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**Working Paper**

## Urban revitalization and shelter inadequacy: A geospatial analysis

PIDS Discussion Paper Series, No. 2025-40

**Provided in Cooperation with:**

Philippine Institute for Development Studies (PIDS), Philippines

*Suggested Citation:* Ancheta, Jenica A.; Magno-Ballesteros, Marife; Ramos, Tatum P. (2025) : Urban revitalization and shelter inadequacy: A geospatial analysis, PIDS Discussion Paper Series, No. 2025-40, Philippine Institute for Development Studies (PIDS), Quezon City, <https://doi.org/10.62986/dp2025.40>

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## **Urban Revitalization and Shelter Inadequacy: A Geospatial Analysis**

*Jenica A. Ancheta, Marife M. Ballesteros,  
and Tatum P. Ramos*

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Urban Revitalization and Shelter Inadequacy:  
A Geospatial Analysis

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PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

December 2025

## **Abstract**

This study examines the effects of urban revitalization strategies in Metro Manila, focusing on their implications for housing adequacy. Using geospatial and statistical analyses, the research integrates GIS-based mapping and demographic data to trace patterns of housing growth, land value changes, and spatial inequities associated with upzoning and urban renewal in Metro Manila. Findings reveal that revitalization projects have significantly transformed Metro Manila's urban landscape, driving high-density mixed-use developments and increasing land values. However, these gains are spatially uneven, with adjacent areas constrained by inadequate infrastructure and environmental risks experiencing minimal growth. While revitalization improved housing quality and expanded residential stock, affordable housing supply remains concentrated in peripheral regions, reinforcing spatial inequalities and gentrification pressures. The study underscores the need for inclusive urban planning through policies such as inclusionary mixed-income zoning, transit-oriented development, and community land trust strategies that would promote equitable urban growth.

**Keywords:** cities, urban revitalization, zoning, housing, Geospatial analysis

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# Urban Revitalization and Shelter Inadequacy: A Geospatial Analysis

## *Jenica Ancheta, Marife Ballesteros, and Tatum Ramos*

### 1. Introduction

Amid rapid urbanization faced by cities globally, countries consider urban revitalization strategies to build agglomeration economies for cost savings and increased efficiency in the management of urban areas. Urban revitalization involves up-zoning or urban renewal that is often accompanied by significant changes in land use and land cover. Most governments argue for urban revitalization to optimize the use of land, protect biodiversity, alleviate the rising cost of housing, and enable inclusive development. However, the effects on housing, in particular, equitable access to housing could either be negligible or geographically limited. It can also result in gentrification whereby low-income residents, especially renters, are being displaced by middle- or upper-income residents (Carmon 1990 in Perkins and Brow 2009; Davis 2021).

The difference in impact underscores the complex interplay of market forces, government policy interventions, and household decisions, which can differ across countries (Chen and Li 2025). In Hongkong, upzoning exacerbates income-based clustering and vertical segregation given rigidities on zoning that restrict land supply, constrain housing availability and amplified speculative market behaviors (Chen and Li 2025). On the other hand, Singapore's centralized housing model supported by proactive land governance and mixed-income planning achieves 80 percent coverage of households for public housing (Chiu and Ha 2018). In Tokyo Metropolis, the policy of adaptive zoning aligned housing supply with demographic shifts thus curbing price volatility (Glaeser and Gyourko 2018).

The Philippines adopt zoning policies like Hongkong, mainly market driven addressing housing affordability with policies such as housing subsidies and land supply expansion (e.g. urban sprawl). Within this policy backdrop, this study considers government urban revitalization or upzoning strategies through greenfield or brownfield developments that have ballooned in the early to mid-2000 in highly urbanized cities such as Metro Manila. Metro Manila is among the top densely populated cities in Asia with a population density of 43,064 persons per square kilometer as of 2022. Despite this condition, "greenfield and brownfield" areas are scattered within the city interspersed with low-income neighborhoods. The development of these areas has been encouraged by the government with the intent to optimize the use of land toward inclusive urbanization and better integration of social, environmental, economic elements of communities with infrastructure upgrading. However, we also note the intensifying tension between market-driven urbanization and equitable access to shelter due to these projects.

Urban revitalization attracted considerable research globally in the fields of regional sustainability, housing and urban ecology. There is, however, limited empirical work in the country that examined the benefits of revitalization projects along these fields. This study is relevant given the unfavorable urban environment and the deepening housing crisis arising from rapid urbanization of Philippine cities.

## 2. Objectives of the Study

The study aims to analyze urban revitalization effects on city and residential development using spatiotemporal analysis. It will focus on Metro Manila, where several urban revitalization projects have been happening in the past three decades. Metro Manila is also viewed as the microcosm of the bigger geospatial agglomeration dynamics that is the Philippines.

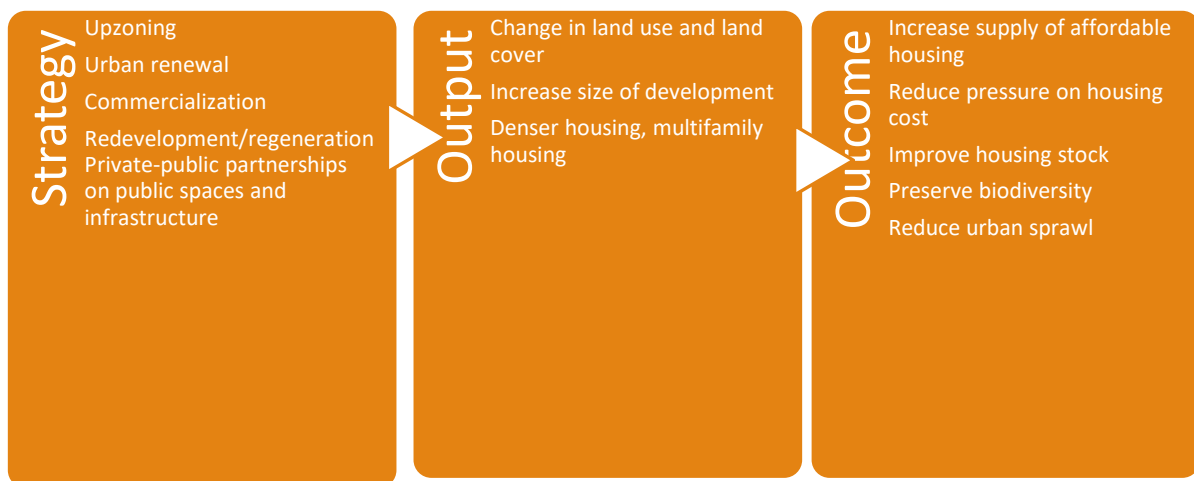
In particular, the specific objectives are:

- a. Determine the evolution of the stock of residential housing in Metro Manila. How has the stock of residential buildings developed in Metro Manila (e.g. types, housing material stock or habitability)
- b. Assess the spatial characterization of residential distribution in relation to hotspot areas (e.g. urban landscape, agglomeration, population and housing, street patterns or road traffic factors).
- c. Examine changes in land prices and land price gradient in projects that have undergone upzoning/urban renewal or revitalization.

## 3. Conceptual Framework: Urban revitalization and inclusive housing development

Urban upgrading or renewal increases the size of development and allows the construction of denser housing and multifamily housing, thus, helps increase the housing supply, reduce the pressure on housing costs and provide incentives for neighborhood owners to improve housing stock (Figure 1) (Davis 2021). These strategies will also diminish or at least moderate urban sprawl, thus providing environmental protection. Urban sprawl is associated with significant negative environmental, economic, and social consequences while an agglomeration economy characterized by controlled densification enables economies of scale and contributes to economic growth of cities or sub-regions (Wang et al 2021; Yejin et al 2024).

**Figure 1. Urban revitalization framework**



Source: Authors summary from reviewed literature

Empirical research that examined the link between urban revitalization tools and urban development changes noted both positive and negative effects that are influenced by the interplay between market forces, policy interventions, and household decisions (Chen and Li 2025).

Chen and Li (2025) noted that cities characterized by land scarcity and a dualistic housing market (private vs public) can exacerbate socioeconomic disparities observed through spatial patterns such as income-based clustering and vertical segregation. The authors' analysis also revealed that land use or rezoning policies that prioritize revenue generation over equitable development have further polarized the housing landscape in the city. This finding implies that urban revitalization policies can exacerbate skewness of housing resources unless government moves away from a reliance on land revenues and directs the allocation or rezoning of certain areas for affordable housing.

In the United States, most of the largest cities, have used “upzoning” strategies for higher density development to increase housing supply and address housing affordability problems. Freeman (2019) examined the impact of upzoning on housing production and land values in Chicago between 2013 and 2015. Using hedonic regression model and controlling parcel and neighborhood characteristics, he finds that upzoning is positively associated with increases in property value and housing prices in the short-term, which could accelerate gentrification. Moreover, there was no statistically significant evidence that upzoning leads to higher housing unit construction activity within five years of the zoning change, indicating that improvement of housing affordability is negligible in the short term.

Wolf-Powers (2005) that the upzoning of previously light industrial districts in Brooklyn, USA contributed to property speculation and the displacement of firms and shifted the city's economy toward dominantly white-collar and service functions” (p.380) indicating that some level of gentrification pressures might have occurred.

Davis (2021) examined the effects of a series of city-initiated upzoning and neighborhood changes in New York City between 2002 and 2009 using a beta regression model that better captures direction of skewness that is ideal to use for heteroskedastic proportion data. The author reported that upzoning supports earlier findings of higher land values, accelerating gentrification pressures. As land values increase in upzoned areas, developers are likely to transfer these higher costs to tenants through increased rents, effectively limiting the ability of lower-income households to move into these neighborhoods (Stein, 2019). The author noted that upzoning should be accompanied by mandatory inclusionary housing (e.g. stronger tenant protection mechanisms; anti displacement policies) that provide more subsidized units for lower-income and minority households to help reduce gentrification pressures. Upzoning should incorporate safeguards that reduce negative effects on housing-insecure communities in order to expand much-needed housing supply in strong-market cities and promote more inclusive urban development.

Rodriguez-Pose and Storper (2020) reviewed the effect of relaxing zoning codes and inter-regional migration of lower-income households to cities and argued that upzoning does not exacerbate regional spatial inequalities. Instead, job availability is the most important factor in a low-income household's decision to migrate to a city than housing costs do. The authors

conclude that “blanket upzoning policies are unlikely to increase domestic migration or to improve affordability for lower-income households in prosperous areas” (p. 223).

