

Chapter 10. The democracy of green infrastructure: some examples from Brazil and Europe.

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Abstract

With the understanding of nature in terms of ecosystem services and the recognition of the vital role these play for human wellbeing (Millennium Assessment, 2005), the value of the natural realm is scientifically and socially defined while at the same time institutionalised. Within this frame of interpretation, nature is a supplier of provisioning, regulating, supporting welfare and cultural services, thus becoming not only a life-enabling factor for humanity but also a conceptual construct comparable to cornerstones of democracy, such as equality, freedom and citizenship. The idea of green infrastructure is another recently coined term envisioning nature in cities in the form of a network and enabling a broad life-furthering vision of society. Standards for green open spaces embedded in some planning frameworks further state the right for all to a common good. Yet, evidence shows that this common right is not always met. Within the current context of advanced and neoliberal capitalism, green areas are sometimes used as an added financial value for real estate, thus increasing restrictions to their free access and full utilization. In developing countries with young democracies, such as Brazil, this process implies another significant factor of social inequality insofar the restricted access to nature by the poorest people means also diminished food safety, and the jeopardizing of certain cultural practices.

In developed countries, loss of land for food production and movements reclaiming the right to the city by squatting unoccupied open spaces to initiate community gardens, demonstrates that the access to green spaces is also problematic, although in different ways if compared to developing countries. This chapter contributes to this topic by discussing the inequality in provision of green spaces in informal settlements and social housing development in Brazil, as well as in the globalised north. The chapter concludes with recommendations to enhance democracy through a just provision of nature in cities.

Introduction

Crouch and Ward (1997) connect the birth of the English allotment movements with a long tradition of struggle for access to land. Manifestations of this struggle are many; in the XVII century, for example, groups of peasants, under the name of Diggers, were squatting land which was progressively enclosed and given to local lords, under the assumption that, with peasants farming, hunting, foraging and logging, natural resources would be overexploited. Only a century later, with the unstoppable rise of industrialisation in cities and in farming (e.g. the increasing use of threshing machines), and recurrent cycles of unemployment requiring poverty relief measures, this unjust assumption was overturned with the idea of the allocation of plots of land in rural and urban areas, which could provide subsistence to the poor. Allotment movements culminated in the first Allotment Act in 1830, sanctioning the right to allocate land for those who required it for subsistence (Acton, 2014). The struggle of the right to use land for sustenance also epitomises the unjust access to resources, which characterises the contemporary age and that democracy promises to cancel. Regardless of such a promise, in a globalised world where 1% of the population possess 50% of the world's wealth (Neate, 2017), the attainment of this objective can hardly be claimed as accomplished. Against this backdrop, with an environmental crisis defined as the biggest challenge to humanity, access to green land – a vital resource - must be more than ever a right for all.

With the dramatic rate of environmental degradation, new concepts are being defined, which capture how invaluable for mankind green spaces are. Those promoted by the Millennium Ecosystem Assessment (2005) explicit the role of nature in sustaining life on this planet and shaping our systems of knowledge. With the acceptance of the ecosystem services frame of interpretation, the value of the natural realm is scientifically and socially defined while at the same time institutionalised. Within this frame, nature is a supplier of provisioning, regulating, supporting and cultural services, thus becoming not only a life-enabling factor but also a conceptual construct linked to those that are cornerstones of democracy, such as equality, freedom and work. The idea of green infrastructure (an infrastructure providing ecosystem services to cities) is another recently coined term envisioning nature in cities as a conventional urban infrastructure: that is, a network of systems or services enabling society to function. Standards for green open spaces (see Dai, 2011) embedded in some planning frameworks further state the right for all to a common good. Yet, evidence shows that this right is not met.

In cities, too often green space is associated with leisure or physical activities, but the role it plays transcends these functions: indeed, green space is a matter of environmental justice. Environmental justice is a movement which was born to defend those who live next to places with exposure to environmental hazards, such as toxic industries or car fumes (Leichenko and Solecki, 2008). The movement exposed geographies of urban land distribution in which safe places, because of the land values associated to them, are out of reach for low-income groups. By extension, poor access to green spaces is associated with higher rates of overweight and obesity, poorer self-perceived health, and higher mortality risks (Dai, 2011). In the UK, in areas predominantly inhabited by ethnic minorities ‘there is 11 times less green space than in areas where residents are largely white’ (CABE, 2011). Other studies suggest that, generally, less educated individuals have reduced availability of green space and that ‘adults living below the poverty line [are] three times less likely to be physically active than higher-income adults’ (Wright Wendel, 2012; see also Boone, 2009; Sherer, 2006). Access to green space, however, does not necessarily imply that this will be used: perception of safety can, for example, prevent people from its fruition.

