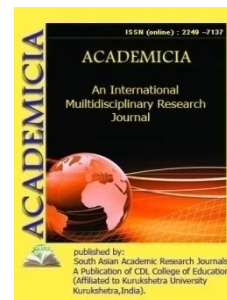


ACADEMICIA

An International Multidisciplinary Research Journal

(Double Blind Refereed & Peer Reviewed Journal)



DOI: **10.5958/2249-7137.2021.02369.7**

OPEN SPACES IN THE PERIPHERY OF MADRID AND ITS METROPOLITAN AREA (SPAIN), SUSTAINABLE URBAN PLANNING AND ENVIRONMENTAL VALUES

Piyush Mittal*; **Neelanchal Trevedi****; **Rahul Arora*****

*Department of Pharmacy, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA
Email id: piyush.pharmacy@tmu.ac.in

**Department of Pharmacy, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

***Department of Pharmacy, Teerthanker Mahaveer University,
Moradabad, Uttar Pradesh, INDIA

ABSTRACT

This contribution is focused on the valuation of the spaces that remain vacant at the city border, as part of a future urban Green Infrastructure. To that end, they have been identified and characterized. Furthermore, a specific GIS has been developed for Madrid, the largest urban metropolitan area in Spain. This chapter is organized in five parts and the final conclusions. First of all, in the introduction, the general objectives are exposed and the concept and importance of the open spaces in the city are studied. Secondly, the methodology describes the design of the research and the development of the GIS. Afterwards, the urban and territorial contexts, where these pieces have their origin, are characterized. This is a synthetic approach which also includes the recent evolution of the legislation as well as that of the city. Through this evolution it is possible to see how these pieces have been framed into a failed green belt since the middle of the last century. Fourthly, a presentation of these open spaces, their urban regime and their land uses is carried out. Subsequently, their valuation in a potential network of open spaces in the Madrilenian metropolitan area is performed. The basic criteria for this valuation are the land adjacent to each of these open spaces. Finally, in the conclusions, we set out the evidence arising from this research, requiring the need for having accurate tools, such as GIS, in order to reach solid proposals that deal with the challenge of Green Infrastructures. We also believe that

the conservation and integration of open spaces should be a priority in general strategies of urban development for mitigation Climate Change and to reduce the effects of Global Warming.

KEYWORDS: *Periphery, Metropolitan, Sustainable, Urban, Environmental.*

1. INTRODUCTION

The phrase "Open Spaces" was most likely coined about 1833 by the London "Select Committee on Public Walks" (Turner 1992). Over the past several decades, open spaces have evolved into a component of green infrastructure. The European Council defines them as "a network of natural and semi-natural areas and other environmental components that provides a broad variety of ecosystem services." The European Commission has created a Green Infrastructure Strategy (Council of Europe 2013a) that is very important in territorial planning and natural resource protection. This strategy outlines the potential components of a Green Infrastructure: legally protected natural areas, healthy ecosystems and areas with high ecological value outside of protected areas, natural landscape features, restored habitats, artificial features such as eco-ducts or eco-bridges designed to improve wildlife movement, and multi-functional zones where compatible land uses can help to maintain biodiversity (Council of Europe 2013b). Land use changes significantly alter the conditions of the near-surface atmosphere (rise in temperatures) above cities and peri-urban regions, exacerbating the effects of climate change. Mitigation measures are required in urban areas, and adaptation activities have been suggested by the European Environmental Agency (2012) based on data from the Intergovernmental Panel on Climate Change.

Open Spaces and Green Infrastructures are critical to urban adaptation to climate change and the long-term viability of the urban environment.

The city of Madrid has been examined, and the present plan for a Green Infrastructure includes some of the components listed above, such as urban green spaces or protected natural areas designated at the regional level. However, in this chapter, a suggestion is presented so that some of the peripheral areas, whether non-urban or urban territory but without urban development, may become part of a network of open spaces from the city's core to its outskirts [1]. The recognized free areas may be divided into two categories: urban green land and edge open space, which is made up of uninhabited periphery lands. In this second category, there are three sub-categories: Protected Natural Areas, Wasteland (unfinished urbanization projects), and Future Open Urban Land (areas undergoing transition into General Systems such as roads, equipment, and public spaces).