In Switzerland, upzoning became prominent in the 1990s with the main consideration of protecting biodiversity. Municipalities allowed upzoning to promote the densification of existing settlement areas and reduce urban sprawl. Buchler and Lutz (2024) assessed the effects of upzoning on local housing supply and rents using econometric analysis in controlled and treatment areas. The study reported a significant increase (9%) in living space and housing units in the upzoned areas in the subsequent five to 10 years and by 50% after 15 years specifically in areas with stronger upzoning intensity. The increase in living space and housing supply was also noted at a lesser degree (5%) in the neighboring areas that were not rezoned. This spill-over effects were significant primarily in areas where large upzoning intensity was undertaken arising from the redevelopment efforts of landowners with properties nearby those properties with higher floor area ratio (FAR).<sup>1</sup> In terms of rents, upzoning did not lead to a significant change in rents because the rent effects dissipate across the entire city in the subsequent 10 years. Upzoning did not also have spillover effects on rents regardless of upzoning intensity. This result has been attributed to: (1) upzoning led to positive demand effect from wealthier households attracted to new and better-quality housing, thus canceling the supply effect; (2) the city of Zurich is a non-segmented city, where the supply of new market rate housing units has a chain effect on middle and low-income neighborhoods due to a law of one price.

In Vienna, a model of “gentle urban renewal” or public subsidized urban renewal is the government approach to neighborhood developments (Hatz 2021). The subsidy involves co-financing by the government of the renewal of neighborhood and/or housing (apartment) units as well as the provision of subsidized loan rates to private owners.<sup>2</sup> The intent of the approach is to perpetuate housing affordability and avoid gentrification. The study noted that the approach is successful. While gentrification is not completely avoided, gentle urban renewal has mitigated the process of displacement of low-income families from the neighborhood. Moreover, the involvement of the private sector and the inflow of households with a high social status allowed for a mixed culture and prevents the conversion of the neighborhood into “ghettos of low income” (Hatz 2021, p12).

The need for government intervention in the process of urban renewal is also noted in a study by the World Bank of slum upgrading programs in Metro Manila (World Bank 2017). The study revealed that for upgrading strategies to be inclusive, such interventions must go beyond straightforward brick and mortar approaches of urban upgrading. Aside from government subsidy, the informality of livelihoods and social relations among slum communities is to be incorporated in a transformation to formal housing or improved neighborhoods.

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1 FAR is the relationship between the total gross floor area of the building and its lot area. A higher FAR indicates a more intense, denser development

2 The Vienna housing market is primarily a rental housing market with about 76% are rental apartments and only 20% are owner-occupied.

#### 4. Methodology: GIS Procedures and Strategy of Analysis

A geospatial analysis framework was mainly used to trace and determine the effects of urban revitalization strategies in Metro Manila. Geospatial analysis is the process of examining location-based data to uncover patterns, trends and other relationships between variables that are that are often difficult to detect using conventional data presentation techniques, such as data tables. Essentially, geospatial analysis combines geographic information systems (GIS) with other data analysis techniques by adding a geographic component to traditional data types. By adding location coordinates or other spatial references in the analysis, data can be visualized in ways that may reveal location-specific trends, patterns, and relationships that would be hard to see otherwise.

In this study, four key datasets and analytical approaches were utilized: (1) the spatial mapping of Licenses to Sell data to assess housing development trends over the past decade; (2) the monitoring of changes in zonal values to trace variations in land prices; (3) the detection of land cover changes through satellite imagery and remote sensing; and (4) the generation of demographic and housing trend analyses from the Census of Population and Housing to evaluate shifts in spatial distribution characteristics. Initial dataset processing was conducted using Stata, while QGIS served as the primary platform for geospatial analysis.

The Licenses to Sell dataset provides an overview of properties under development and is available through the Department of Human Settlements and Urban Development (DHSUD). However, the dataset is published in PDF format, requiring conversion for processing and analysis. In addition, inconsistencies in reporting formats and variable values necessitated data cleaning to ensure usability. Moreover, the data was geocoded, meaning location coordinates were added, so it can be processed in a GIS software. Aside from just visualizing the location of the licenses to sell projects, kernel density analysis tool via GIS was also utilized to produce a heatmap highlighting the clustering of projects within certain regions. The generated maps were subsequently overlaid with other relevant map layers to identify deeper patterns and insights.

The zonal values were obtained from the Bureau of Internal Revenue (BIR) website. The data were presented in Excel format per RDO Of the cities. Within each RDO, the zonal values are listed per barangay and further classified per street, and according to different land classifications. The summary was computed by getting the average of the zonal values per land classification per barangay. The land classification categories are as follows:

**Table 1. Zonal Values Land Classification**

**Classification Legend:**

<i>Code</i>	<i>Classification</i>	<i>Code</i>	<i>Classification</i>
RR	Residential Regular	GL	Government Land
CR	Commercial Regular	GP	General Purposes
RC	Residential Condominium	I	Industrial
CC	Commercial Condominium	X	Institutional
CL	Cemetery Lot	APD	Area for Priority Development
A	Agricultural	PS	Parking Slot

With the following definitions:

Residential	Land/building principally devoted to habitation
Commercial	Land/building devoted principally to commercial purposes and generally for the object of profit.
Industrial	Devoted principally to industry as capital.
Agricultural	Devoted principally to raising of crop such as rice, corn, sugarcane, tobacco, etc. or to pasturing, dairying, inland fishing, salt-making and other agricultural uses including timberland and forest land.
General Purpose	Rawland, undeveloped and underdeveloped area which has potential for development into residential, commercial, industrial, institutional, etc. Must not be less than 5,000 square meters.

Source: Department Order from BIR

The changes in the land cover were processed using the Object-based Image Analysis (OBIA) tool in QGIS. OBIA is a type of remote sensing image analysis tool used for change detection in land use-land cover (LULC) (Idowu et al. 2020). OBIA is particularly useful in land use-land cover (LULC) studies involving buildings, which make up a huge portion of urban areas (Norman et al. 2021). OBIA uses an image segmentation algorithm that tags image pixels as segmented objects or polygons as opposed to just tagging single pixels (Norman et al. 2021). OBIA takes into consideration the shapes and textures of the aggregated image pixels unlike other pixel-based classification methods that focus only on spectral characteristics of single pixels (Weig & Riggan 2010 in Idowu 2020; Norman et al. 2021). However, this method heavily relies on the quality of segmentation which depends on a lot of factors such as satellite image quality, parameter settings, and feature tagging (El-naggar 2018; Pedernana et al. 2013 in Norman et al. 2021).

The satellite images used were Sentinel-2 (10m) satellite images, which is the highest quality satellite image accessible for free for the identified study area. For this analysis, the covered area is the study area plus a 3-kilometer buffer zone, which is measured from its center-point. For this study, the land cover was classified into 5 categories: 1 – water; 2 – roads; 3 – green/open spaces; 4 – built-up (low density); and 5 – built-up (high density). Built-up was further disaggregated to differentiate bigger structures (low density) from smaller ones (high density) [note: density is in terms of number of structures per square area]. The bigger structures are characterized by having bigger roofs or have more identifiable or prominent roofs or figures. Meanwhile, the smaller structures or high-density areas are those with smaller roofs and the structures are almost undistinguishable. These may represent slums or structures that occupy smaller spaces and are more cramped (World Bank 2017). The green or open spaces include parks, empty lots and rawlands.

The Census of the Population and Housing datasets were utilized to come up with statistical results on the demographic and housing characteristics of the study area. To enable spatial analysis in the QGIS software, the processed CPH datasets were merged with the barangay-level Philippine administrative boundary map (ADM4) using the Philippine Standard Geographic Code (PSGC). This spatialization allowed the datasets to be integrated into QGIS for further geospatial processing. The resulting spatialized CPH layers were subsequently

overlaid with other generated GIS map layers to facilitate comparative analysis. For this study, the 2010 and 2020 CPH, which are the latest CPH datasets available, were used to capture the latest trends in housing and population dynamics. Non-sample datasets were specifically used to allow analysis at the barangay level, since only the non-sample datasets have barangay level observations.

Metro Manila was chosen as the study area given the level and rate of its urbanization. Within this context, the Bonifacio Global City (BGC) township development is examined as a prominent case of large-scale urban redevelopment, offering insights into the spatial and socio-economic dynamics of contemporary urban transformation. More details of these will be discussed further in the following sections.

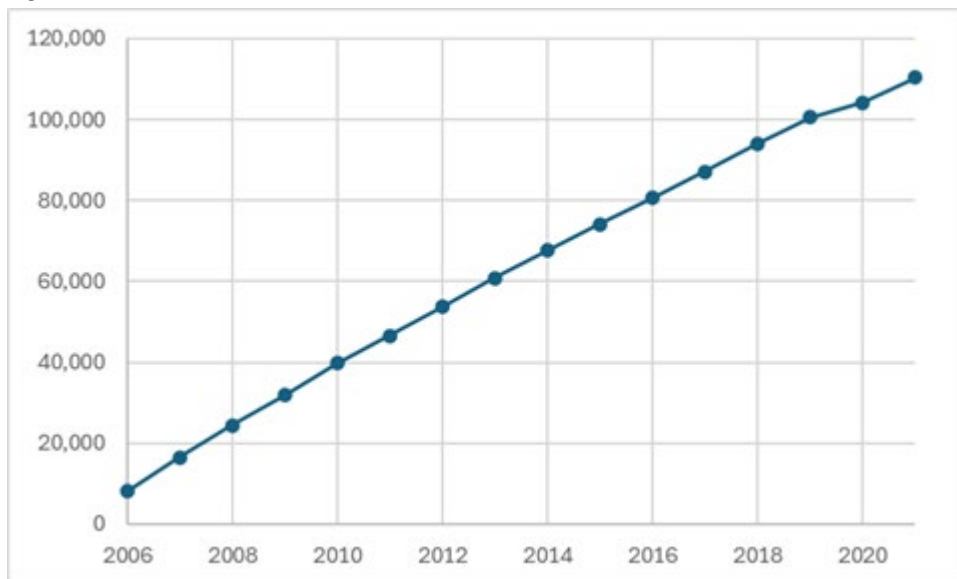
## 5. Metro Manila Residential Landscape and Urban Revitalization Projects

### 5.1 Evolution of residential building stock in Metro Manila

Metro Manila is the most densely populated region in the Philippines. In 2020, its population reached about 13.5 million and is projected to rise to nearly 15 million by 2040 (PSA). While the annual population growth rate has slowed in recent years to below 1%, the region's population density of over 43,000 persons per square kilometer, as of 2022, remains among the highest in the world. With rapid urbanization and limited land availability, Metro Manila continues to face significant challenges in providing affordable housing.