CABE's report (2011) finds that 'less than 1 per cent of people living in social housing reported using the green space on their estate'. Cultural background and social norms play a role too: some studies suggest that, with green spaces available, middle and upper classes are more likely to utilise them (Lindsey, 2001). In some American cities, the process of suburbanisation, during which middle-to-high-income groups fled from city centre, resulted in low-income communities living in proximity of big parks designed and implemented between 19th and 20th century (Boone, 2009), which are now dangerous places, also because of low maintenance.

Another manifestation of inequity, which is at the same time a mechanism locking low-income groups out of areas with sufficient provision of green spaces, is the monetary value associated to them. Within the current context of a society surrendered to a pervasive neoliberal doctrine, green areas are used as an added financial value for real estate, thus increasing restrictions to their free access and full utilization (Crompton, 2001). In developing countries with young democracies, such as Brazil, this process implies another significant factor of social inequality insofar the restricted access to nature by the poorest people means also diminished food safety, and the jeopardizing of certain cultural and religious practices. In developed countries loss of land for food production (Crouch and Ward, 1997) and movements reclaiming the right to the city by squatting unoccupied open spaces to initiate community gardens (McClintock, 2014), demonstrate that the access to green spaces is also problematic, although in different ways when compared to developing countries, in which the right to the city is framed differently. UNHabitat (2008) defines the right to the city as an access to the basic services or even recognition of the basic human rights for all within an urban context.

The examples mentioned above do not cover all the multiple, interconnected perspectives characterising the (lack of) democracy of green spaces. Another aspect that deserves attention, for example, is the one connected to the decision-making process through which green spaces are designed. Even where virtuous examples of a more just use and distribution of green areas across cities such as Bogota' can be found (Barney, 2010), determination of function, use and more tend to steer away from participatory approaches to decision-making

(Wolch et al., 2014). Against the backdrop of such complexity, this chapter contributes to this topic by providing a possibly partial, although quite telling overview of stories and thoughts from Brazil and Europe. The three following sections present an overview of what is happening in terms of just access to green land in Brazil generally, Rio de Janeiro in particular and finally in the UK. These empirical contributions are followed by a brief discussion section, attempting to find some common themes from a multifaceted, fragmented urban reality.

Brazil: approaches to green infrastructure

Green infrastructure in Brazil is still a topic unfamiliar to the majority of the inhabitants. This is because the relationship between Brazilians and green areas is dual: the rich and diverse landscapes are part of the daily life of families, but are constantly being occupied without planning or environmental awareness. Thus, Brazilian landscape, especially in the urban surroundings, is under constant pressure for development. This pressure comes from low and high income families, and in both cases is characterized by a non-sustainable model of urbanization, with a morphological pattern that has little attention to the rich biophysical support that nature can provide. Poorly designed and managed streets, inadequate sidewalks and no consideration of the original landscape characterize this non-sustainable model. Unfortunately, this inadequate morphological model is a reality in almost all Brazilian cities, in new and old urban areas.

The application of any model of urban green infrastructure in Brazilian cities requires an understanding of the characteristics of this context as well as a careful observation of the everyday interactions between spaces and social agents. It also requires an understanding of the difficulties of implementing any planned green infrastructure, which works for all. The lack of access to green infrastructure goes from poorly understood and attended environmental laws to not predicted environmental disasters, and even political actions, with no attention to the biophysical characteristics of the territory (Donoso, 2017).

A case in point of infringement of environmental legislation is the irregular occupation of floodplains, hills and other natural, protected

areas (Figures 1 and 2) as well as the inadequate waste disposal or the many other development projects that do not consider environmental codes.



Figure 1: Salvador-BA, favela aerial view. Photography courtesy of the Laboratory QUAPÁ, from the Faculty of Architecture and Urbanism, University of São Paulo – FAUUSP, Brazil.

Figure 2: Belém-PA, periphery aerial view. Photography courtesy of the Labora-



tory QUAPÁ, from the Faculty of Architecture and Urbanism, University of São Paulo – FAUUSP, Brazil

Shifting the focus to the paucity of environmental consideration of centrally planned development, an example is the housing program “Minha Casa Minha Vida” (My House My Life), which was rolled out on a national scale and delivered housing for three different low-income groups. In some Brazilian cities, housing developments are being constructed in former spaces of production or even green protected areas. That is the result of the pressure for new development supported by public private actors. In this way, green areas that are ecologically sensitive and critical for the broader environment are being transformed in urban areas with poor infrastructure. The projects created for the social group with lowest income rate are a huge example of disregard to the landscape (Figure 3) and permissiveness from municipal legislation (Donoso, 2017).



