European Review of Latin American and Caribbean Studies
Revista Europea de Estudios Latinoamericanos y del Caribe

No. 99 (2015) October, pp. 113-125
www.erlacs.org

Explorations | Exploraciones

A Framework for Urban Environmental Planning in Brazil

Mônica Amaral Haddad
Iowa State University

Abstract

Brazil faces numerous environmental challenges despite having many laws and policies in place. The implementation process of such laws and policies does not exist a majority of the time, affecting the quality of environmental governance in the country. Within the urban planning context, the City Statute law enacted in 2001 included the environmental dimension of urbanization; however, the wording of this inclusion was vague and broad. For instance, two environmental assessment planning tools of the law are not mandatory at the federal level and are without a defined scope. In this *Exploration,* a new framework focusing on the environmental dimension of urbanization is proposed. These two planning tools can be developed using the framework, which is based on the concept of carrying capacity and geographical information systems; it includes a combination of participatory mapping (i.e., increasing knowledge) and tactical urbanism (i.e., increasing awareness) to enhance public participation, targeting low-income populations. This combination was chosen because by increasing the knowledge and awareness of the poor who will participate in environmental-related projects, it will empower and allow them to exert their influence as citizens more fully. *Keywords:* environment, urbanization, public participation, participatory mapping, tactical urbanism, City Statute.

Resumen: Un marco para la planificación ambiental urbana en Brasil

Resumen: Brasil afronta numerosos retos ambientales a pesar de contar con muchas leyes y políticas. El proceso de aplicación de dichas leyes y políticas no se lleva a cabo la mayoría de las veces, lo cual afecta a la calidad de la gobernanza ambiental en este país. Dentro del contexto de planificación urbana, la ley denominada Estatuto de la Ciudad y promulgada en 2001 incluyó la dimensión ambiental de la urbanización; sin embargo, la formulación de dicha inclusión era vaga y amplia. Por ejemplo, dos herramientas de la ley para la planificación ambiental no son obligatorias a nivel federal y no disponen de un campo de aplicación definido. En esta *Exploración,* se propone un nuevo marco que se enfoque en la dimensión ambiental de la urbanización. Esas dos herramientas de planificación se pueden desarrollar utilizando el marco que se basa en el concepto de la capacidad de carga y en los sistemas de información geográfica; lo anterior implica una combinación del mapeo participativo (aumentar los conocimientos) y del urbanismo táctico (aumentar la concienciación) para

http://doi.org/10.18352/erlacs.10106

ERLACS is published by CEDLA – Centre for Latin American Research and Documentation / Centro de Estudios y Documentación Latinoamericanos, Amsterdam; www.cedla.uva.nl; ISSN 0924-0608, eISSN 1879-4750.

reforzar la participación pública, dirigiéndose especialmente a la población con bajos ingresos. Esta combinación se eligió porque al aumentar los conocimientos y la concienciación de los pobres que participarán en los proyectos relacionados con el medio ambiente, les empoderará y les permitirá ejercer su influencia como ciudadanos con mayor plenitud. *Palabras clave:* medio ambiente, urbanización, participación pública, mapeo participativo, urbanismo táctico, Estatuto de la Ciudad.

Three mega-trends will persist in the next several years in the field of planning. First, technology innovations are evolving, and they will be recurrent around the globe. Second, with the advance of democratization processes in many countries, public participation is at the core of democracy to achieve social equity. Third, sustainability is a continually increasing part of planning agendas, and the environment will be central in political processes. Therefore, there is a need to better understand how these mega-trends are evolving in the Latin American context to assure that environmental governance will be implemented in an effective way in the region.

In this *Exploration,* the case of Brazil is used to examine the environmental dimension of urbanization. A new framework is proposed to assist public sector staff when working with environmental planning issues, and intends to affect both: implementation precesses and policy formation. The framework is based on the concept of carrying capacity and geographic information systems (GIS), a technology that allows users to analyze spatial data, produce scenarios for comparison, and support place-based and evidence-based policies. To enhance public participation, a combination of participatory mapping and tactical urbanism is also included in the framework. This combination has been chosen because by increasing the knowledge and awareness of the poor who should participate in environmental-related projects, they will be empowered and allowed to exert their influence as citizens more fully. This framework can be applied in issues related to the environmental governance on the urban, metropolitan and/or regional scales, and can be adapted to other countries in the region to target similar environmental challenges.

