – NVPL (Federal Law 12,651/2012), a normative dispositive that deals with terrestrial ecosystems and their interfaces with aquatic environments (Brasil, 2012), configures environmental risks to the wetland ecosystems protection at the national level, resulting in the no full compliance of the NHRP. Worth to be mentioned that the NVPL has its content influenced by the agribusiness sector perspective, resulting in risks to wetland management and establishes marginal vegetation bands that are not very effective to ensure the water bodies maintenance, as well as threatening the environmental services maintenance (Brancalion et al., 2016; Grasel et al., 2019).

Basically, the threat associated with the environmental services proved for the wetlands occurs in the function of ecosystem metabolism and ecological functioning alteration caused by human activities development and the landscape conversion in other anthropic land uses.

Grasel et al. (2018) stand out the alarming rates of degradation and loss of wetlands in Brazil, the authors emphasize that the vulnerability associated with the NVPL and the possible collapse of these systems, situation that demands actions to deal with the existing threatens.

Among the main degradation drivers of the Brazilian wetlands stands out the urban-industrial process and the agribusiness, given the input of pollutants/contaminants in these ecosystems, as well as the conversion of natural areas to other landscape use (e.g. crop fields, pastures, industrial parks) and (Bassi et al., 2014) the allotments housing speculation in the urban centers. The

interactions between these conversion drivers, their respective scales and complexity have become a challenge for planners, decision-makers, researchers and society (Verweij et al., 2016), compromising the sustainable development promotion during the planning process. Furlong et al. (2016) believe that most common lacks in planning structures related to water resources are associated with the existence of weak connections between the knowledge fields of water resources management, urban planning, and public policies.

Front the different administrative levels (i.e. National, State and Municipality), decision-makers should seek ways to facilitate the implementation of measures characterized by their mitigating or adaptative nature and, also is important to regard a long-term horizon and obtain the support from the interested public (Verweij et al., 2016) and/or directly affected. Taking as base the degradation scenario of aquatic systems, water bodies quality loss and the increasing demand for water, improvements in the systems of water resources management are necessary to ensure the ecosystems maintenance and ensure the societies survival, given the disorderly growth in the municipalities and the need for a local planning (Harrison et al., 2016, Serafim e Ricci, 2017). Smith et al. (2018) in their approach showed that the municipality can play an important role in environmental protection, especially with the implementation of environmental management actions.

In this context, the Master Plan (MP) emerges as a strategic mechanism capable of assist in the planning and measures implementation at the local level. The MP is an instrument that establishes norms that regulate the existing interests in the community, what includes the aspects related to the property, reflecting such aspects in the planning of all the municipality territory and creating a future reference that meets all the needs, with a view to prevent a predatory occupation of the landscape and avoid future problems (Barossa et al., 2010; Mesquita e Ferreira, 2016).

Given the view of the above, the present work aimed to verify the possible connections that can be established among the MP, the NHRP, the Strategic Plan for Biodiversity 2011 - 2020 and the Ramsar Strategic Plan 2016 - 2024, seeking to assist the policies content incorporation and wetlands conservation through the MP.

Theoretical reference

Front of the wetland degradation scenario, the Ramsar Convention was adopted in 1971 by many countries during a meeting in Ramsar, Iran.

This convention was an intergovernmental agreement and came into force in 1975, having as goal provide a framework for national and international actions development to promote the conservation and wise use of wetlands, including associated resources and protection of the aquatic bird habitats (Ramsar, 2019).

Brazil only became one of the parties and adopted measures related to the Ramsar Convention in the 1990s. The text of the Convention only was adopted in 1992 (Legislative Decree n° 33 from 1992), its promulgation occurred in 1996 through the Decree n° 1,905, from May 16, 1996 (Brasil, 1992; 1996). Worth to be mentioned that, when ratifying the Convention, Brazil has undertaken to comply and implement all the agreement content, as well as to: (i) promote the conservation of wetlands and waterfowl by establishing natural reserves in wetlands, providing appropriate protection; (ii) in cases of restriction or cancellation of the wetland boundaries included in the list, as far as possible, shall compensate for any loss by creating reserves for waterfowl in the same region or in another, in proportion to the previous habitat; (iii) encourage research and the exchange of data and publications related to wetlands and their biota; (iv) undertake efforts to manage wetlands and increase waterfowl populations in the appropriate regions, and (v) promote competent people training for studies, management and protection of wetlands.