Figure 3: Maceió-AL, Minha Casa Minha Vida social housing aerial view, 2014. Photography courtesy of the Laboratory QUAPÁ, from the Faculty of Architecture and Urbanism, University of São Paulo – FAUUSP, Brazil.

November 2015 brought the worst environmental disaster in Brazil’s history: the Samarco dam collapse, which dropped a tidal wave

of 32 to 40 cubic meters of mining waste into preserved valleys, farmland, and villages. The flood left hundreds homeless in a nation with a poor national disaster management plan. It is important to notice that those who became homeless are from low-income social groups, which historically have no access even to urban infrastructure, let alone to green infrastructure. Whilst it can take some decades to change the Brazilian light-touch approach to planning or not planning at all, which results in lack of action to preserve natural features that can prevent disasters, cities, mainly medium-sized, continue to grow.

Landscape should be analyzed through its interconnected social dimensions. Landscape, as an expression of society, reveals its social characteristics, which are the dynamic result of an interaction between social processes – economic, cultural and political – and natural processes under continuous changes (Donoso, 2017). For most Latin American cities, the idea of open space (Magnoli, 1982; Queiroga, 2012) is all-encompassing because it considers not only green or blue areas, but every urban or rural area without construction. Every space where people can meet and gather, and has some value for the public sphere, can be object of open spaces analysis. That considered, in Brazilian cities it is necessary to analyse not only the environmental aspects of green areas, but also the social value of open spaces. Brazilian public spaces are at their best when they encourage social integration, civic participation as well as recreation, especially in disadvantaged urban areas where well-planned public spaces are sorely needed. To stimulate people to understand the complexity of daily life by appreciating the importance of the social, cultural and economic context is essential to the pursuit of thinking cities. Especially in cities that still have so many social inequalities it is important to consider the necessity not only to plan and manage urban green and blue infrastructure, but also to understand the citizen's needs, thus providing a more complete understanding that will be important to create habitats and, therefore, more sustainable cities.

Rio de Janeiro: a case study.

The section above illustrates the ambiguous relationship of Brazilians with nature, which manifests itself in a constant tension between fruition and destruction, even when it comes to interventions aimed at implementing urban green infrastructure. With some notable differences, this approach can be seen in Rio de Janeiro too. Although Rio de Janeiro is a city blessed with plenty of nature, green spaces, in their daily use or for the occasional visitor, are often perceived as isolated, as if they were small museums. Today, forest remnants are surrounded by a dense urban network, in which dispersion and fragmentation predominate, much of it as a by-product of the urbanization process of Brazilian cities in general. This has led to a fragmentation of the forest cover too, and the isolation of plants and animals, putting in question the conservation of biodiversity. At this moment of strategic repositioning, after the major works that were carried out for the 2016 Olympic Games, we will highlight some green infrastructure projects planned and implemented by the public sector, in which the participation of residents has been fundamental, and on the other hand, initiatives of appropriation of spaces where the bias of culture and nature demarcate a new vision of “life in the city” and the public realm (Corner, 2016: 4).

The urbanization process in Rio de Janeiro (Abreu, 2006:1987) from the mid-twentieth century onwards was marked by the implementation of a new transportation infrastructure of tunnels and highways that allowed urban growth by opening access to areas, which until then were contained among the main geographical features, the Tijuca massif and the Guanabara Bay waters. In this same period, favelas consolidated themselves as the place for the poor, which accentuated the socio-spatial segregation in an urban context increasingly marked by excessive costs of the most valued areas, the increase of urban voids and the rising rates of informality. In the first slum census, in 1950, its population was 7.13% of the total urban population, a figure that in 2010 increased to 22% of 6.5 million (Izaga and Pereira, 2014; Cavaliere, 2012:7; Valladares, 2000:24). Over time, slums expanded from the most central areas and the eastern part of the city, which are still occupied, to more peripheral areas in the western part.

In this process, vegetation was drastically reduced, covering today only 29% of the territory with forests or other natural environments mostly located in the Tijuca and Pedra Branca and Gericinó-Mendanha Massifs, and the rest scattered on isolated hills and wetlands. An uneven urban growth is also reflected in the distribution of vegetation cover: 9 districts (out of 160) with more than 50% forest cover are located in the South Zone and Barra da Tijuca, which are areas occupied by high-income groups, and well provided with infrastructure and services (Prefeitura da Cidade do Rio de Janeiro, 2012: 5).