The functions of open spaces are often divided into two categories: those that offer leisure and other societal benefits, such as health, and those whose primary goal is the preservation of natural assets. These two methods are based on the assumption that open spaces with recreational functions are concentrated in urban regions, while those with protection of natural values are concentrated in rural areas. This work proposes a third option in which some of the remaining open spaces within urban and metropolitan space, under specific planning figures, can develop a function of conservation of natural, agricultural, landscape, visual, and aesthetic values, as well

as of reduction of urban densities, reducing the recreational and landscaped role with an intensive use, which has become much more common [2].

A model is recognized in many European regions, which is created by a triangle whose vertex is "agricultural landscapes—versus—nature—versus—urban development." Land use changes in this triangle do not have the same power and dynamic: transitioning from agricultural to urban lands is more simpler and more common than transitioning from natural regions to urban or agricultural lands. This lack of resistance to change in agricultural regions against urbanization is intriguing and necessary for understanding the development of these spaces and their current scarcity. This is what Maruani and Amit-Cohen call a "market failure," since the market value and speculative value of these areas are much more than the value of the land preserved as open space. In certain instances, the use of restricted zoning has proven to be an effective instrument in the protection of open spaces, leading to the acquisition of property for the continuation of agricultural operations. This is where planning comes into play, enabling us to discover iconic examples in Euro, as well as research that has conducted comparative studies in connection to the management of urban green areas.

Furthermore, the ESDP recommendations (European Spatial Development Perspective) on urban-rural gradient planning are focused on: accelerating agrarian restructuring, diversifying rural economies, mobilizing and increasing natural resource production through the valuation and enhancement of cultural services, and promoting sustainable development [3]. The development of European urbanization has been extensively researched. Various cycles and phases have been identified. In them, new features and buildings encroach on old landscapes, which remain but are fractured and lose character, giving way to functionally identical regions. Transport routes have played an important part in these urbanization processes, with accessibility being the most important element in landscape change, not only because of the influence of the transport route itself, but also because of the indirect impacts it causes. Suburbanization, counter urbanization, and reorganization are the acknowledged stages shows that the transition from urbanization to suburbanization happened in the southern European area in the 1990s. This is when the case of Madrid could be formulated. These dramatic changes in land use posed a danger to the landscapes and their patrimonial values, prompting changes in legal categories (zoning or planning control) and urban planning, leaving the surrounding regions vulnerable.

Cutting-Edge Open Spaces in Madrid and Its Surrounding Area of the city's residents are unprotected, living in the "urban—shadow." Furthermore, research on the evaluation of the natural potential that these lands have is abundant (Weber et al. 2006; Beer 2005), albeit almost always from an ecological perspective and with large areas, with research on the key role that these pieces can play in landscape quality and agrarian functionality being scarcer [4].

2. DISCUSSION

The places of interest, as well as their buffer zones, are situated in the municipal borough of Madrid (Fig. 1). These zones were established in accordance with the development of the General Plan of Madrid (GPM 1997), with special consideration given to the regions included in the GPM's adjustment to the Land Law of Madrid (9/2001). Most are situated around the municipal boundary (Edge Open Spaces, EOS), as well as neighboring lands that were included in a buffer of 700 m around the polygon's exterior edge. Four methodological methods were

used: searching for digital and bibliographical material, doing fieldwork, analyzing and validating theme information to assess its socio-environmental relevance, and lastly implementing all of this information in a Geographical Information System [5].