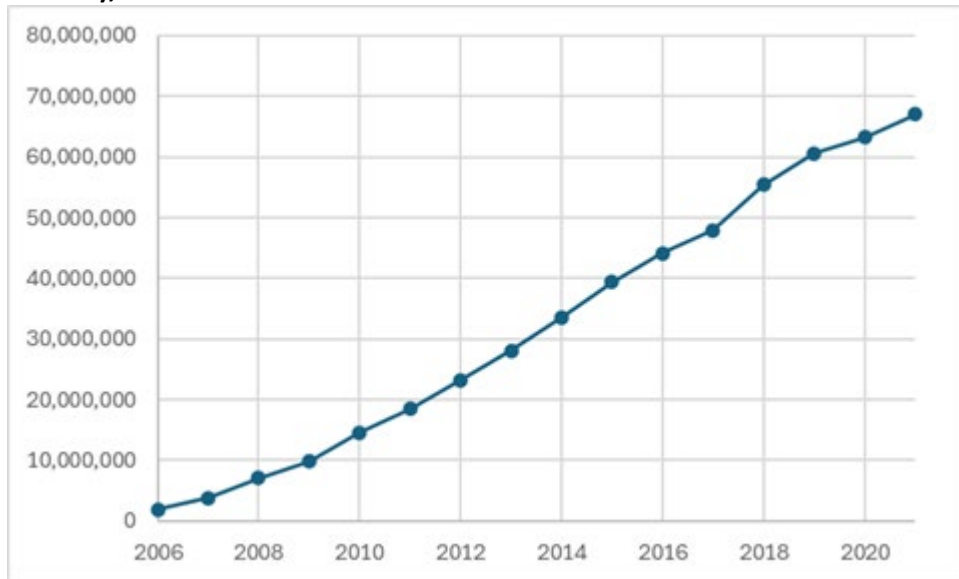
Residential housing stock in Metro Manila has been rising over time as reflected in the growth of residential construction in the past two decades. Between 2006 and 2021, the construction of residential housing increased by 13-fold in number (Figure 2) and in floor area (Figure 3).

**Figure 2. Cumulative Number of Residential Units Constructed in Metro Manila, 2006 to 2021**



Source: PSA & Local Building Officials (LBO) (2022)

**Figure 3. Cumulative Residential Construction Floor Area in Metro Manila (in square meters), 2006 to 2021**

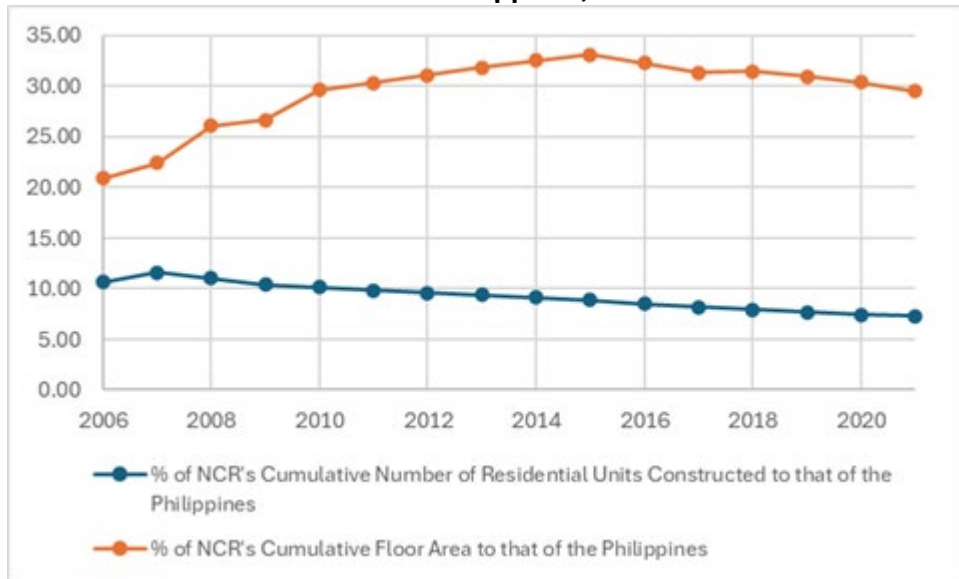


Source: PSA & Local Building Officials (LBO) (2022)

Metro Manila accounts for about one third of the new residential units constructed in the country. The proportion shows a rising trend from 2006 to 2015 but a slowing down after 2015, signaling the expansion of residential construction to other areas primarily in peripheral areas, which signifies pressure to move out of Metro Manila (Figure 4). On the other hand, while outer regions are urbanizing; developments in these regions are being planned in consideration of their connectivity to Metro Manila.

The data also shows that in Metro Manila, the increase in floor area has been accompanied by a slowing down of the number of residential units being built after 2015 compared to floor area, which indicates that larger-sized units are being built in the later years.

**Figure 4. Proportion of Metro Manila’s Cumulative Floor Area and Number of Residential Units Constructed to that of the Philippines, 2006 to 2021**

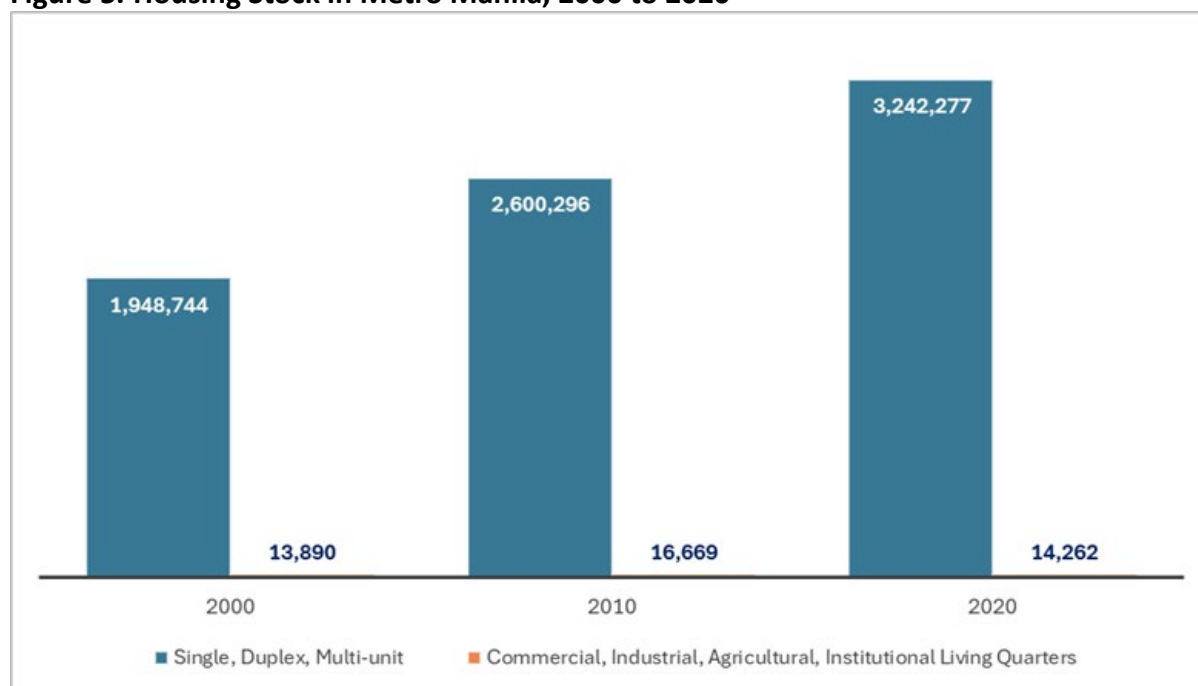


Source: PSA & Local Building Officials (LBO) (2022)

<sup>[1]</sup> Cumulative values for number of residential units constructed and floor area were generated by adding values from the previous year(s) to the value of the current year with 2006 as the earliest year where data were found. Consequently, the 2006 value is the actual number of residential units constructed and total floor area for that particular year.

From the Census of Population and Housing, we note that residential stock in Metro Manila is composed of single house, duplex and multi-unit residential buildings. From 2000 to 2020, there has been an increase in these types of housing in Metro Manila (Figure 5). The number of units rose from 1.9 million to 3.2 million. The number of units corresponds is 200,000 less than the number of households in Metro Manila in 2020, which means households living in non-housing units. This is shown from the number of households residing in commercial/industrial/agricultural (eg. factories and offices) and institutional buildings (eg. hospitals and hotels). The proportion of such living quarters is less than one percent and has declined in the last two decades, indicating some improvements in housing stock.

**Figure 5. Housing Stock in Metro Manila, 2000 to 2020**



Source of Basic Data: PSA (n.d.-a-c)

In terms of habitability of housing units, we note that the majority of these units can be considered habitable based on their physical conditions. In this study, habitability is based on the definition used in the study of Ballesteros et al. (2024), wherein “habitability is based on the construction materials used for the roof and outer walls, as well as the state of repair. While the units considered uninhabitable include those whose roof/wall are made up of makeshift/salvaged/improvised materials, without walls at all, need major repair, and dilapidated/condemned” (p. 40). Table 2 shows that about 92 percent of residential housing units in Metro Manila are habitable as of 2020. The housing conditions are noted to be better compared to 2000, when only about 80 percent of residential units are considered habitable. This implies that aside from the additional number and floor area of new residential construction, existing housing stocks are being improved. Among different housing types, single housing units have the least percentage of habitable units compared to duplex and multi-unit residential units.

**Table 2. Residential Housing Units in Metro Manila by Habitability per Housing/Building Type, 2000 to 2020 (Column %)**

		Habitable	Uninhabitable	Unknown	Total
2000	Single House	78.73	19.18	2.09	100.00
	Duplex	80.51	17.60	1.89	100.00
	Multi-unit	80.08	18.85	1.08	100.00
	Total	79.31	18.93	1.75	100.00
2010	Single House	85.46	12.78	1.76	100.00
	Duplex	86.38	12.06	1.56	100.00
	Multi-unit	86.90	11.07	2.03	100.00
	Total	86.01	12.17	1.82	100.00

2020	Single House	91.71	7.93	0.36	100.00
	Duplex	93.64	5.97	0.39	100.00
	Multi-unit	94.84	4.00	1.15	100.00
	Total	92.71	6.70	0.59	100.00

Source of Basic Data: PSA (n.d.-a-c)

We also note that the number of floors of residential types varies (Table 3). Units in single houses are more likely to be in a single-storey house, while around 46% of the units in duplex houses are in dwellings with two floors. Around 34% of units in multi-unit residential buildings are in buildings with two floors, but there are also around 16% of units in buildings with three storeys and 15% in those with more than 11 floors. The presence and rising number of higher density residential buildings in the recent decade reflects the direction towards condominium living quarters, which also results from the rising land prices in the metropolitan areas.