In Latin American urban areas, environmental conditions are closely related to social spatial inequality. With real estate speculation, for example, low-income populations are pressured to move to the more deprived and poorer outskirts of cities, known as the 'peripheries', giving rise to an unbalanced relationship between urban growth and the environment. Forests may be cleared out, or sewers may be directed to rivers without any treatment. Second, socio-economic infrastructure tends to be located in wealthy neighbourhoods, forcing the low-income population to adopt livelihood strategies that could affect natural resources (for example, favelas built in steeper areas could collapse with severe weather). Third, larger cities have an informal market for unskilled labour, attracting massive numbers of immigrants. This demographic pressure compromises the quality of life for all citizens, newcomers and locals (for example, by decreasing water supply). Moreover, in urban planning projects,

middle class and wealthy citizens are often the ones who actively participate (Baud, Scott, Pfeffer, Sydenstricker-Neto, & Denis, 2013; Caldeira & Holston, 2014). Enhancing public participation should indeed be emphasized in the new framework, as proposed in this *Exploration*, so that the poor will have the opportunity of making their voices heard.

Environmental planning in Brazil

The biggest challenge for Brazilians in regard to environmental planning does not entail a lack of laws and policies; there is already a large variety of them across all levels of government, federal, state, and local. Instead, it is about the enforcement of these laws. The 1988 Federal Constitution was the basis for many of the environmental laws and policies that currently exist across the country, such as Article 225 stating that all people have the right to an ecologically balanced environment, and the 9,605 bill explaining how environmental crimes should be prosecuted in Brazil. Persistent environmental issues such as deforestation, air and water pollution, and the absence of water reserves are mostly related to the design and implementation processes of such laws and policies. Many times, the implementation process simply does not exist, and as ordinary Brazilians say, *some of our environmental laws and policies stay on the bookshelves and get dusty*.

There are several explanations for the current lack of implementation of environmental laws and policies in Brazil. Research has shown that a high degree of bureaucracy, lack of integration between governmental agencies, corruption, fragile institutional capacity, lobbying, and favouritism to projects that go against these laws are some of the reasons for this status (Kaiser, Bezerra, & Castro, 2013; Aklin, Bayer, Harish, & Uperlainen, 2013; de Marques & Peres, 2015). To illustrate this, even though the National System of Conservation Units was designed for conserving coastal areas containing mangroves, high losses of this landscape affected by anthropogenic activities are still occurring (Santos et al., 2014, p. 40).

The 1988 Federal Constitution covers a variety of topics, and among them is urban planning. In 2001 a very important law that is based on the Constitution – the *Estatuto da Cidade* (henceforth City Statute) - was enacted. Not unlike other laws, there are many obstacles for the City Statute to achieve nationwide implementation. Authors have drawn attention to the gaps between the law itself, its implementation, and the environment (Friendly, 2013; Fernandes, 2007). The environmental dimension of urbanization is also included in the City Statute. However, the wording of this inclusion is vague, broad, and without details, making it even more of a challenge to implement.

A planning agenda

Indicators' ascending trends show that some types of behaviours need to change in Brazil. For instance, CO^2 emissions increased from 1.9 metric tons per capita in 2009 to 2.2 in 2010, and the total annual freshwater withdrawal increased from 58.1 billion cubic meters in 2007 to 74.8 in 2013 (World Bank, 2015). Additionally, as in all other Latin American countries, Brazilians are concentrated in urban areas, and to date, more than 82 per cent of the national population is located in cities; therefore, the importance of the urban, metropolitan, and regional scales of planning becomes paramount. Within this context, planning for future growth in a more sustainable way is imperative. This planning agenda should include not only economic growth issues, but urban growth as well, and should be based on social sustainability, i.e., all socio-economic classes should participate (Larsen, 2012, p. 78).