The Mutirão Reforestation Program, created in 1988 by the Secretariat of Social Development of Rio's Municipality, stands out as one of the government's longest-running actions tackling environmental degradation. Its widely recognized success in promoting environmental recovery, providing a source of income, strengthening the relationship between communities and the forest, and increasing the control of local communities over the areas at risk as well as the improvement of environmental quality lies precisely in the direct participation of local communities. To date, this program has involved 140 communities and has reforested, over 26 years, approximately 2,200 ha.

A more recent initiative, which is in line with the Reforestation Program (Fig. 4), is the Green Corridors Proposal (Prefeitura da Cidade do Rio de Janeiro, 2012), which from 2011 onwards began to study the ecological connection of all the forest fragments that make up the Carioca Mosaic, which brings together 27 parks and environmental protection areas. The Transcarioca Trail (TCT) (Fig. 5), today completed, is the first great result of the Green Corridors Proposal. It crosses Rio de Janeiro with a green corridor of approximately 180 km, connecting Barra de Guaratiba to the west, to Morro da Urca, to the east, near the Sugar Loaf. In fact, most of the Transcarioca Trail is the coming together of smaller trails that had been in use, but which are now part of a larger whole, broadening its environmental reach. It is important to note that TCT has private initiative support through Grupo Boticário Foundation, a Brazilian cosmetics company. According to the website of the trail (<https://transcarioca.wikiparques.org/sobre-a-trilha/>), this will serve

as a conservation model for several ecosystems of the Atlantic Forest and also as a living tool for environmental education in areas of mangrove, beach, rocky coast, lowland forest and mountain forest.

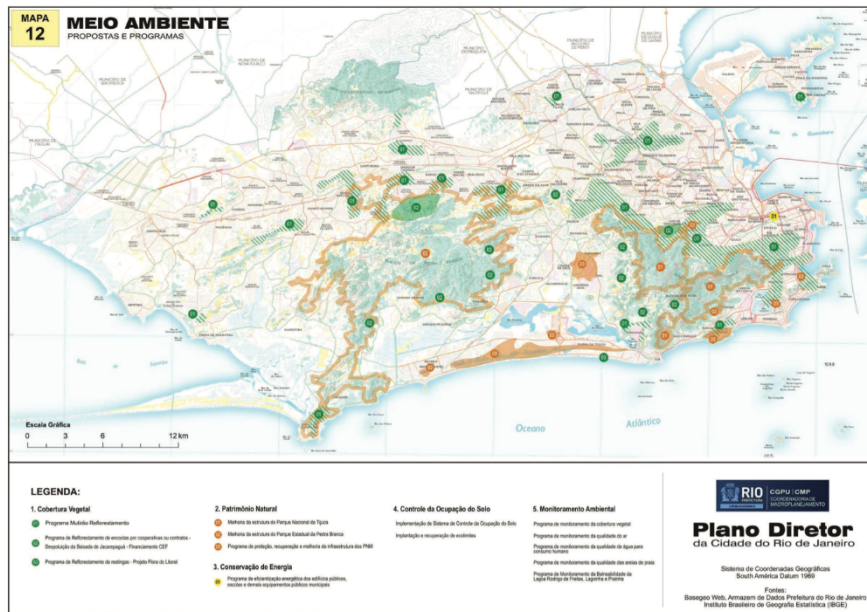


Figure 4: Reforestation Program. Source: Rio de Janeiro City Hall, Secretariat for the Environment, Plan of Urban Afforestation. Rio de Janeiro, p. 216, 2015. Available at: www.rio.rj.gov.br/dlstatic/10112/5560381/4146113/PDAUto-tal5.pdf. Consulted in: Nov, 2017.

Socio-cultural appropriations aimed at providing a green infrastructure – in terms of spaces such as agricultural community gardens and parks - have lately proliferated in Rio de Janeiro in the form of initiatives of local groups acting independently or with the support of private or public associations. The Sitiê Institute Park (Fig.6), located in the Vidigal favela in the South Zone of Rio, originated from the initiative of Mauro Quintanilha, a resident of the community, who in 2005 sought to transform the place filled with debris from demolitions into a leisure area for a community lacking public spaces (Seldim and Vaz, 2017). Located in the central area of the favela, the initiative was initially built through community gardens and partial reforestation. It gained strength through the collabo-

ration of architect Pedro Henrique de Cristo, who enabled partnerships with public and private institutions, transforming the space into a place of landscape experimentation and community practices. In 2016 the Sitiê Park was recognized by the Municipality of Rio, which expanded its original area from 1500m² to 8.500m².