**Table 3. Housing Units in Metro Manila by Number of Floors of the Building and Housing/Building Type, 2020 (Column %)**

Floors	Single House	Duplex	Multi-unit	Total
1	47.59	42.03	18.25	38.76
2	40.99	45.67	33.90	39.10
3	8.81	9.16	16.09	10.96
4	1.76	2.13	7.46	3.44
5 to 10	0.00	0.00	9.20	2.70
11 up	0.00	0.00	14.54	4.27
Unknown	0.85	1.00	0.57	0.77
Total	100.00	100.00	100.00	100.00

Source of Basic Data: PSA (n.d.-a-c)

## 5.2 Overview of urban revitalization projects in Metro Manila

In response to rising population pressures and intensifying urban density, numerous township projects have been developed across the region in the past decades. These large-scale, mixed-use estates combine residential, commercial, and institutional functions, and are often marketed as self-contained communities designed to meet the needs of an increasingly urbanized population. The major developments in Metro Manila over the past three decades are summarized in Table 4. When classified according to the four geographical quadrants of the metropolis, three of these are located in North Metro Manila, while the rest are situated in the southern part. Notably, no prominent township development projects were identified in the eastern (Pasig and Marikina) and western (Manila, Malabon, and Navotas) portions of Metro Manila in the past 25 years.

**Table 4. Key Township Development in Metro Manila**

Area	Description
North Metro Manila	
Eastwood City, Barangay Bagumbayan, Quezon City	Eastwood City launched by the Megaworld Corporation in 1997 is a 18.5-hectare township comprising of offices, residential condominiums, retail and commercial spaces, learning institutes, healthcare facilities, and a police and fire station (Aquino 2015; Megaworld 2025a). It is widely regarded as Metro Manila’s first urban township, as well as the first cyberpark (Aquino 2015, Lacsamana 2021). Thus, it also houses several IT-BPO and multinational companies.
Vertis North, Quezon City	A 46-hectare mixed-use estate developed by Ayala Land with the National Housing Authority (NHA). The area is located in the currently being developed Quezon City CBD. The price range of the condo units built in the area are around ₱4.1 million – ₱17.4 million per condo unit (Aquino 2015). The township is expected to stimulate business and lifestyle growth across Quezon City.
Greenfield District, Mandaluyong City	A 15-hectare mixed-use township that, like the Ayala Center, is strategically located near Makati, Ortigas, BGC, and Eastwood City and highly accessible via public transport and road networks (Bernardino 2023). Moreover, the development prioritizes being pedestrian-friendly and having green open spaces.
South Metro Manila	
Bonifacio Global City (Uptown Bonifacio, Fort Bonifacio, Taguig City)	A mixed-use township comprising of residential and commercial condominiums, commercial and office spaces, healthcare facilities, learning institutes and other establishments, designed as a premier cosmopolitan central business district with an upscale lifestyle (Megaworld 2025b). The 15.4-hectare Uptown Bonifacio has around 3,500 luxury condominium units (Aquino 2015), 400,000 sqm of office space (Lamudi 2019), and 90,000 sqm of retail and dining spaces. Meanwhile, the 5-hectare Forbes Town Center has 12 condominium towers equivalent to around 3,500 units (Megaworld 2025b).
Bonifacio Global City (Veritown Fort, Taguig City)	A 10-hectare New York City-inspired lifestyle community with residential, hospitality, and office spaces (Aquino 2015). It is marketed as a luxury township that caters to high-end local and international clients.
McKinley Hill, Fort Bonifacio, Taguig City	Regarded as the largest township in Metro Manila with about 54 hectares (Lacsamana 2021). A mixed-use development with residential, commercial, and other institutional spaces (e.g. schools, embassies, etc.) It has around 10 hectares dedicated to residential space with about 34 condominium towers and houses more than 60 multinational companies (Lamudi 2019).
McKinley West, Fort Bonifacio, Taguig City	A 34.5-hectare township development with residential villages and condominiums, commercial and office spaces, and other infrastructure

	and amenities. The prices of the residential lots and units reaches up to 200,000/sqm. It is considered as Megaworld's flagship luxury township (Lamudi 2019).
Century City, Makati City	A township branded as a "vertical village" which has residential condominiums, commercial, office, retail, and lifestyle spaces, as well as healthcare facilities. The price range of the units are around P8 – 92 million per unit (Aquino 2015). The township is marketed as a symbol of global luxury and innovation in Makati through building international-standard communities.
Circuit Makati, Makati City	A 22-hectare mixed-use commercial and entertainment hub built on a former racetrack. The residential and commercial condominiums have prices ranging from ₱3.8 million – ₱19.1 million per unit (Aquino 2015).
Rockwell Center, Makati City	A 15.5-hectare mixed-use township built on a former thermal power plant site (HousingInteractive n.d.-c). It offers luxury residential properties and upscale rentals, catered to affluent urban dwellers.
Ayala Center, Makati City	A mixed-use township strategically located near Makati, Ortigas, BGC, and Eastwood City, which are major CBDs (HousingInteractive n.d.-e). Its location is also highly accessible via transport terminals, main roads, and rail networks (Bernardino 2023). It is a prime business and commercial hub surrounded by high-end malls, schools, restaurants, and parks.
Bay City, Pasay/Paranaque City, Manila Bay Reclamation Area	A mixed-use township being developed in the reclamation sites since old Manila is running out of lands big enough for large-scale projects such as township developments. It is strategically located in the area envisioned to become "Manila's Las Vegas" that will comprise of casino and resort projects (Aquino 2015).
Newport City, Pasay City (2009)	The Newport City is a 25-hectare township project strategically located near the airport and other entertainment and hospitality hubs (Megaworld 2025c).
MET Park, Pasay	A 36-hectare mixed-use township that will focus on cultural and creative spaces. It is strategically located near EDSA, Roxas Boulevard, Macapagal Boulevard, and within Bay City that will be home to the entertainment hub (Federal Land n.d.). More than being just a business and residential hub, it also aims to be Metro Manila's cultural and lifestyle center.
Filinvest City, Muntinlupa City	A 244-250-hectare premier mixed-use township located in the Metro South. It is the first and only green-certified CBD in the Philippines; BERDE 3-star rated and LEED Gold-certified (Filinvest City 2024). It prioritizes eco-friendly master planning with parks, trails, and open spaces.

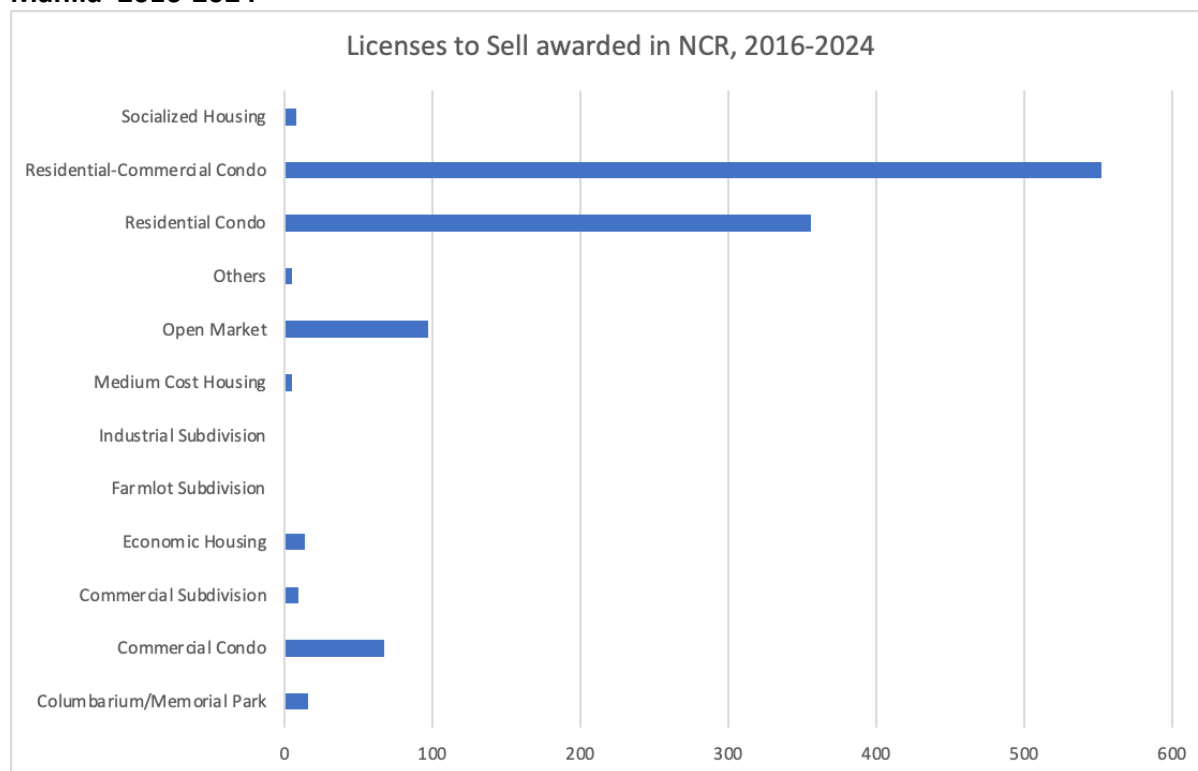
Source: Authors' compilation from online sources