Given the fact that Brazil already has a law that covers urban planning, i.e., the City Statute, having urban growth included in a planning agenda which is working towards sustainable development is indeed quite appropriate. When accounting for future growth, a majority of the time the relationship between urban planning and the environment is not addressed. When urban planners do address it, they do not use a systematic approach, nor do they include accurate measurements of environmental impacts that may be caused by urbanization pressure. To illustrate planners' typical behaviour, Costa, Campante & Araújo (2011) examined 27 Brazilian states' reports about municipal comprehensive plans, which covered planning for growth. The authors concluded that the environmental aspect included in the content of these comprehensive plans was mostly related to the preservation of open spaces (i.e., green areas) and did not really address issues such as water quality, air pollution, and greenhouse gas emissions.

The City Statute

In 2001 the City Statute was enacted, and in 2003, the Ministério das Cidades (henceforth Ministry of Cities) was created. The main idea for its creation was to have a 'locus for designing and implementing urban policies, after almost 20 years of erratic policies scattered across different ministries' (Rolnik, 2011, p. 242). Over the years, the Ministry has established several agreements with different universities and consulting firms to improve the implementation of the law. However, there is no department within the Ministry dedicated to environmental issues, nor have agreements identified specific improvements for environmental planning.

When compared to other developing countries, Brazil is considered a pioneer for having approved such a law. Caldeira and Holston (2014) described the City Statute as a remarkable law that redefines how democracy, urban planning, government and society should work together towards equality (p. 4).

Moreover, as Fernandes (2012) pointed out, the City Statute is an example of legal change inspired by Lefebvre's concept of the 'right to the city' (1968). As Fernandes advocated, Brazilian citizens should have 'the right to environmental preservation' (p. 189) among other rights such as housing and access to transportation.

On paper, in the City Statute's contents, urbanization and the environmental dimension go hand-in-hand; however, the reality is more disjointed. A complex concept such as the environmental dimension of urbanization requires a comprehensive collection of actions to be successful. Not surprisingly, the City Statute includes words related to this concept 23 times in 16 pages. A specific piece of the law that is very relevant to this *Exploration* follows: *for this law to be implemented, various planning tools should be used, including an environmental impact assessment and a neighbourhood impact assessment.* However, the law did not propose a common scope for the tools, and furthermore, they are not mandatory at the federal level, although some municipalities have made them mandatory.

Currently, both of those planning tools are being used by larger cities, but most of the time, municipalities do not even consider using them (de Lollo, & Röhm, 2007). Since every municipality can design its own assessment, their use varies from municipality to municipality (Texeira & Moura, 2014). The consequences of such practice can lead to unsound policies because the methodologies used may be lacking in public participation. Additionally, they may be utilizing incomplete data sets which will likely produce weak and/or incomplete results. The environmental impact assessment and neighbourhood impact assessment can become powerful tools for environmental planning use if they are developed in a systematic way, based on scientific research and information. These two assessments are the core of the proposed framework; in other words, by applying the framework to a potential urban change, urban planners can measure the impact of urbanization on the environment.

Public participation: participatory mapping and tactical urbanism

Participatory mapping is a process where local people are involved in a project through mapping activities. Based on collaboration between the people of the place and planners in charge, maps representing cognitive and environmental knowledge of the place are produced. The cartographical products of this process can them be used to better understand people's perception of the place.

The term tactical urbanism was introduced by Lyndon in 2005. It describes citizens and grassroots organizations directly acting to change the urban space, using low-cost strategies, without formal permission from the public sector. Tactical urbanism has been proposed by scholars as temporary solution to a variety of urban problems such as new development in previously disrupted areas (Radywyl and Biggs, 2014) and projects for public spaces (Ismail and Said, 2015). Tactical urbanism has a short-term temporal dimension embedded

in its essence, yet it can lead to long-term change (Lydon, Bartman, Woudstra, & Khawarzad, 2010). It is also seen as an eye-opener for the public sector because it shows that there are opportunities for changes to the status quo of urban areas (Ismail and Said, 2015, p. 362). Moreover, Khawarzad noticed that tactical urbanism is being adopted by the public sector as 'a way to start conversation' when there is a need to engage citizens in the urban planning process (as cited in Radywyl and Biggs, 2014, p 162). In the framework, tactical urbanism can serve as pedagogical process for low-income residents to increase awareness of how and why they should participate.