For its turn, the CBD has a similar history. During 1988, the United Nations Environment Programme promoted an Ad Hoc Working Group with biodiversity experts to verify the need of an international convention about the topic, the result was the Nairobi (Kenya) Conference in 1992 and the adoption of the agreed content of the CBD (Convention on Biological Diversity, 2010). Basically, the document brings a brief preamble and essential content related with terms employment (e.g. protected area, ex-situ conservation, habitat); principles; jurisdictional scope; cooperation; general measures for conservation and sustainable use; identification and monitoring; in situ conservation; ex situ conservation; sustainable biological diversity use components; incentives; research and training; education and public awareness; impact assessment and minimization of negative impacts; access to genetic resources; access to technology and technology transfer; technical and scientific cooperation; biotechnology management and distribution of its benefits; financial resources; financial mechanisms; relation to other international conventions; conference of the parties; secretariat; the subsidiary body on

scientific, technical and technological advice; reports; disputes settlement; protocols adoption; amendments to the convention or protocols; annexes adoption and amendments to annexes; right to vote; relations between this convention and its protocols; signature; ratification, acceptance or approval; accession; implementation; reservations denunciations; provisions; transitional arrangements for the secretariat; depositary and authentic texts.

Brazil, through the Legislative Decree n° 2 from 1994, approved the content from the CBD agreement, that was signed during the Rio 92 after the convention be opened for signature (Ministério do Meio Ambiente, 2019). Some years later, the Legislative Decree n° 2,519 from 1998 promulgated the CBD in its totality (Brasil, 1998), what implies in the main goal achievement, the need of biological diversity conservation, the sustainable use of its components and the fair/equitable benefits derived from genetic resources sharing.

In relation to the hydric resources, the first important document in Brazil legislation was the Water Code (Decree n° 24,643/1934), a normative instrument that introduces general rules on water ownership, navigation, responsibilities, administrative measures, and other factors. Inspired by the State Hydric Resources Policy of São Paulo State (Law n° 7,663/1991), the NHRP was created, what provide a robust approach, introducing a new mechanism to the water management and providing the regulation of the need of a national system of hydric resources management imposed by the 21st article (incise XIX), from the Brazilian Federal Constitution.

The Federal Constitution also addressed topics about the urban question in some of its articles (Chapter II - Urban Policy, articles 182 and 183). It was outspread of the movement coming from the urban reform that was observed during the '50s and '80s, a process that aimed to guide the planning and cities management and culminate in the City Statute Law - 10,257/2001 (Boeira, 2003; Avritzer, 2010). This normative disposal establishes general measures to the urban policy, as well brings guidelines (e.g. sustainable cities, democratic management, government cooperation), urban policy instruments (e.g. multiannual plans, tributes, environmental zoning), and general provisions. Basically, the City Statute (CS) disciplines the local development through the establishment of the Master Plan (MP), that plays a regulatory role in the landscape conversion.

Methodological procedures

The development of the research began with verification of the NPHR and the strategic plans, all available in an electronic form (i.e. web pages). An analysis of the content of the NPHR, the Strategic Plan for Biodiversity 2011 - 2020 (SPB) and the Ramsar Strategic Plan 2016 - 2024 (RSP) was carried carefully. The focus consisted in identify aspects related to the wetlands ecosystems that could have application in a local context (i.e. municipality). Subsequently, after the analysis and identification of elements related to the scope, relevant topics that encompassed wetlands ecosystems and could be integrated during the construction of the MP were listed for discussion. Afterward, was verified the CS content about the MP and its instruments description, situation that allowed verify alternatives to promote the NHRP and strategic plans incorporation into MP.

Results and Discussion

The NHRP was established through Federal Law n° 9,433/1997, with the premise of regulating the item XIX of article 21, from the Federal Constitution (Brasil, 1988).

It is verified that the NHRP has elements that reinforce the water importance as a natural resource, as well as its economic importance. The NHPP also brings the need to promote multiple water use through decentralized and participatory management (involving users, communities and public authorities), which is integrated into environmental management and not dissociated from qualitative and quantitative aspects.