## 6. Geospatial characterization of Metro Manila

### 6.1 Spatial Agglomeration Analysis

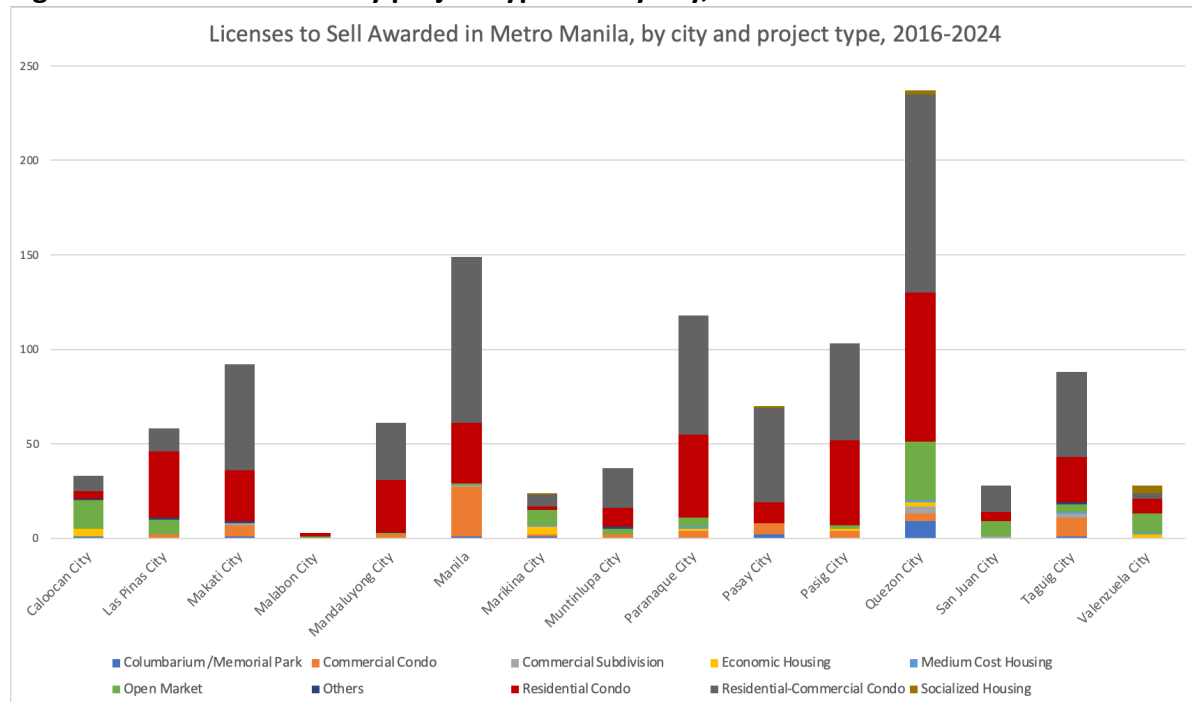
Analysis of the Licenses to Sell data over the past decade reinforces the spatial development patterns in Metro Manila. In the National Capital Region (NCR), the largest share of approvals was for Residential-Commercial Condominiums, with 552 licenses issued (Figure 6), with most of them located in Quezon City (105), then Manila (88), Parañaque (63), and Makati City (56) (Figure 7). This was followed by Residential Condominiums with 356 licenses, most of which are again located in Quezon City (79), then Pasig City (45) and Paranaque (44). Open Market developments ranked next with 97, and Commercial Condominiums with 67. This distribution reflects the dominance of and growing trend towards high-density, mixed-use vertical developments in shaping Metro Manila’s urban landscape.

**Figure 6. Licenses to sell for residential, commercial, and industrial projects in Metro Manila 2016-2024**



Source: Authors’ summary of licenses to sell data from DHSUD

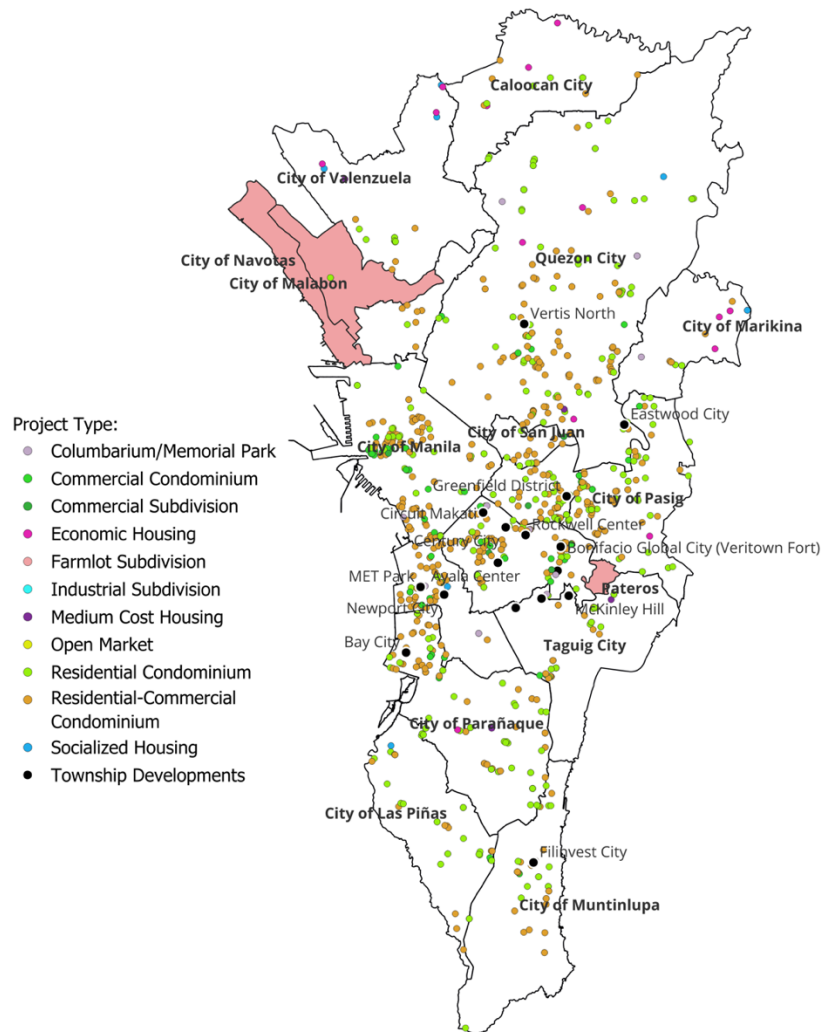
**Figure 7. Licenses to sell by project type and by city, Metro Manila: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

Within Metro Manila, Quezon City recorded the highest number of projects with 237, followed by Manila (149), Parañaque City (118), Pasig City (103), Makati City (92), and Taguig City (88). This spatial distribution aligns with the concentration of township developments across the region, as discussed above. It is also interesting to note the scarcity of projects in some parts of Metro Manila such as Malabon City having only 3 projects, and none in Navotas City and Pateros for the years 2016 to 2024 (Figure 8).

**Figure 8. Licenses to sell awarded in NCR, by project type: 2016-2024**



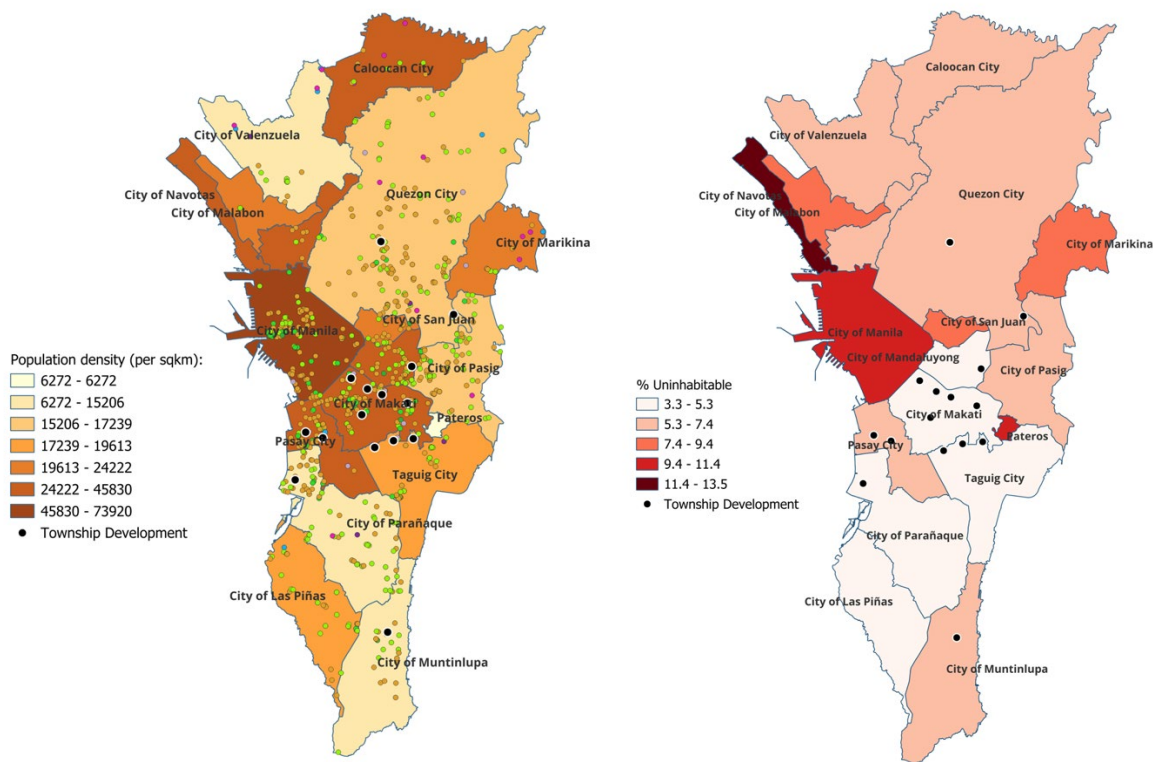
Source: Authors' summary of licenses to sell data from DHSUD

The limited number of residential and commercial developments in these areas highlights the uneven spatial distribution of urban growth within the metropolis. A key factor contributing to this pattern is the geophysical and environmental risks associated with these locations. Navotas and Malabon are low-lying coastal areas that are highly susceptible to flooding and storm surges (Enano 2021). These areas also face increasing vulnerability to land subsidence or sinking of the land and rising sea levels brought about by climate change (Enano 2021). Constructing large-scale infrastructure such as roads and building, which are essential components of urbanization, without adequately addressing these flooding and foundation challenges may further exacerbate these environmental risks (Enano 2021). While several flood-mitigation projects have been initiated, their implementation has often been delayed due to bureaucratic challenges, such as changes in political leadership and administrative inefficiencies (Inquirer 2018). Consequently, these persistent environmental and governance barriers have constrained private investment and hindered the expansion of urban development in these flood-prone areas.

As for Pateros, one of the primary constraints to its urban development is its limited land area of only 168 hectares, which significantly restricts its capacity to accommodate large-scale projects (De Borja 2023). According to a 2005 land use classification report, about 91.62% of its land area is allocated for residential use, leaving only 4.40% for commercial, industrial, and agricultural purposes. This limited land availability, combined with its small population, which is the lowest among all localities in Metro Manila with only 65,227 as of the 2020 Census, and its status as a municipality rather than a city, further constrains its potential for major urban development (De Borja 2023).

Examining the spatial distribution of projects in relation to population density reveals that most developments are concentrated in densely populated areas, represented by the darker shades on the map (Figure 9). However, there are also indications of a mismatch between population density and project distribution. For instance, densely populated cities such as Navotas, Malabon, and Caloocan have relatively few projects. In terms of habitability, areas with relatively limited or no projects built such as Navotas, Malabon, Marikina, San Juan, and Pateros tend to have higher proportions of uninhabitable housing units.