However, after conducting a literature review, it was found that neither participatory mapping or tactical urbanism had been reported in use thus far in any issue related to the City Statute. As the City Statute is being operated today, urban planning processes are not helping the poor (Caldeira and Holston, 2014). There are three main reasons for this *modus operandi*: the participatory requirements are followed, but their results are ignored; different judges rule on the same case materials in different ways (p. 12); and wealthy citizens are the ones participating the most (p. 13). Arnstein's 1969 participation ladder can be applied to this *modus operandi* in order to understand how to improve participation of the poor. In brief, the ladder has three main phases (nonparticipation, tokenism, citizen power), with eight steps in total (from manipulation to citizen control). Every higher rung on the ladder implies a higher level of participation. In this *Exploration*, it is argued that Brazilians should be experiencing rungs from the 'citizen power' phase, but in reality, they have only climbed to the 'tokenism' phase. More specifically, low-income people are in the 'consultation' rung of the 'tokenism' phase, where citizens are heard but are offered 'no assurance that citizen concerns and ideas will be taken into account' (p. 219).

To be able to move up the ladder, the two methods of participatory mapping and tactical urbanism are proposed as part of the framework to assure that low-income people have the necessary knowledge and awareness about the urban planning processes to participate as stakeholders. Participatory mapping was chosen because 'GIS [geographic information systems] has the potential to increase community knowledge and enhance involvement by communicating information more effectively' (Gonzalez, Gilmer, Foley, Sweeney & Fry, 2008, p. 303). Tactical urbanism was selected to be a catalyst for long-term public participation and should be applied as a way to sensitize the low-income residents to urban planning processes.

Participatory mapping is one method which is increasingly being applied around the globe, such as in the Colombian Amazon (Ramirez-Gomes et al, 2015), and in Zimbabwe (Mapedza, Wright & Fawcett, 2003). A few studies have applied participatory mapping in their methodology for the Brazilian context, but not for urban planning-related issues such as conservation practices (Bernard, Barbosa and Carvalho, 2011), fishing management (De Freitas & Tagliani, 2009), forest fragmentation, and protected areas (da Silva, Ferreira

Jr., Medeiros, Araújo, & Albuquerque, 2014). In the framework, participatory mapping has a twofold purpose: to capture residents' environmental values, preferences, qualities, and experiences of the area under examination (henceforth the place); and to increase residents' knowledge about the environmental aspects of their place and how they can be affected, negatively and/or positively, by urbanization.

While this method is advancing, it should be acknowledged that working with technology, and, at the same time, promoting public participation that includes low-income residents, is a challenge. To illustrate this point, based on six case studies Baud, Scott, Pfeffer, Sydenstricker-Neto, & Denis (2013) examined how urban governance has been changing with the use of various technologies, including GIS. They found that initiatives that used technology and allowed public interaction had middle-class residents as participants, whereas low-income residents were only represented by their political representatives (p. 507).

Moreover, when the public sector is involved in participatory mapping methods, the they may face barriers to succeed because their employees have an ingrained culture of being averse to innovation (Brown & Kyttä, 2014). Only with motivation, skills and opportunity can innovations flourish in the public sector (Mugan & Albury, 2003, p. 32). Some strategies are suggested for the public sector to overcome barriers to innovation: to assure that incentives are in place to award innovation initiatives (p. 31) and that 'culture, systems, management methods and processes' of innovation are in tune with organizational structure (p. 33).

The framework

Since the 1980s, sustainability is a term widely used in various fields of study, and this is no different in the field of urban planning. For the framework, sustainability is based on the theory and concepts of ecological planning, which 'is a way of directing or managing changes in the landscape so that human actions are in tune with natural processes' (Ndubisi, 2002, p. 12). The concept of carrying capacity is central in ecological planning; there are several definitions for it in the urban planning literature (Oh, Yeunwoo, Dongkun, Wangkey, & Jaeyong, 2005; Gao, Wang, & Sheng, 2011; Shi Wang & Yin, 2013). In this *Exploration,* carrying capacity is defined as the urban condition that can be changed, depending on its characteristics to retain transformations. Carrying capacity needs to be examined based on acceptable sustainable standards of its geographical, cultural, political, and socio-economic characteristics. Sustainable standards can be defined based on the threshold carrying capacity of the landscape for different variables (Ndubisi p. 56). One should have the following question in mind when examining sustainable standards: 'how can we determine the critical points (in space and time) in the maturation of a landscape

so that its continued use for production will not eventually degrade it?' (Ndubisi p. 55).