Fig. 5 –Transcarioca Trail. Source: Transcarioca Trail. Available at: <http://transcarioca.wikiparques.org/mapa/>. Consulted in: Nov. 2107

Community gardens in Rio de Janeiro have been very successful: the Municipal Secretariat for Conservation and Environment (Seconserva) claims that, to date, at least 66 have been created. Volunteers started them with the support of the public sector, and in some cases, of private companies too. According to the Seconserva website, the “Hortas Cariocas” Program (Agricultural Gardens Program), which supports these initiatives, started in 2012, with a focus on generating employment and income for residents of communities and providing food to municipal schools in the vicinity of these communities. Students often visit these gardens, learn about healthy eating, and plant and harvest their own food. In the area of Tijuca, for example, there are now 5 vegetable gardens in the communities of Chácara do Céu, Borel, Salgueiro and Formiga and one in the Municipal School Antoine Margarine Torres Filho. What is produced is divided between the Schools of the Municipal Education Network, the surplus is sold and the profit stays with the partners or part of it is reinvested.

Among the initiatives of groups located in the South Zone, the oldest is led by the resident Manfred Bert, who coordinates a garden in the neighborhood of Laranjeiras on a site where landslides occurred.



Fig. 6 – Sitiê Institute Park, Vidigal Favela, Rio de Janeiro, Brazil. Source: Brazil Foundation. Available at: <<https://brazilfoundation.org/parque-sitie-e-oficializado-e-se-torna-modelo-de-parques-urbanos-no-rio/?lang=pt-br>>.

Considering the importance of green infrastructure in cities and the necessary change in the way people relate to nature and to each other, the Rio de Janeiro cases presented here show that on the one hand environmental public policies operate at a slower pace compared to other more vote-rewarding priorities set by governments. On the other hand, a new effervescence of environmental awareness and voluntary work is evident, conquering spaces for culture and leisure both in the formal and informal areas. These actions reveal the

emergence of agents of creativity, who give new potential to forgotten, degraded, empty or peripheral places. Although it may still be difficult to quantify these voluntary mobilizations, they contribute to the transformation of public spaces in which the appropriation process acts as a field where the relations between nature and city can be rewritten in new terms in the sense of an "ecological imagination" to which James Corner refers (2016).

In different ways, appropriation of green areas is practiced in the global north too. It is a form of appropriations charged with meanings that are rather political, in reaction to a socio-economic context of a mature democracy, which struggles to deliver promises of adequate means, rights and spaces through which all can live well. This context may – to an extent – differ from the Brazilian one but it nevertheless presents forms of inequality when it comes to access to green.

Europe: the right to the green city

The *right to the city* is a contended term, with different meaning which vary depending on the geopolitics of the area considered. As mentioned in the introduction, it can be understood as access to basic rights within the urban context of developing countries. It can also be understood as the right of individuals and groups to use and self-manage public space (i.e. production of space as conceptualised by Lefebvre (1991:1987)) within an urban context which is very much sanitised from all those who do not align with predetermined social codes, hence often excluding any informal use of public space (i.e. selling or street art) or manifestation of poverty (i.e. begging) (Pierce and Williams, 2011). Within the prevailing current socio-political discourse of security and order that is too often limiting individual and community rights, protest marches, street performances or any other informal manifestation cannot happen without a formal permission. If an idea of democratic green infrastructure implies the capability of benefitting from urban nature in terms of health and wellbeing, the *right to the green city* (i.e. a term that transfers the right to the city to a green context) must be considered too. This concept has been well documented by Krasny (2012), also in an historical perspective. Access to green spaces for food production in cities has been a contested issue in the past, sometimes associated with self-help movements, mainly working class groups striving to

access land, self-build their houses and use green spaces to perpetuate horticultural practices, which were part of their rural, cultural tradition. Today, with an on-going resurgence of urban agriculture practices, under very different circumstances, community groups struggling to find spaces to grow food resort to a similar *right to the city* approach by reclaiming land without previous negotiation with authorities (Purcell and Tyman, 2013).