One factor that deserves to be highlighted is the fact that the NHRP articulates water resources management with landscape cover, taking as base the fact that the public police implementation must take place by means of MP and Water Resources Plans. The Resolution n° 187/2016 from the National Council of Hydric Resources gave approval for an important instrument of the NHRP, the Hydric Resources National Plan. This plan has as target the fallowing elements: (i) develop a long-term planning to deal with the conservation and wise use of waters, considering the climate changes; (ii) promote the water availability improvement in quantity and quality, aiming the conservation and suitability for many uses; (iii) expand the knowledge about water uses, current and future demands, as well as the possible impacts on their availability, quantity and quality; (iv) integrate water policy with environmental policy and other sectorial policies; (v) support institutional development and the social

technologies diffusion to improve water management and develop educational actions for society; (vi) establish criteria for authorization of the water use and inspection of the users, considering the watersheds particularities; (vii) identify, evaluate and propose actions for areas that are under risk of flood, droughts, among others extreme events related to water, that generate adverse situations to the population; (viii) expand and strengthen participation of the society in the water management; (ix) share information in clear language and accessible, regarding the water quality/quantity situation and its management and (x) expand the knowledge about the rainfall occurrence and the quantity/quality of the water.

The SPB was the fruit of a conference held in Nagoya (Japan) in 2010, where the CBD countries established the Aichi Goals, which are the 20 components of five strategic objectives for the conservation of biodiversity (Convention on Biological Diversity, 2010). Between all the components present in the PEB, twelve (2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 18, 19) somehow address elements associated with wetlands (Table 1).

Similar to SPB, the RSP was agreed during a conference of the parties in June 2015. The formulated plan includes four general objectives, which in turn have their content distributed into 19 targets (Table 2) (Ramsar Convention Secretariat, 2016). Succinctly, the RSP aims at the use of management practices that contribute to reducing the threat associated with the wetlands, promoting the ecosystem restoration, focusing on the increase of the areas that belong to the Ramsar network, what should be scientifically supported and have the countries involvement.

Table 1. Aichi Biodiversity Targets (CBD, 2010)

Strategic Goal A - Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society
1. By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
2. By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
3. By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.
4. By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of the use of natural resources well within safe ecological limits.
Strategic Goal B - Reduce the direct pressures on biodiversity and promote sustainable use
5. By 2020, the rate of loss of all-natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation are significantly reduced.
6. By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
7. By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring the conservation of biodiversity.
8. By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
9. By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
10. By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.
Strategic Goal C - Improve the status of biodiversity by safeguarding ecosystems, species, and genetic diversity
11. By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures and integrated into the wider landscape and seascapes.
12. By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
13. By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
Strategic Goal D - Enhance the benefits to all from biodiversity and ecosystem services.
14. By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and wellbeing, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.
15. By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 percent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.
16. By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force
Strategic Goal E - Enhance implementation through participatory planning, knowledge management and capacity building
17. By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.
18. By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.
19. By 2020, knowledge, the science base and technologies relating to biodiversity, its values functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
20. By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan 2011-2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.

Table 2. RSP Targets (Ramsar Convention Secretariat, 2016)