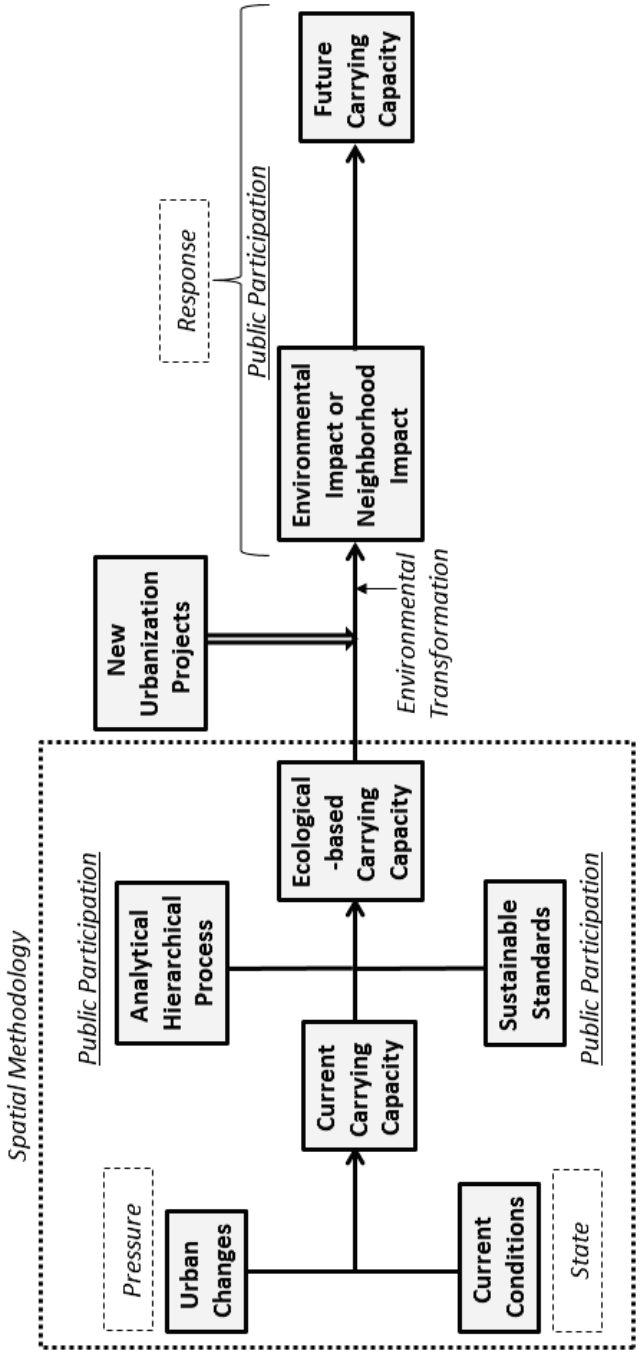
With the advance of the GIS technology, assessing urban carrying capacity becomes more policy-maker friendly, promoting more accurate evidence-based and place-based analyses. A few empirical studies examining urban carrying capacity and using spatial methodologies have been developed in the last ten years (Oh et al., 2005; Gao et al., 2011; Liu, 2012; Shi et al., 2013). In the studies, authors developed spatial methodologies that were applied to case studies, none of them in Latin America.

In environmental planning studies, the OEDC 1994 Pressure-State-Response (PSR) framework, which is based on the concept of causality, has been widely used. PSR constitutes the conceptual basis for the framework proposed in this essay. Segnestam (2002) nicely explained the three variables. The 'pressure' variable, representing the new or existing cause of the problem, refers to human activities or other pressure on the environment such as natural disasters. The 'state' variable results from the 'pressure' and it deals with 'physical measurable characteristics of the environment' (p. 7). The 'response' variable captures the societal response to environmental changes. Despite some criticism of PSR's simplicity, the adoption of more complex frameworks such as PSIR and DPSIR for projects in developing countries can be challenging mainly because of data availability. Figure 1 depicts the proposed framework in which the planning tools – environmental impact assessment and neighbourhood impact assessment – can be designed.