**Figure 9. Population density and uninhabitable residential stock and population density by city: 2020**

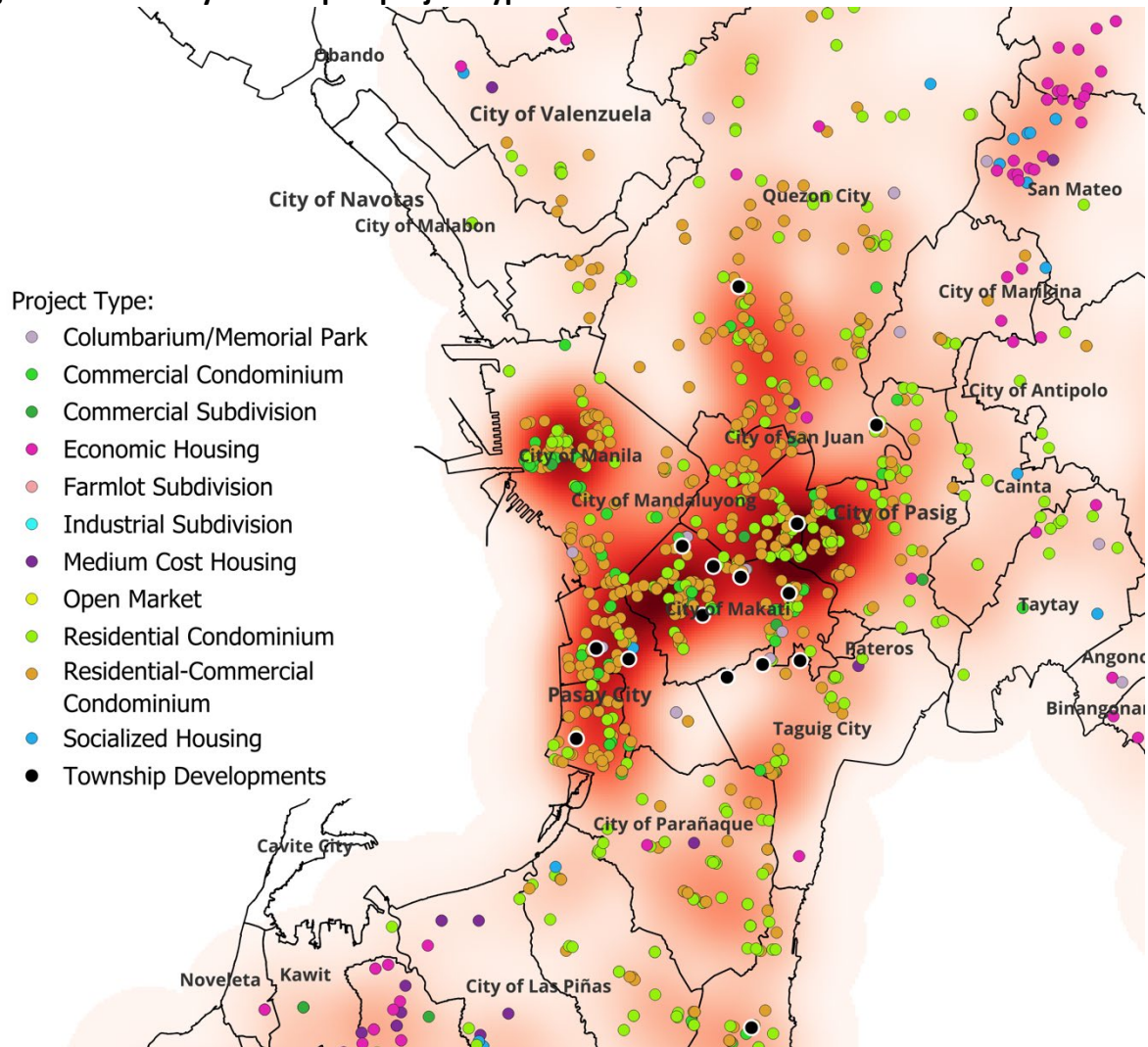


Source: Authors' summary of licenses to sell and 2020 CPH data

## 6.2 Density Analysis and Hotspots

Spatial analysis further reveals distinct clustering patterns of residential condo (yellow green points), commercial condo (red points), and residential-commercial condo (yellow points) projects in Makati City, Manila City, and Pasay City, over the last 10 years (Figure 10). This concentration may partly be explained by the historically high demand for condominium units in these areas due to prevalence of Philippine Offshore Gaming Operators (POGOs) during that time (Camba 2020; Mendoza et al. 2018). As of 2020, Makati, Pasay, and Manila had the highest number of POGO establishments in NCR (Ibon Foundation 2020), increasing rental demand and encouraging high-rise constructions in those areas. Another factor may be the presence of the University Belt in Manila, an area with a high concentration of colleges and universities, which generates a high rental demand from students who temporarily reside in the area to pursue higher education.

**Figure 10. Density heatmap of project types in Metro Manila: 2016-2024**

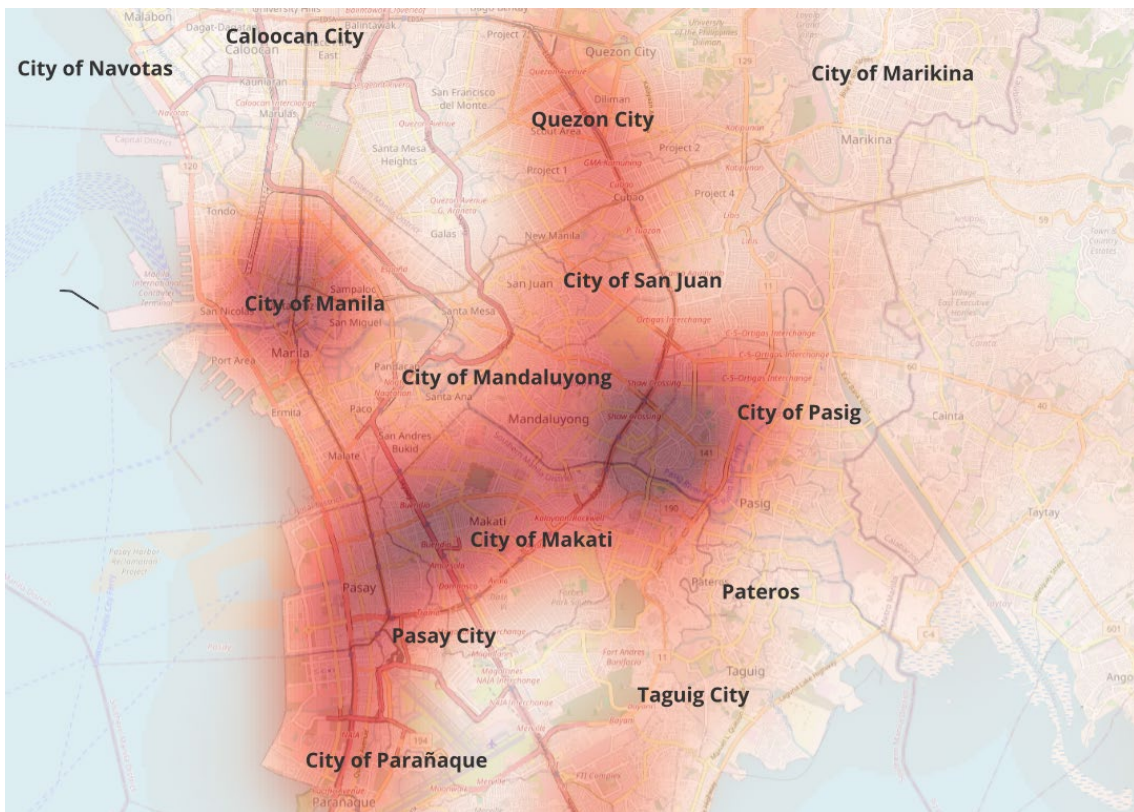


Source: Authors' summary of licenses to sell data from DHSUD;

Another prominent clustering of residential and residential-commercial condominium projects is found across the boundaries of Mandaluyong, Pasig, and Makati City. This pattern may be

attributed to the strategic accessibility of these areas. This hotspot is located between key business districts such as BGC, Makati CBD, and Ortigas CBD, between two major highways, which are EDSA and C-5. The map below showing the density hotspot analysis overlaid on an Open Street Map basemap shows the location of the hotspots in relation to the road networks (Figure 11). The pattern shows how clustering tends to be located along major road networks, highlighting the role of connectivity in shaping development patterns. Moreover, the area where this hotspot is located also has relatively lower zonal values compared to the business districts, which will be discussed in the following sections.

**Figure 11. Project Type Density Heatmap across Metro Manila’s road network**



Source: Authors’ summary of licenses to sell data from DHSUD

To obtain a more in-depth analysis of the effects of urban revitalization strategies at a finer scale, this study will focus on the Bonifacio Global City (BGC) in Taguig City as a case study area. As a prominent large-scale urban redevelopment project with substantial economic impact, BGC has significantly transformed the urban dynamics of its area, as well as the neighboring districts. Eastwood City was also considered a potential case; however, given that the available Licenses to Sell dataset only covers the period 2016–2024, the results would not fully capture Eastwood City’s peak development phase. In contrast, BGC’s growth trajectory coincides with the available data, as it is a relatively recent development, but at the same time has already reached a certain level of maturity. Other township projects, meanwhile, are either still under development or have only recently commenced.

### 6.3 Case study of Bonifacio Global City development

The Bonifacio Global City (BGC) is a high-density, mixed-use township development spanning approximately 240 hectares and is now recognized as one of the major central business districts in the Philippines. Its development is relatively recent, beginning in 1995 when the investment holding company Metro Pacific Corporation acquired a 150-hectare portion of Fort Bonifacio (Urban Land Institute 2020). To oversee the transformation of the area, the Fort Bonifacio Development Corporation (FBDC) was established. The FBDC operates as a public–private partnership (PPP), with 55% owned by the private sector and 45% by the government, through the Bases Conversion and Development Authority (BCDA) (ULI 2020).

From its origins as a military base in the 1990s, the area has undergone a rapid and extensive transformation into a premier urban district characterized by residential and commercial condominiums, office and retail spaces, educational and healthcare institutions, and other key urban infrastructures.

#### 6.3.1 Changes in Land use cover

The figure below presents an aerial view of Bonifacio Global City (BGC) at different points in time, showing its significant transformation over a span of two decades (Figure 12). In the 2005 satellite image, the area is still largely undeveloped, with visible open fields and vacant lots. However, the planning grids are already visible signifying that the developments are underway. By 2025, the satellite image shows a dramatic transformation of the area marked by dense concentration of high-rise buildings, extensive commercial and residential infrastructure, and carefully integrated pockets of green space that reflect a meticulously planned urban community.