Strategic Goal 1: Addressing the Drivers of Wetland Loss and Degradation	
1. Wetland benefits are featured in national/local policy strategies and plans relating to key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture, fisheries at the national and local level.	
2. Water use respects wetland ecosystem needs for them to fulfill their functions and provide services at the appropriate scale inter alia at the basin level or along a coastal zone.	
3. The public and private sectors have increased their efforts to apply guidelines and good practices for the wise use of water and wetlands.	
4. Invasive alien species and pathways of introduction and expansion are identified and prioritized, priority invasive alien species are controlled or eradicated, and management responses are prepared and implemented to prevent their introduction and establishment.	
Strategic Goal 2: Effectively Conserving and Managing the Ramsar Site Network	
5. The ecological character of Ramsar sites is maintained or restored, through effective planning and integrated management.	
6. There is a significant increase in area, numbers and ecological connectivity in the Ramsar Site network, in particular, underrepresented types of wetlands including in under-represented ecoregions and Transboundary Sites.	
7. Sites that are at risk of change of ecological character have threats addressed.	
Strategic Goal 3: Wisely Using All Wetlands	
8. National wetland inventories have been initiated, completed or updated and disseminated and used for promoting the conservation and effective management of all wetlands	
9. The wise use of wetlands is strengthened through integrated resource management at the appropriate scale, inter alia, within a river basin or along a coastal zone.	
10. The traditional knowledge, innovations, and practices of indigenous peoples and local communities relevant to the wise use of wetlands and their customary use of wetland resources are documented, respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention, with the full and effective participation of indigenous peoples and local communities at all relevant levels.	
11. Wetland functions, services, and benefits are widely demonstrated, documented and disseminated.	
12. Restoration is in progress in degraded wetlands, with priority to wetlands that are relevant for biodiversity conservation, disaster risk reduction, livelihoods and/or climate change mitigation and adaptation.	
13. Enhanced sustainability of key sectors such as water, energy, mining, agriculture, tourism, urban development, infrastructure, industry, forestry, aquaculture, and fisheries, when they affect wetlands, contributing to biodiversity conservation and human livelihoods.	
Operational Goal 4: Enhancing Implementation	
14. Scientific guidance and technical methodologies at global and regional levels are developed on relevant topics and are available to policymakers and practitioners in an appropriate format and language.	
15. Ramsar Regional Initiatives with the active involvement and support of the Parties in each region are reinforced and developed into effective tools to assist in the full implementation of the Convention.	
16. Wetlands conservation and wise use are mainstreamed through communication, capacity development, education, participation, and awareness.	
17. Financial and other resources for effectively implementing the fourth Ramsar Strategic Plan 2016 – 2024 from all sources are made available.	
18. International cooperation is strengthened at all levels.	
19. Capacity building for implementation of the Convention and the fourth Ramsar Strategic Plan 2016 – 2024 is enhanced.	

Relationships among the MP, NHYP, SBP, and RSP

Looking to the NHRP, the MP can contribute to the promotion of multiple water use through the instrument called zoning, providing in this way alternatives that favor and ensure water with quality standards suited to the various uses. The application of such instrument contributes to avoiding the inappropriate natural resources use and the occurrence of extreme hydrological events, considering the entire local context (i.e. biotic, demographic, socioeconomic and cultural factors) and other influences that can exercise some influence. For example, the special zones created in Sorocaba (SP) contribute to safeguard the remain wetlands in the municipality and avoid the human pressure on aquatic systems (Silva, 2018).

The NHRP also advocates the articulation of the water resources management with the landscape cover, a situation that can be assured by the MP. The implementation of this action is feasible through the territory compartmentalization and zones definition for the land use planning in the municipality integrating hydrographic basins and coastal environments, as established by the NHRP.

Elements present in the Hydrographic Basin Plans can be favored in a synergistic way by the MP. Through previous diagnoses on water resources, goals formulated for the water quality maintenance or even for the quality improvement, are likely to be present in the MP formulation and the final writing. This action brings the means for the implementation of the goals to occur in fact, either through conditioning or mechanisms of another nature. Another important point that should be emphasized is that the water resources protection required by the Hydrographic Basin

Plan can be materialized through the creation of restrictive areas (e.g. specially protected areas in the municipality, restrictive areas for urbanization or other landscape uses). These actions, in the end, can contribute to the cost reduction related to the water bodies pollution because it has a preventive character.

Considering this context, the HRPN can be favored through the element attendance from the NPHR, although some specific topics should be considered (e.g. principal water uses, water quality, direct degradation drivers, environmental education needs) in the MP. The ecosystems complexity and the uncertainties related with the climate change demands actions with an intersectoral perspective, which enables joint measures elaboration and greater success in their application, given the context of an integral vision perspective and specific particularities consideration.

SBP

In the local development strategies, the MP can explicitly incorporate biodiversity values and their connection to poverty reduction and actions related to social inequality reduction. In this case, wetland ecosystems can be listed as essential areas that can be considered during the planning process, given their importance in the resources provided for society (e.g. agriculture provision, biomass, tourism) and maintenance of the biological diversity (Ramsar Convention Secretariat, 2015).

Aiming at a sustainable production and the reduction of the adverse impacts on natural resources (Goal 02), municipal territory can be compartmentalized, what can favor the wise landscape cover and also protected the wetlands, implying in the fact that adjacent areas exploration does not cause changes in the ecological limits considered as safe, such as guidelines or reference values, obtained from wetlands located in natural areas without anthropic interference.