Social dynamics characterising community garden projects are concrete attempts to take back from central and local authorities the power of determination (of life, action, social arrangements, use of space, etc.), which is precisely the meaning Lefebvre attributes to the expression he coined. This in turn, transforms the urban landscape in ways that are not centrally determined through planning codes, in a process of spatial organisation that is unpredictable and generated by direct agreement between users (Caputo et al, 2016). Critics of this interpretation (see McClintock, 2014) point out that local authorities, in reaction to the reclaiming of urban land for gardening, typically implement programmes that, while addressing such claims, in reality pre-empt their subversive edge. By offering or brokering the temporary use of space, local authorities mitigate the protest with partial concessions. It can also be surmised that, for local authorities, the attractiveness of these community projects resides in the top-down attempt to move towards a devolution of public services and social assistance. In this perspective, urban food cultivation can offer solutions for major problems such as food deserts, prevention of many health illnesses and safety of parks, at no cost and with much economic advantage. Another example suggesting the *right to the green city* can be exerted in ambiguous ways is the guerrilla gardening movement, which, although clearly born out of the impossibility of an easy access to green land (Adams and Hardman, 2014), is today carried out by some groups with the objective of city beautification, thus showing that such groups demonstrate forms of civic awareness, rather than protest towards central authorities (Certoma', 2011).

It could be argued that, despite the ambiguous results which attempts to establish the right to the green city can generate, the action of groups determined to exert such a right in a way or another (i.e.

through conflict or partnership with authorities) helped reach a critical mass and a tangible impact. In the UK, for example, an initiative started from the association Sustain – the alliance for better food and farming - in partnership with the Mayor of London, aimed at opening 2012 new food gardens in London by 2012, the year of the Olympic Games. The initiative was hugely successful and, it can be surmised, it was sponsored in the awareness of the public attention this practice catalyses. However, the institutionalisation of this practice – whenever this happens in some form – could bear some consequences. A confrontation between two worldviews has the advantage of showing clearly where each side stands. In a negotiation, such a clarity is lost and some of the initial aims diluted. A case in point is the top-down promotion of community gardens and allotment sites in Vienna, which, Schwab et al (2017) maintain, is framed within a narrative of high-quality life that the city offers. This seems to attract predominantly gardeners from the cultured middle class. The risk is that the right to green becomes an elitist hobby and not a way to allow access and use of green space to those who most need it. This case study suggests that the concept of democracy of the green infrastructure, and a higher attention to the rights of vulnerable urban groups, has still to be fully embedded in policy and in civic and political life.

Discussion and conclusions

The final section of this chapter is used to identify strands that emerge from the disparate perspectives presented in the previous sections. Although it is difficult to make sense of such a diversity of examples, situations, needs and cultural contexts, some points of intersection can be seen. The foremost and most obvious one is that urbanisation has reached a tipping point. Whether planned or unplanned, the sheer growth and densification of people, buildings and infrastructure deteriorate human conditions. The phenomenon has reached such alarming peaks that even one of the largest city in the world (i.e. Shanghai) is questioning whether there are limits to urban growth and coining a new term, the big city disease, to express the multiplication of environmental issues triggered by large scale development (Haas, 2017). As urban degradation escalates, nature becomes one of the factors which can restore a balance that at present

is lost. Over the history of urbanisation, the purpose of urban nature has moved from providing leisure, well-being and sometime subsistence, to one providing resilience at all levels: to climate change, to communities, to ecology and to economy. Although there is recognition that green infrastructure can provide this resilience, green is too often used as an ornament. From a human perspective (the viewpoint of individuals and groups) the right to the green city still stands for the possibility of using green areas to meet their daily needs. However, when we zoom out and consider the processes of urbanisation of Rio, or the critical mass reached by urban gardeners in some countries of the global north, we can fully perceive the dangerous acceleration of processes of urban growth, the urgency of providing more efficient solutions to green infrastructure and the insufficient efforts from central authorities to recognise green as a vital right for all.

Another common recurrent strand is participation. Taking people at the centre of the decision making process does not only result in ensuring that interventions implemented are in line with real needs but it also helps create the necessary dialogue between policy makers and citizens. Participation is a much debated approach to planning and design that has been experimented in many forms by architects and urban designers over decades, spanning from the work of Erskine (e.g. Byker Wall in Newcastle, UK- see Collymore, 1994) and De Carlo (Villaggio Matteotti in Terni, Italy – see De Carlo, 2005) in 1970s to the more recent experiments of Brillembourg with the Urban Think Tank in Venezuela (McGuirk, 2015). In Rio de Janeiro too participatory projects can be observed too, including the seminal experience of urbanist Carlos Nelson Ferreira dos Santos in Brás de Pina, and more recently, the Participatory Urban Plan elaborated by Luiz Carlos Toledo for the Rocinha Favela, a community with almost 100 thousand inhabitants. These are all examples which refer to residential and non-residential urban development, rather than green infrastructure. Nevertheless, there are lessons that can be learned from them in terms of participation and dialogue between stakeholders. Participation and the co-production of the green infrastructure, however, present a level of complexity that perhaps exceeds that of the built environment. Urban dwellers can understand and spell out their needs in terms of living standards, services and

infrastructure. Yet, an understanding of the criticality and urgency for the provision of green infrastructure may escape many. The initiatives in Rio presented in section 3 show that partnerships between local authorities and communities can yield positive results but these are sporadic examples if compared to the environmental damages, which are often perpetrated, particularly at the expenses of low-income groups, with little power to oppose these actions. At the same time, participation as a way to disengage from obligations that authorities have in delivering vital services to all as illustrated in section 4 can become tokenism.