- Digital and bibliographical data. Data on development were acquired in shapefile and dgn formats from the Planning, Housing, and Infrastructure Area of the Madrid City Council. All of the additional geo-referenced data was created specifically for this study. The major topic areas of the bibliographic information were open spaces, green infrastructures, and city dynamics.
- Work in the field. Using orthophotographies, 22 basic tracks were created in shapefile format. Different theme information was recorded for each track, and they were relocated using DGPS Trimble Nomad 6G (items of interest and terrestrial photography). A second evaluation of the data was Madrid and surrounding towns (2016). Source The Community of Madrid compiled this list. Cutting-Edge Open Spaces in Madrid and Its Surrounding Area was created, and if additional tracks were required to complete the information, they were constructed. The attribute table is related to the form and number of tracks. All tracks were coded in line and point format, with accompanying metadata.
- Using Geographic Information Systems analyze and validate thematic data. Green spaces were defined as valuable social-environmental regions and areas protected by existing legislation, with the latter being spared from development initiatives. Protected areas of the Community of Madrid Network are among the places exempt from urban development. Protected Areas (Regional Parks, Preserved Forest, Geological Points of Interest), Nature 2000 Network (Special Conservation Areas, Special Protection Areas for Birds), and Important Bird Areas (Birdlife International). Rivers and protected meadows are also incorporated through a 100-meter buffer from the thalweg. New forms were digitalized over PNOA orthophotographies: landscapes, driven highways (drawn over 1956 aerial photography of the USAF and PNOA, they also contain legally protected margins) [6].

All variables were saved as shape files (ArcGis 10.x) and kHx files (Google Earth). In alphanumeric format, three complimentary characteristics (landscape categorization, toponymical reference, and environmental value) were evaluated for each shape.

- Information generation via synthesis. To assess urban carrying capacity, landscape units were utilized (UCC). These components provide a synopsis of social-ecological and geographical factors. Their social-environmental values were described as follows: litho logy, geomorphology, topography, drove roads and excluded margins, rivers and excluded margins, protected areas, and vegetation and land uses [7].

The areas were categorized as having a high or medium ecological value or being of interest in the urban environment based on this value. We have established three types of urban carrying capacity based on this classification: high, medium, and low urban capacity (proposed protected areas). Singularity and dispersion criteria were used to categorize synthesis data, using two scales of reference: local and metropolitan [8]. The connection of these places with neighboring zones has been addressed at both sizes, and therefore the significance of these areas in an open spaces network has been examined.

The very comprehensive research allows for a more accurate evaluation of Edge Open Spaces' social-environmental benefits. Without this comprehensive perspective, determining the true value of the EOS and the findings and conclusions of this chapter would be difficult. F. Allende et al. 3 Madrid's Open Spaces Evolution Planning of open spaces surrounding the municipal border of Madrid throughout the Recent Municipal General Plans (1963–1997) is a chronicle of a continuing failure [9]. The legally obligatory urban planning started in the 1950s. The first three General Plans created a series of green belts that were repeatedly breached. The fourth, which was adopted in 1997 and is still in effect, proposes full urban development for the whole municipal territory. The Spanish housing bubble (1996–2006) encouraged this expansionist strategy of almost limitless urbanization, which was always backed by local authorities. Currently, Madrid has just a tiny representation of underdeveloped edge open areas. The continuity with traditionally protected woods increases the footprint of these tiny regions on the outskirts of the city [10].

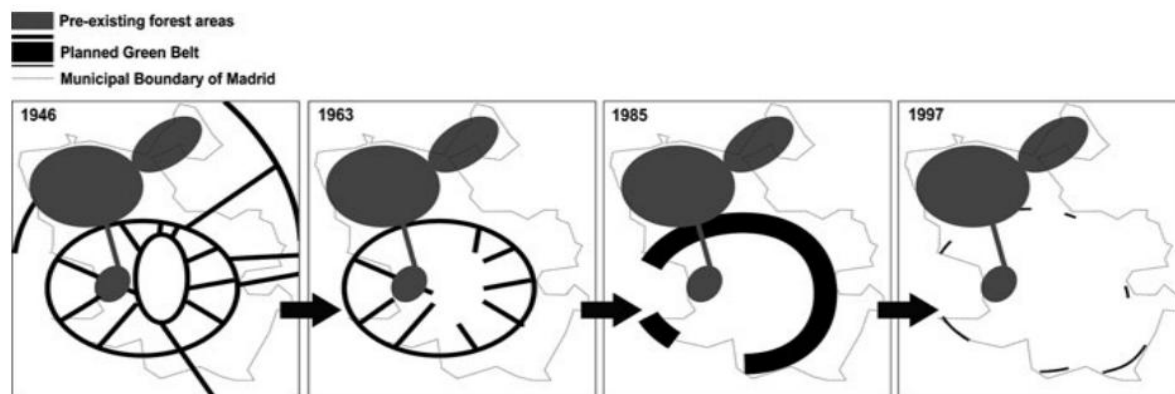


Figure 1: Schematic representations of the structures of the successive Green Belts

Following a definition of the city's recent history, including the genesis and structure of the main important open spaces, we will thoroughly examine the substance of each General Plan and their vision for these places. The demolition of the green compromise for a more livable and greener city will then be debated. The demise of this compromise begins with the partial invasion of planned open areas and ends with the neoliberal urban model's final extinction. Figure 1 discloses the Schematic representations of the structures of the successive Green Belts.