Figure 12. Aerial view of Bonifacio Global City's transformation from 2005 to 2025



2025



Source of images: Google Earth

For a more quantitative-based approach in detecting land use land change cover of the area due to urban revitalization efforts, the object-based image analysis geoprocessing tool was also utilized. Two satellite images of BGC from different time periods covering a 3-kilometer buffer zone measured from the center-point were analyzed. As discussed in the methodology section, the earliest available processable satellite image with a good quality is from 2015, thus the two time periods that will be compared are 2015 and 2025. Based on the results of the OBIA, the area percentage of roads increased from 14.72% to 26.27%, while the green/open spaces decreased from 27.28% to 16.33% (Table 5). This can be related to the increase in road area. The total built up decreased from 54.67% to 52.83%. However, the low density built up increased from 25.31% to 27.58%. The high density built up meanwhile decreased from 29.36% to 25.25%, which can be related to the increase in roads and low density built up.

**Table 5. Land change cover of BGC plus 3-kilometer buffer area from 2015 to 2025**

BGC	2015	2025	Changes in Area (in sqm) from 2015 to 2025
Water	3.32	4.57	427,270.99
Road	14.72	26.27	3,949,173.27
Open space	27.28	16.33	(3,745,512.62)
Built up (Total)	54.67	52.83	(630,031.71)
<i>Built up (low density)</i>	25.31	27.58	(608,549.89)
<i>Built up (high density)</i>	29.36	25.25	(1,408,690.16)
Total	100.00	100.00	

Source: Authors' processing of satellite images from ESRI.

Note: The satellite images used and the results of the segmentation and classification processes can be found in the annex

It should be noted, however, that the OBIA method applied in this study represents only a preliminary and rough application due to several data limitations. First, the satellite imagery used had a spatial resolution of only 10 meters, which is considered medium resolution and therefore less ideal than high-resolution imagery typically required for detailed urban analysis. High-resolution satellite data were not utilized due to their high acquisition costs. The lower resolution of the imagery makes object tagging and segmentation more challenging, as the features are less distinct and the shapes are more ambiguous. For instance, the color of the pixels for water are the same with the roads and some green spaces (Annex 1), that may have led to potential misclassifications. This segmentation and tagging inaccuracies inevitably affect the reliability of the results. To mitigate these issues, multiple models were trained and compared, and the classifications were partially validated against Google Maps street view. However, this validation was limited to randomly selected features rather than the entire map.

Second, the earliest available high-quality satellite image of BGC dates only to 2015, providing a limited comparison period of about a decade. This relatively short timeframe may not capture the full extent of BGC's transformation, much of which occurred in the late 2000s to early 2010s. This constraint stems from the fact that the Sentinel-2 mission, which provides publicly accessible medium-to-high quality satellite imagery, was launched only in 2015.

Because of these limitations, the OBIA results should be taken as rough estimates rather than precise measurements. The main goal here is to give a general idea of the changes that happened and to show the direction of changes occurring within a period. This method can be used for similar types of analysis with more and better-quality data in the future.

### 6.3.2 Demographic and Housing of BGC

We also examined some demographic changes in the area and found that the population of BGC plus the buffer area increased by around 28% over the last decade (Table 6). Population density within BGC and the buffer area likewise rose by about 28%. This may be expected given the proliferation of high-rise developments over the years, allowing these areas to hold more people per unit of land area.

In terms of habitability, the study area showed an increase of around 8%, suggesting a general improvement in housing quality or a shift toward better living conditions. In relation to this, space sufficiency also improved during the same period. These trends can be related to several factors such as: growing prevalence of condominium housing in the area, which typically offers better structural quality compared to low-cost housing (economic and socialized housing) (Ballesteros et al. 2024); declining average household size in the National Capital Region (NCR); and the rising number of single-person households, reflecting shifts in demographic patterns and lifestyle preferences (Ballesteros et al. 2024).

**Table 6. Summary of demographic and housing changes in BGC plus the buffer area**

	BGC (+3km buffer area)		
	2010	2020	% change
Population	849,146	1,083,038	27.54
Density (# of people/area sqkm)	19,786.75	25,236.88	27.54
% Habitable	87.44	94.65	8.24
% Uninhabitable	9.82	4.12	(58.05)
% Sufficient space	68.69	78.19	13.83
% Insufficient space	31.31	21.81	(30.35)
% lot with no consent	2.53	1.03	(59.30)

Source: Authors' processing of data from the non-sample CPH 2010 and 2020 datasets from PSA

## 6.4 Spatiotemporal analysis of zonal values

### 6.4.1 The Case of BGC

To understand how development influences land valuation, we also examined the changes in zonal values within and around Bonifacio Global City (BGC). Again, we looked at the barangays that are covered by the Bonifacio Global City, up to the 3-kilometer buffer. Using the buffer tool in GIS, we identified the barangays covered which is listed as follows:

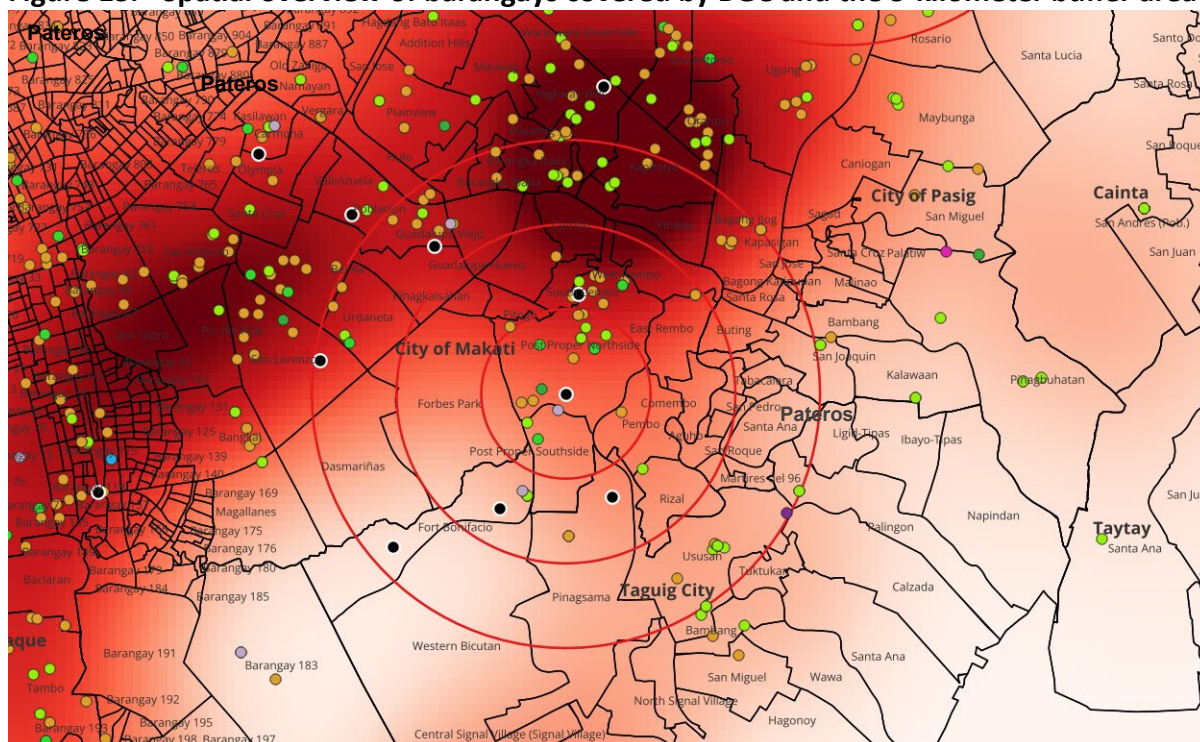
**Table 7. Barangays covered by BGC and the 3-kilometer buffer**

<b>1 km</b>	<b>2 km</b>	<b>3 km</b>
<i>Forbes Park, Makati City</i> <i>Pembo, Makati City</i> <i>Post Proper Northside, Taguig City</i> <i>Post Proper South Side, Taguig City</i>	<i>Buting, Pasig City</i> <i>Cembo, Makati City</i> <i>Comembo, Makati City</i> <i>East Rembo, Makati City</i> <i>Guadalupe Nuevo, Makati City</i> <i>Pinagkaisahan, Makati City</i> <i>West Rembo, Makati City</i> <i>Rizal, Makati City</i> <i>Aguho, Pateros</i> <i>Martires del 96, Pateros</i> <i>Poblacion, Pateros</i> <i>San Pedro, Pateros</i> <i>Santo Rosario-Kanluran, Pateros</i> <i>Tabacalera, Pateros</i>	<i>Barangka Ibaba, Mandaluyong City</i> <i>Barangka Ilaya, Mandaluyong City</i> <i>Barangka Itaas, Mandaluyong City</i> <i>Buayang Bato, Mandaluyong City</i> <i>Bagong Ilog, Pasig City</i> <i>Bagong Katipunan, Pasig City</i> <i>Kapitolyo, Pasig City</i> <i>Pineda, Pasig City</i> <i>San Joaquin, Pasig City</i> <i>San Jose, Pasig City</i> <i>Santa Rosa, Pasig City</i> <i>Sumilang, Pasig City</i> <i>Santa Lucia, Pasig City</i> <i>Poblacion, Makati City</i> <i>Magtanggol, Pateros</i> <i>Santo Rosario-Silangan, Pateros</i>
<b>1 km (less than 30% of the area covered by 1 km buffer)</b>	<b>2 km (less than 30% of the area covered by 2 km buffer)</b>	<b>3 km (less than 30% of the area covered by 3 km buffer)</b>
<i>Pitogo, Makati City</i> <i>Ususan, Taguig City</i> <i>Fort Bonifacio, Taguig City</i> <i>South Cembo, Taguig City</i>	<i>Bel-Air, Makati City</i> <i>Dasmariñas, Makati City</i> <i>Guadalupe Viejo, Makati City</i> <i>Urdaneta, Makati City</i> <i>San Roque, Pateros</i> <i>Santa Ana, Pateros</i> <i>Western Bicutan, Taguig City</i>	<i>Barangka Drive, Mandaluyong City</i> <i>Highway Hills, Mandaluyong City</i> <i>Hulo, Mandaluyong City</i> <i>Malamig, Mandaluyong City</i> <i>Bambang, Pasig City</i> <i>Kapasigan, Pasig City</i> <i>Malinao, Pasig City</i> <i>San Lorenzo, Makati City</i> <i>Ligid-Tipas, Taguig City</i> <i>Palingon, Taguig City</i> <i>Tuktukan, Taguig City</i>

Source: Authors' processing of Philippine Administrative Map (ADM4) data

A spatial overview of these barangays is presented in the accompanying map, where concentric circles represent the 1 km, 2 km, and 3 km buffer zones (Figure 13). The map is overlaid with the project type density analysis heatmap discussed earlier, situating the study area within the broader urban context of Metro Manila. This visualization helps illustrate how zonal value changes in and around BGC may have been shaped not only by developments within the city itself but also by spillover effects from surrounding growth centers.