A combination of steps from those empirical studies and new steps proposed in this *Exploration* are included in the framework. The steps described below are tailored to the Brazilian context, but they can be adapted to other countries in the region. The main goal of the framework is to examine if new urbanization projects can indeed be implemented without going beyond the carrying capacity of a given place. The first step is to gather spatial variables about the geographical and socio-economic characteristics of the study area (including 'pressure' and 'state') for at least two years, if possible. Data availability makes gathering spatial data in developing countries a very challenging task (Hinojosa & Hennermann, 2012; Macedo & Haddad, 2015), and no public participation is included in this step. Secondly, using GIS software all variables are combined to generate the 'current carrying capacity'.

Thirdly, an analytical hierarchical process is applied to weigh the available spatial variables including 'pressure' and 'state' based on the rankings elaborated by Ministry of Cities' staff, local low-income residents from the place, and other stakeholders who wish to participate. In this step, participatory mapping is used with local residents to understand their preferences and increase their knowledge about available variables and their conditions, so residents' ranking is well-informed. After ranking, setting acceptable sustainable standards' thresholds for the available spatial variables is suggested. A literature

Figure 1: The Proposed Framework



review can reveal some of the acceptable standards. The other standards, not found in the literature, can be calculated based on the average regional characteristics of the place's location. Then, the identified thresholds are examined and discussed by Ministry of Cities' staff, local low-income residents from the place, and other interested stakeholders.

The fourth step combines 'pressure' and 'state' again, taking into account the ranking and acceptable standards that were proposed after public participation. The output of this step is the 'ecological-based carrying capacity' that is used as a digital model to assess new urbanization projects and their related environmental transformations (step five). This spatial output is used to develop the environmental impact or neighbourhood impact assessments. During the development of these assessments, tactical urbanism is applied to increase public awareness. Finally, if new urbanization affects the carrying capacity to a point of exceeding sustainable standards, then that urbanization is denied. Then depending on the assessments, the 'future carrying capacity' is defined.

Final remarks: what is next for the framework?

In this *Exploration* a framework to examine the environmental dimension of urbanization is proposed to improve the City Statute implementation. Specifically, the two planning tools of environmental impact assessment and neighbourhood impact assessment that were included in the law, but have not been systematically developed, are at the core of the framework. To assure that the topic of this essay can actually contribute to urban environmental governance, the application of the framework to a case study should be the next research step.

Environmental governance should be implemented in an effective way in Latin America. Questions that still need to be answered to ensure this, are: How are other Latin American countries dealing with the environmental dimension of urbanization? Are there similarities that should be considered? How can we apply the spatial results of the framework to produce knowledge to participants' citizens, qualifying them for future participation? How can we ensure that the tactical urbanism experience will be a catalyst for long-term goals participation? How can we assist planners facing lack of data when applying the framework? How can we disseminate the framework at the local level? How can we produce a smooth dissemination of the technology to local planners? How can the public sector be motivated to pursue innovations? Some of the answers to these questions may have a good starting point in the literature, but there is still much to be done to fully respond to them.

* * *

Mônica Amaral Haddad <haddad@iastate.edu> is an Associate Professor of Urban and Regional Planning at Iowa State University where she specializes in

geographic information systems and spatial analysis applications for planning issues. Her research agenda focuses on four main issues: 1) social justice in both Brazil and the U.S.; 2) urban infrastructure provision in Brazilian cities; and 3) environmental planning in Brazilian cities. Her work has been published in journals such as *Environment and Planning B*, *Economic Development Quarterly, Journal of International Development.* She received her PhD and Master's degrees in Urban and Regional Planning from the University of Illinois at Urbana-Champaign.

Mônica Amaral Haddad
Department of Community and Regional Planning
College of Design, 583
Ames, IA, 50011
United States

Acknowledgements: The author would like to acknowledge three anonymous reviewers for their feedback and comments. I also would like to thank Dr. Ana Clara Mourão Moura for discussing the framework with me, and Jayme Wilken for her editorial suggestions.