The rate of loss and degradation of wetland ecosystems should be reduced, according to Goal 05. In order to meet this objective, the MP has the possibility and is able to insert these areas in a special area category (i.e. spaces where there are conditions for the use), creating areas of special environmental interest or protection areas, what has as a goal the promotion of the environmental protection and preservation.

Wetlands are essential spaces for the development of a large variety of commercial fish species (Claro-Jr et al., 2004; Luz et al., 2012). Thus, through zoning instrument, MP makes it possible to restrict the adverse activities

development in the vicinity of the water bodies that have an important role for these species reproduction and life cycle. In this way, is possible to create conditions for the human activities establishment that can auxiliary in the maintenance of the ecological integrity and avoid adverse environmental impacts on the aquatic biota.

Regarding the activities development related to agribusiness (e.g. agriculture, cattle raising, and aquaculture), the MP, when defining the municipality multifunctional zone, can establish as a premise that the activities development are allowed as long as take the biodiversity conservation as priority, adopting environmentally sustainable practices in the agroforestry systems, as well as encouraging the marginal vegetation maintenance around the hydric bodies.

The target 08 addresses mainly to nutrient-related pollution. For its turn, the MP can bring as one of its main goals the human pollution control of the wetlands and the recovery of the already degraded ecosystems. When environmentally based, this urban policy instrument has the possibility of creating a specific mechanism to the diffuse pollution control. As an example, the Territorial Physical Development Master Plan (PDDFT) of Sorocaba municipality (Sorocaba, 2014) can be cited, given the existence of an environmental aspect that carries out this need and aims to deal with the pollution, including the diffuse one.

Combating exotic and invasive species is one of the main challenges to conserve biodiversity nowadays (Secretariat of the Conversion on Biological Diversity, 2014). However, is also necessary an element to protect the native species that play an important role and are of commercial interest, as well as their ecological importance for the ecosystem function. With regard to wetlands, the MP can establish as one of its guiding principles the efforts against non-native species, a factor that will serve as a premise for the maintenance of these ecosystems integrity and safeguard the fish communities and other species that play an important role for the local environment maintenance.

Looking at Goal 11, the MP to fill this need has to create specially protected and ecologically representative areas throughout the municipal landscape, both in coastal spaces and continental areas. This action contributes to the terrestrial portions protection with wetlands ecosystem that provides indispensable environmental services. The spaces should also ensure processes related to evolution and ensure the species genetic diversity (Nori et al., 2016).

Similar to Goal 09, Goal 12 has the possibility of being established as one of the principles or objectives of the MP, a factor that stimulates the measures formulation directed to this goal achievement in its environmental aspect or culminates in the generation of means that allow the species persistence at the local level. Measures that aim at the areas depollution, stressors withdrawal and the restriction of potentially affecting activities development in spaces that can cause some harm to the wetlands can be contemplated by the MP redaction.

The Goal 14, in the aspects that refers to the wetlands ecosystems, can be integrated into the MP by recognizing ecosystems that provide essential environmental services (e.g. water supply, flow control, water purification) and pointing out the need for the marginal vegetation areas recovery, and bring elements for the wetlands systems restoration. It is also possible to insert in the context of vulnerable communities and promote the community participation that is living around these ecosystems.

Regarding the aspects related to wetlands and the Targets 18 and 19, is possible to note that the MP can integrate them partially and not in their total context. Front of the need to the incorporation of the biodiversity value along with the content of the plan is necessary scientific background to provide the basis for the formulation of the guidelines and allow the practices use that is originating from indigenous knowledge or from local communities, always looking for the sustainable biodiversity use in the wetlands. The recognition of traditional low impact practices favors a bond creation and increase the identity of the local population (Cestaro et al., 2012) with the wetlands ecosystems.

RSP

The first strategic objective aims to identify the mechanisms that can lead to wetlands degradation and loss. Foremost, one of the strategic objective premises is the wetlands benefits incorporation into the local strategies (e.g. projects, public policies), an element that allows the articulation with the MP, which is related with the municipal development in general.

Also, in order to contemplate this goal, the MP can establish that the water uses water should respect the wetlands ecosystems needs (i.e. functioning, metabolism, biodiversity maintenance). Here is possible to require the application of the guidelines to promote good practices (e.g. pollution reduction, wise water use, environmentally friendly technologies), regarding

these systems use, including elimination and combat of invasive species.