The role of green infrastructure is evolving. The idea of a green system augmenting the functionality of the urban nature and, by extension, that of the city itself is fairly recent and therefore in the course of definition. The multiple claims for an urban green that can be utilized for food production, or religious and meditative practices, or mitigation of climate change effects, or simply for preserving an ecological memory that is being lost in cities (Barthel et al., 2010) assign to the green infrastructure the responsibility of solving daunting challenges that come with the excessive growth of urban development. While nature can surely meet such demands, this cannot happen merely through the re-greening of urban land: a deeper scientific understanding of nature must go hand in hand with a socio-cultural shift, redefining what nature means to cities and citizens. In short, a new value system must substitute the existing one, which can guide policy making and become one of the cornerstones of democracy. The good functioning of nature requires maintaining in balance the urban and global ecological system, which, in turn, necessitate respecting nature, rather than constricting it within the landscaped lawns of a Brazilian, top-market condominium. Re-naturing cities requires building corridors and habitats where species can thrive and co-live with people. Green infrastructure in cities should be designed with this in mind, thus conceiving green spaces less as places to relish and more as places that perform natural functions from which we all benefit. **Equity and democracy**, in short, are not only for people but for all living species.

Literature

Abreu, M. (2006:1987) *Evolução urbana do Rio de Janeiro*. 4. ed. Rio de Janeiro: IPP.

Acton, L. (2014) *Growing space: a history of the allotment movement*. Five Leaves Publications.

Adams, D. and Hardman, M. (2014). Observing guerrillas in the wild: reinterpreting practices of urban guerrillas. *Urban Studies* 51(6): 1103–1119.

Berney, R. (2010) Learning from Bogotá: How Municipal Experts Transformed Public Space. *Journal of Urban Design* 15(4): 539-558.

Barthel, S., Folke, C. and Colding, J. (2010) Social–ecological memory in urban gardens - Retaining the capacity for management of ecosystem services. *Global Environmental Change* 20: 255–265.

Boere, N. (2017) Plantando batata na Lapa. *Jornal O Globo*. Editoria Rio. 10 de dezembro 2017.

Boone, C. G., Buckley, G. L., Grove, J. M. and Sister, C (2009) Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland. *Annals of the Association of American Geographers*, 99(4): 767–787.

Cavallieri, F. and Vial, A. (2012) Favelas na cidade do Rio de Janeiro, O quadro populacional a partir do censo de 2010. Coleção Estudos Cariocas. Instituto Pereira Passos, Rio de Janeiro. Available at http://portalgeo.rio.rj.gov.br/estudoscariocas/download%5C3190_FavelasnacidadedoRiodeJaneiro_Censo_2010.PDF.

Collymore, P. (1994) *The Architecture of Ralph Erskine*. Academy Editions.

Commission for Architecture and the Built Environment (2011) *Community Green: using local spaces to tackle inequality and im-*

prove health. CABE. Available at <https://www.designcouncil.org.uk/sites/default/files/asset/document/community-green-full-report.pdf>

Corner, J. (2016) The ecological imagination. Life in the city and the public realm. In: Steiner, F., Thompson, G. and Carbonell, A. Nature and Cities. The ecological imperative in urban design and planning. Cambridge, MA: The Lincoln Institute of Land Policy.

Cortes, G.(2017) Roça urbana. Hortas cultivadas por voluntários em terrenos ociosos estimulam a vida comunitária. Veja Rio, 6 de dezembro 2017.

Crompton, J. L. (2001) The impact of Parks on Property values: a review of the empirical evidence. *Journal of Leisure Research* 33(1): 1-31.

Crouch, D. and Ward, C. (1997) *The Allotment – Its Landscape and Culture*. Five Leaves Publications, Nottingham.

Dai, D. (2011) Racial/ethnic and socioeconomic disparities in urban green space accessibility: Where to intervene? *Landscape and Urban Planning* 102: 234– 244.

De Carlo, G. (2007) 'Architecture's Public', in *Architecture and Participation*, ed. by Peter Blundell Jones, Doina Petrescu and Jeremy Till. Abingdon: Spon Press, 2007: pp. 3-22

Deleuze, G. and Guattari, F. (2007) “*Mil Platôs: Capitalismo e Esquizofrenia*”, São Paulo: Editora 34.