References

Aklin, M., Bayer, P., Harish, S.P., & Urpelainen, J. (2013). Understanding environmental policy preferences: New evidence from Brazil. *Ecological Economics, 94,* 28-36. http://dx.doi.org/10.1016/j.ecolecon.2013.05.012

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners, 35*(4), 216-224. http://dx.doi.org/10.1080/01944366908977225

Baud, I., Scott, D., Pfeffer, K., Sydenstricker-Neto, J., & Denis, E. (2013). Digital and spatial knowledge management in urban governance: Emerging issues in India, Brazil, South Africa, and Peru. *Habitat International, 44,* 501-509. http://dx.doi.org/10.1016/j.habitatint.2014.09.009

Bernard, E., Barbosa, L., & Carvalho, R. (2011). Participatory GIS in a sustainable use reserve in Brazilian Amazonia: implications for management and conservation. *Applied Geography, 31*(2), 564-572. http://dx.doi.org/10.1016/j.apgeog.2010.11.014

Brown, G., & Kyttä, M. (2014). Key issues and research priorities for public participation GIS (PPGIS): A synthesis based on empirical research. *Applied Geography, 46,* 122-136. http://dx.doi.org/10.1016/j.apgeog.2013.11.004

Caldeira, T., & Holston, J. (2014). Participatory urban planning in Brazil. *Urban Studies,* 1-17.

Costa, H., Campante A., & Araújo R. (2011). A dimensão ambiental nos planos diretores de municípios brasileiros: Um olhar panorâmico sobre a experiência recente. In O.A.S. Junior and D.T. Montandon (Orgs.), *Os Planos Diretores Municipais Pós-Estatuto da Cidade: balanço crítico e perspectivas.* Rio de Janeiro: Letra Capital.

De Freitas, D. M.; & Tagliani, P. R. A. (2009). The use of GIS for the integration of traditional and scientific knowledge in supporting artisanal fisheries management in southern Brazil. *Journal of Environmental Management, 90*(6), 2071-2080. http://dx.doi.org/10.1016/j.jenvman.2007.08.026

da Silva, T. C., Ferreira Jr, W. S., de Medeiros, P. M., de Sousa Araújo, T. A., & Albuquerque, U. P. (2014). Participatory Mapping of the Terrestrial Landscape in Brazil: Experiences and Potentialities. *Methods and Techniques in Ethnobiology and Eth-*

noecology (pp. 239-254). Springer New York. http://dx.doi.org/10.1007/978-1-4614-8636-7_15

de Lollo, J. A., & Röhm, S. A. (2007). Aspectos negligenciados em estudos de impacto de vizinhanca. *Estudos Geográficos: Revista Eletrônica de Geografia, 3*(2), 31-45.

de Marques, A. A. B., & Peres, C. A. (2015). Pervasive legal threats to protected areas in Brazil. *Oryx, 49*(01), 25-29. http://dx.doi.org/10.1017/S0030605314000726

Fernandes, E. (2007). Constructing the 'right to the city' in Brazil. *Social & Legal Studies, 16*(2), 201-219. http://dx.doi.org/10.1177/0964663907076529

Fernandes, E. (2012). Rights to the city. In S. J. Smith, M. Elsinga, L. Fox O'Mahony, O. S. Eng, S. Wachter, P. M. Ward, (Eds.) *International Encyclopedia of Housing and Home,* Vol. 6. (pp. 187-192). Oxford: Elsevier. http://dx.doi.org/10.1016/B978-0-08-047163-1.00039-4

Friendly, A. (2013). The right to the city: theory and practice in Brazil. *Planning Theory and Practice, 14*(2), 158-179. http://dx.doi.org/10.1080/14649357.2013.783098

Gao, Q., Wang, D., & Sheng, S. (2011). Analysis of temporal-spatial changes of urban integrative carrying capacity to assess urban sustainability in the Yangtze River delta area in China. *International Journal of Urban Sustainable Development, 3*(2), 207-220. http://dx.doi.org/10.1080/19463138.2011.609559

González, A., Gilmer, A., Foley, R., Sweeney, J., & Fry, J. (2008). Technology-aided participative methods in environmental assessment: An international perspective. *Computers, environment and urban systems, 32*(4), 303-316. http://dx.doi.org/10.1016/j.compenvurbsys.2008.02.001

Hinojosa, L., & Hennermann, K. (2012). A GIS approach to ecosystem services and rural territorial dynamics applied to the case of the gas industry in Bolivia. *Applied Geography* 34, 487-497. http://dx.doi.org/10.1016/j.apgeog.2012.02.003