Following, the second strategic objective purpose to conserve and provide adequate management for the wetlands inserted in the Ramsar network. The municipalities that cover all these ecosystems that are a Ramsar network part, or even encompass these systems portions, in the MP they have the possibility of favoring the wetlands conservation and maintenance through an integrated territory planning. This situation favors these ecosystems connectivity and creates opportunities for the mechanisms emergence that avoid negative ecological implications (e.g. areas conversion, quality loss, pollution, contamination).

Concerning the third strategic objective in the MP, it is observed that the urban policy instruments allow the establishment of wetlands conservation and management as a principle so that integrated management at the local scale can occur at basin level too. Sustainable practices employed by traditional communities and indigenous peoples can be integrated into the plan to help in the goal achievement. Worth to be mentioned that the MP can emphasize and bring elements about the functions performed by the wetlands in the municipality in its content, demonstrating their benefits and from there, prioritize those systems restoration, element that can be relevant for the biota conservation, population subsistence, and regard climate change, given their role in the climate mitigation. Silva et al. (2019) showed a variety of ecosystems services that can be provided by the wetlands.

Another point is that the MP can establish as an obligation to the most important economic activities in the municipality, the need performs actions that effectively contributing to wetlands ecosystems conservation, should be encouraged measures that aim the environmental and economic sustainability. An element that should be considered is the involvement of the population in the process and works to promote environmental education (Smith et al., 2019).

For its turn, the fourth strategic objective has the PER implementation enhancement as a goal. In this way, the MP can incorporate in its content reliable scientific information and adequate technical methods that are truly relevant to the plan formulation, besides making feasible the application of financial and human resources for the strategic plan implementation at the local level.

Master Plan Tools for Wetlands Protection

In summary, the Statute of the City - Federal Law 10,257/2001 (Brasil, 2001) brings

some mechanisms that can contribute to the wetland ecosystems protection. The main mechanisms are (i) right to preemption, (ii) urban consortium operations, (iii) zoning and (iv) special areas creation.

The right to preemption confers to public authority the preference in the lands (i.e. properties) acquisition, factor totally possible to be applied to protect areas where has relevant environmental interest, a situation that might enhance the conservation and protection ends. Given the municipality role, the public management sector has the possibility to demarcating strategic areas for water resources protection, especially in areas that are subject to major real estate speculation or socio-ecological conflicts, preventing their degradation and conversion in other land covers as agricultural or urban areas.

In consortium operations, the greatest role for decision-makers is the reduction of the environmental impact, as well as the natural resources use (e.g. water, wood). Similar to the previous mechanism, during the MP formulation, the areas adjacent to the wetland systems that will be destined to the urban process development can be delimited to fulfill this purpose, contributing to reduce the environmental degradation, aquatic bodies pollution and the implementation of sustainable technologies.

Zoning and the creation of the special area are instruments that bring a major contribution to the wetlands protection because both have a complementary character. The urban Brazilian policy pointed out in some passages elements that contribute to wetlands maintenance because, these mechanisms create restrictions for the territory exploration in areas considered ecologically relevant (e.g. biodiversity refuges), as well as allowing the protection of environments that are important environmental services providers. Considering all these elements, the public administration can point solutions to municipal territory specificities, like social context and environmental characteristics, for example (Serafim e Ricci, 2017).

Finally, stand out that the MP can establish as objectives or principles the elements present in public policies to promote the wetlands ecosystems protection. The MP presented among its duties the need of assuring the properties social function, element established by the Federal Constitution (Brasil, 1988), each property must be in accordance with the MP provisions to respect that principle, which is a local ordinance established by law.

Conclusion

The MP has a series of interfaces with the NHRP, HRNP, SBP, and RSP. In relation to wetland ecosystems, this urban policy instrument enables the implementation of public policies evaluated at the local level, thus contributing to the conservation and proper the wetlands ecosystems management and the setback from NVPL. It should be emphasized that the policies discussed here are not effective at the local level without the other mechanisms aid. However, the MP allows its effectiveness at the local level, given its strength as law in the municipal territory. Among the mechanisms that contribute to this goal are the right to preemption, urban consortium operations, zoning, and special areas creation, besides the possibility of the plan establish as principles for local development the elements present in the policies scope. Should be noted that the policies content insertion indicated at the time of the executive plan's formulation is to be favored through the accomplishment of a Strategic Environmental Assessment, an environmental policy.

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