Donoso, V. G. (2017) *Paisagem e cotidiano em habitação social nas Regiões Metropolitanas de São Paulo e Santiago do Chile*. 2017.321 f. Tese (Doutorado). Faculdade de Arquitetura e Urbanismo. Universidade de São Paulo, São Paulo.

Haas, B. (2017) China’s Shanghai sets population at 25 million to avoid ‘ big city disease’. *The Guardian*, 26 December 2017.

Izaga, F. and Pereira, M. S. (2014) A mobilidade urbana na urbanização das favelas no Rio de Janeiro. Rio de Janeiro: Cadernos do Desenvolvimento Fluminense. Available at: <http://www.e-publicacoes.uerj.br/index.php/cdf/article/view/11533>.

Krasny, E. (2012) Hands-on Urbanism' in: Krasny, E. (Ed.) Hands-on Urbanism, Vienna: Thuria+Kant

Leichenko, R. M. and Solecki, W. D. (2008) Consumption, Inequity, and Environmental Justice: The Making of New Metropolitan Landscapes in Developing Countries. *Society & Natural Resources* 21(7): 611-624.

Lefebvre, H. (1991: 1987) The production of space. Wiley-Blackwell.

Lindsey, G., Maraj, M. and Kuan, S. C. (2001) Access, Equity, and Urban Greenways: An Exploratory Investigation. *The Professional Geographer* 53(3): 332-346.

Magnoli, M. M. E. M. *Espaços livres e urbanização: uma introdução a aspectos da paisagem metropolitana*. (1982) Tese (Livre Docência em Arquitetura e Urbanismo), Faculdade de Arquitetura e Urbanismo, Universidade de São Paulo, 1982.

McClintock, N. (2014). Radical, reformist, and garden-variety neoliberal: Coming to terms with urban agriculture's contradictions. *Local Environment* 19(2): 147-171.

McGuirk, J (2015) *Radical Cities: Across Latin America in Search of a New Architecture*. Verso.

Millennium Assessment (2005) *Ecosystems and Human Well-being*. Washington, DC: Island Press.

Neate, R (2017) 'Richest 1% own half of the world's wealth, study finds'. *The Guardian*, 14 November 2017.

Pierce, T. and Williams, A. (2011) *The sanitised city: if you've done nothing wrong...* in Williams, A. and Donald, A. (2011) *The lure of the city: from slums to suburbs*. London: Pluto Press.

Prefeitura da Cidade do Rio de Janeiro (2012) *Corredores Verdes*. Relatório do Grupo de Trabalho (Resolução SMAC P No 183 de 07 nov 2011). Available at: http://www.redemosaicos.com.br/arquivos_dados/arq_downloads/mmídia-id-110.pdf.

Prefeitura da Cidade do Rio de Janeiro (2015). *Plano Diretor de Arborização Urbana da Cidade do Rio de Janeiro*. Prefeitura da Cidade do Rio de Janeiro. Available at: http://www.redemosaicos.com.br/arquivos_dados/arq_downloads/mmídia-id-110.pdf.

Queiroga, E. F. (2012) *Dimensões públicas do espaço contemporâneo: resistências e transformações de territórios, paisagens e lugares urbanos brasileiros*. Tese (Livre Docência em Arquitetura e Urbanismo), Faculdade de Arquitetura e Urbanismo, Universidade de São Paulo, São Paulo.

Seldim, C. and Vaz, L. F. (2017) *Transformações espaciais através de usos temporários e culturais no Rio de Janeiro: um primeiro ensaio*. XVII Enanpur, São Paulo.

Sherer, P. M. (2006). *The benefits of parks: Why America needs more city parks and open space*. San Francisco, CA: The Trust for Public Land.

UNHabitat (2008) State of the World's Cities 2010/2011: Bridging The Urban Divide. Earthscan.

Valladares, L. (2016) A gênese da favela carioca. A produção anterior às ciências sociais. Revista Brasileira de Ciências Sociais, vol. 15 No44. Available at: <http://hilaineyaccoub.com.br/wp-content/uploads/2016/06/Licia-Valladares-A-genese-da-favela-carioca.pdf>.

Wolch, J. R., Byrne, J. and Newell, J. P. (2014) Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning* 125: 234–244.

Wright Wendel, H. E., Rebecca K. Zarger, R. K. and Mihelcic, J. R. (2012) Accessibility and usability: Green space preferences, perceptions, and barriers in a rapidly urbanizing city in Latin America. *Landscape and Urban Planning* 107: 272– 282.