Ismail, W. A. W., & Said, I. (2015). Integrating the community in urban design and planning of public spaces: A review in Malaysian cities. *Procedia-Social and Behavioral Sciences, 168,* 357-364. http://dx.doi.org/10.1016/j.sbspro.2014.10.241

Kaiser, I., Bezerra, B., & Castro, L. (2013). Is the environmental policies procedures a barrier to development of inland navigation and port management? A case of study in Brazil. *Transportation Research Part A, 47,* 78-86. http://dx.doi.org/10.1016/j.tra.2012.10.025

Larsen G. (2008). An inquiry into the theoretical basis of sustainability: Understanding the social dimension of sustainability. In J. Dillard, V. Dujon, & M.C. King (Eds.). *Understanding the social dimension of sustainability.* 45-82 New York: Routledge.

Liu, Huimin. (2012). Comprehensive carrying capacity of the urban agglomeration in the Yangtzer River Delta, China. *Habitat International, 36,* 462-470. http://dx.doi.org/10.1016/j.habitatint.2012.05.003

Lydon, M., Bartman, D., Woudstra, R., & Khawarzad, A. (2010). *Tactical Urbanism* (vol. 1). Recuperado el, 15.

Macedo, J., & Haddad, M. (2015). Equitable distribution of open space: Using spatial analysis to evaluate urban parks in Curitiba, Brazil. *Environment and Planning B: Planning and Design.* http://dx.doi.org/10.1177/0265813515603369

Mapedza, E., Wright, J., & Fawcett, R. (2003). An investigation of land cover change in Mafungautsi Forest, Zimbabwe, using GIS and participatory mapping. *Applied Geography, 23*(1), 1-21. http://dx.doi.org/10.1016/S0143-6228(02)00070-x

Mulgan, G., & Albury, D. (2003). Innovation in the public sector. HM Government Paper, Prime Minister's Strategy Unit, London.

Ndubisi, F. (2002). *Ecological Planning: a historical and comparative synthesis.* Baltimore: The John Hopkins University Press.

Oh, K., Yeunwoo, J., Dongkun, L., Wangkey, L., & Jaeyong, C. 2005. Determining development density using the Urban Carrying Capacity Assessment System. *Landscape and Urban Planning, 73,* 1-15. http://dx.doi.org/10.1016/j.landurbplan.2004.06.002

Radywyl, N., & Biggs, C. (2013). Reclaiming the commons for urban transformation. *Journal of Cleaner Production, 50,* 159-170. http://dx.doi.org/10.1016/j.jclepro.2012.12.020

Ramirez-Gomez, S. O., Torres-Vitolas, C. A., Schreckenberg, K., Honzák, M., Cruz-Garcia, G. S., Willcock, S., Palacios, E., Perez-Minana, E., Verwey, P.A., & Poppy, G. M. (2015). Analysis of ecosystem services provision in the Colombian Amazon using participatory research and mapping techniques. *Ecosystem Services.* http://dx.doi.org/10.1016/j.ecoser.2014.12.009

Rolnik, R. (2011). Democracy on the edge: Limits and possibilities in the implementation of an urban reform agenda in Brazil. *International Journal of Urban and Regional Research, 35,* 239-255. http://dx.doi.org/10.1111/j.1468-2427.2010.01036.x

Segnestam, L. (2002). Indicators of environment and sustainable development, theories and practical experience. Environmental economics series. Paper no. 89. The World Bank Environmental Department.

Shi, Y., Wang, H., & Yin, C. (2013). Evaluation method of urban land population carrying capacity based of GIS – A case of Shanghai, China. *Computers, Environment and Urban Systems, 39,* 27-38. http://dx.doi.org/10.1016/j.compenvurbsys.2013.02.002

Teixeira, P., & Moura, A. C. M. (2014). Contribuições ao Estudo de Impacto de Vizinhança (EIV): base para a proposição do emprego de geoprocessamento como apoio ao instrumento do Estatuto da Cidade. Anais. . XXVI Congresso Brasileiro de Cartografia, 2014. Gramado. Sociedade Brasileira de Cartografia.

World Bank. (2015) http://data.worldbank.org/indicator