3. CONCLUSION

To begin with, there has been a noticeable shift in the ethical and aesthetic approaches that characterized the city model presented by public authorities via their many General Plans. This is inferred not just from the ultraliberal emphasis of the 1997 General Plan, but also from the 2020 Madrid City Future plan. The blueprint that should have guided conservative municipal policy focused on increasing transportation and smart city management, but it overlooked problems connected to green infrastructure. In contrast to previous General Plans, it did not aim to establish a Green City. As a result, there is a stark contrast with other European cities determined to strengthen their green belts, such as Oresund, Copenhagen's metropolitan region, which was named European Green Capital by the European Commission in 2014, as well as Vitoria-Gasteiz in Spain and Hamburg in Germany, which won cities in previous years.

Second, even while acknowledging the limits of the Madrid territorial model of open spaces, the value of what currently exists should be emphasized. In crowded and dynamic cities like Madrid, the ability to rearrange the territory is critical. In this view, intervention over the wastelands is critical, since they are places that are deteriorating due to rural abandonment but still have landscape, aesthetic, ecological, and strategic assets. They may serve as the foundation for the articulation of regional open spaces.

Third, we call on increased political commitment in order to achieve an agreement on a new territorial model in which open spaces play a significant role as environmental services. The significance of these areas for urban planning has previously been highlighted. Nonetheless, these regions continue to be devalued in planning. The percentage of green spaces, the recent changes in their overall size, the number of departments responsible for these areas, and the experience with public involvement all has a role in the effectiveness of this planning. Fourth, protection and integration of open spaces in a network of green infrastructures have been identified as a priority measure for climate change mitigation, and we think that their inclusion in general urban development plans is required. Finally, it has been shown as a critical concept that the design of GIS tools and the technical competence of local governments are critical factors for the creation of an effective information management system. It is doubtful that an appropriate intervention plan can be provided without a thorough examination of the EOS. This is the primary contribution of the study presented here.

REFERENCES

1. A. Cheshmehzangi, "City Enhancement beyond the Notion of 'sustainable City': Introduction to Integrated Assessment for City Enhancement (iACE) Toolkit," in *Energy Procedia*, 2016.
2. A. D'Auria, M. Tregua, and M. C. Vallejo-Martos, "Modern conceptions of cities as smart and sustainable and their commonalities," *Sustain.*, 2018.
3. C. Willmore, J. Longhurst, W. Clayton, H. Tweddell, and A. Walsh, "Young People's Role in Creating Sustainable Cities," in *World Sustainability Series*, 2018.
4. D. L. Chang, J. Sabatini-Marques, E. M. da Costa, P. M. Selig, and T. Yigitcanlar, "Knowledge-based, smart and sustainable cities: A provocation for a conceptual framework," *J. Open Innov. Technol. Mark. Complex.*, 2018.
5. L. Brazil, D. Vivas, M. A. Sarmento, and O. Longo, "Sustainable cities: Paths taken in Brazil," *WIT Trans. Ecol. Environ.*, 2013.
6. Sustainable City | Fully Charged, "Sustainable City | Fully Charged," *YouTube*, 2017. .
7. S. E. Bibri and J. Krogstie, "Smart sustainable cities of the future: An extensive interdisciplinary literature review," *Sustainable Cities and Society*. 2017.
8. Centre for Liveable Cities, *Liveable & Sustainable Cities: A Framework*. 2014.
9. ITU-T SG20, "Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals," *Recomm. ITU-T Y.4903/L.1603*, 2017.
10. X. Bai *et al.*, "Defining and advancing a systems approach for sustainable cities," *Current Opinion in Environmental Sustainability*. 2016.