**Figure 13. Spatial overview of barangays covered by BGC and the 3-kilometer buffer area**



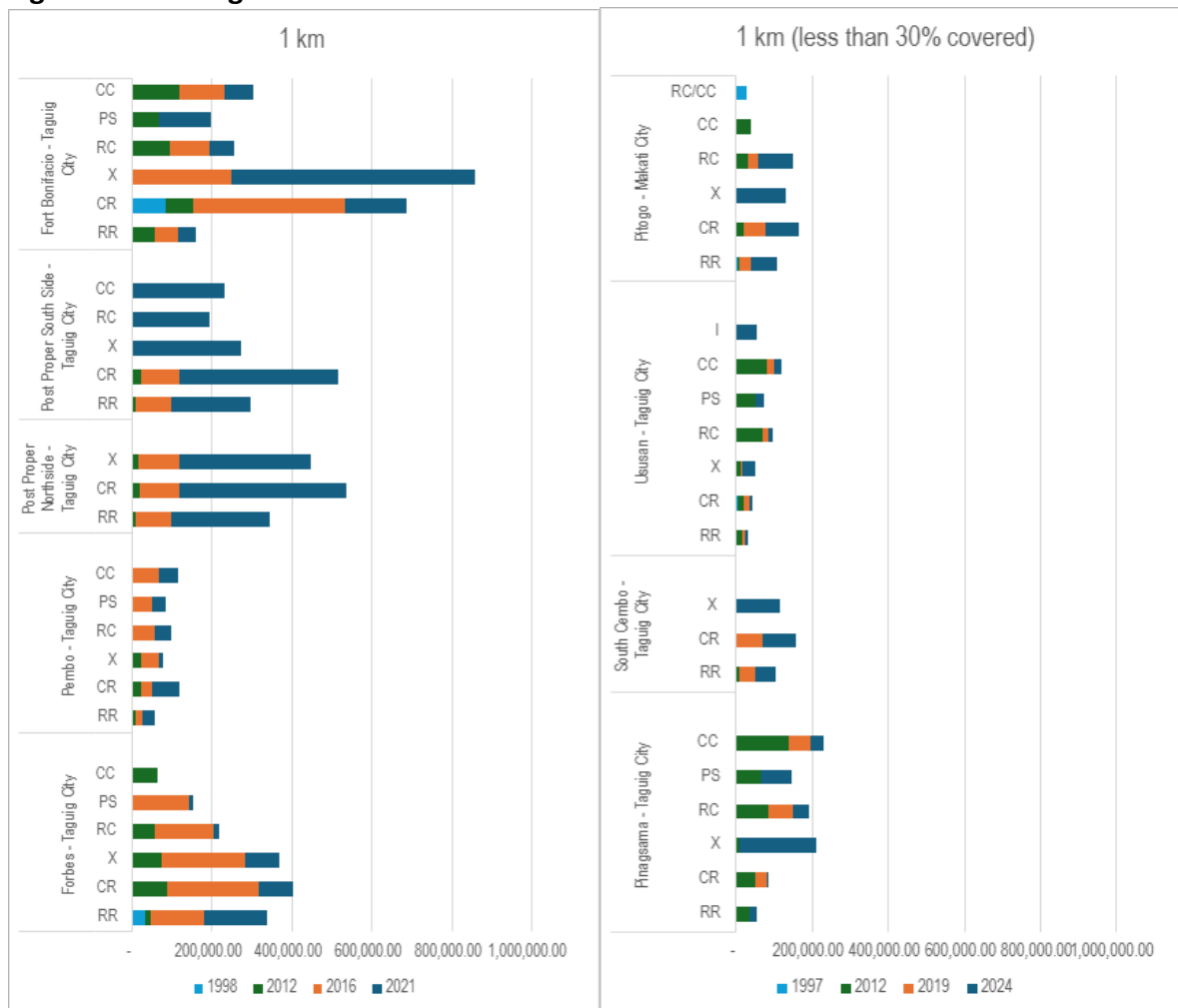
Source: Authors' processing of licenses to sell data from DHSUD and Philippine Administrative Map (ADM4) data

To get a picture of the trend, we got the average of the zonal values per land classification per barangay for the last four revision periods. Below is an overlapped clustered bar chart showing the changes in the values of land per square meter of the covered barangays.

#### 6.4.1.1 1-Kilometer Buffer Zone of BGC

As can be seen, the zonal values for Barangay Fort Bonifacio increased substantially, especially for the institutional (X) and commercial regular (CR) land classifications (Figure 14). This is consistent with the intensive land conversion and large-scale mixed-use developments that have characterized the transformation of Fort Bonifacio since the early 2000s. There is also a notable increase in the zonal values in the immediate areas in the 1 km buffer, especially Brgys. Post Proper Southside and Post Proper Northside, reflecting strong land market spillovers from BGC's development. However, Brgy. Pembo remained to have low zonal values despite being within 1 km of BGC. Moreover, other barangays in the outer 1 km (less than 30% of area covered in the 1 km buffer) also remained to have low zonal values. This suggests that proximity alone may not be enough to influence land values.

**Figure 14. Changes in zonal values within 1 kilometer of BGC**



Source: Authors' summary of zonal values data from BIR

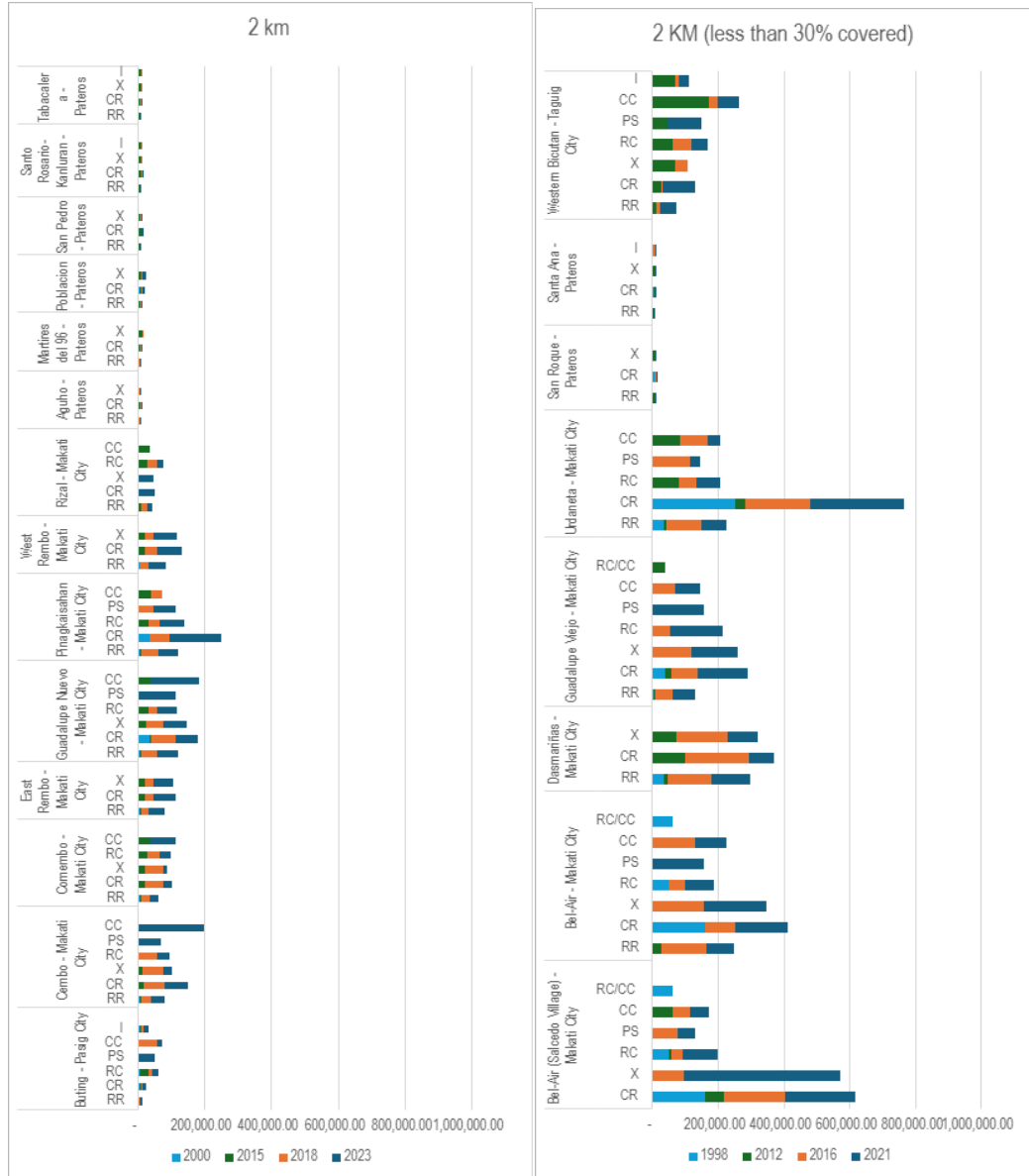
#### 6.4.1.2 2-Kilometer Buffer Zone of BGC

In the 2 km buffer, the barangays well within the 2 km also remained to have low zonal values (Figure 15). Interestingly, several barangays situated along the outer edge of the 2 km buffer (less than 30% of their area covered) displayed higher zonal values than some areas closer to Bonifacio Global City, except for those in Pateros, specifically Barangays Santa Ana and San Roque. In general, barangays in Pateros consistently have low zonal values even those within the inner buffer zone. This pattern once again reflects the uneven spatial distribution of development within Metro Manila. As previously discussed, Pateros was among the few localities that did not receive any licenses to sell over the past decade, primarily due to constraints such as its limited land area, small population, and status as a municipality. All of these hinder its capacity to attract and sustain large-scale urban development and constrain further urban development.

It should also be noted that these barangays in the outer 2 km with high relatively high zonal values (e.g. Urdaneta, Guadalupe Viejo, Dasmarinas, and Bel-Air) are part of Makati City,

specifically near its central business district. Their proximity to this area likely contributes to their higher values.

**Figure 15. Changes in zonal values within 2 kilometers of BGC**

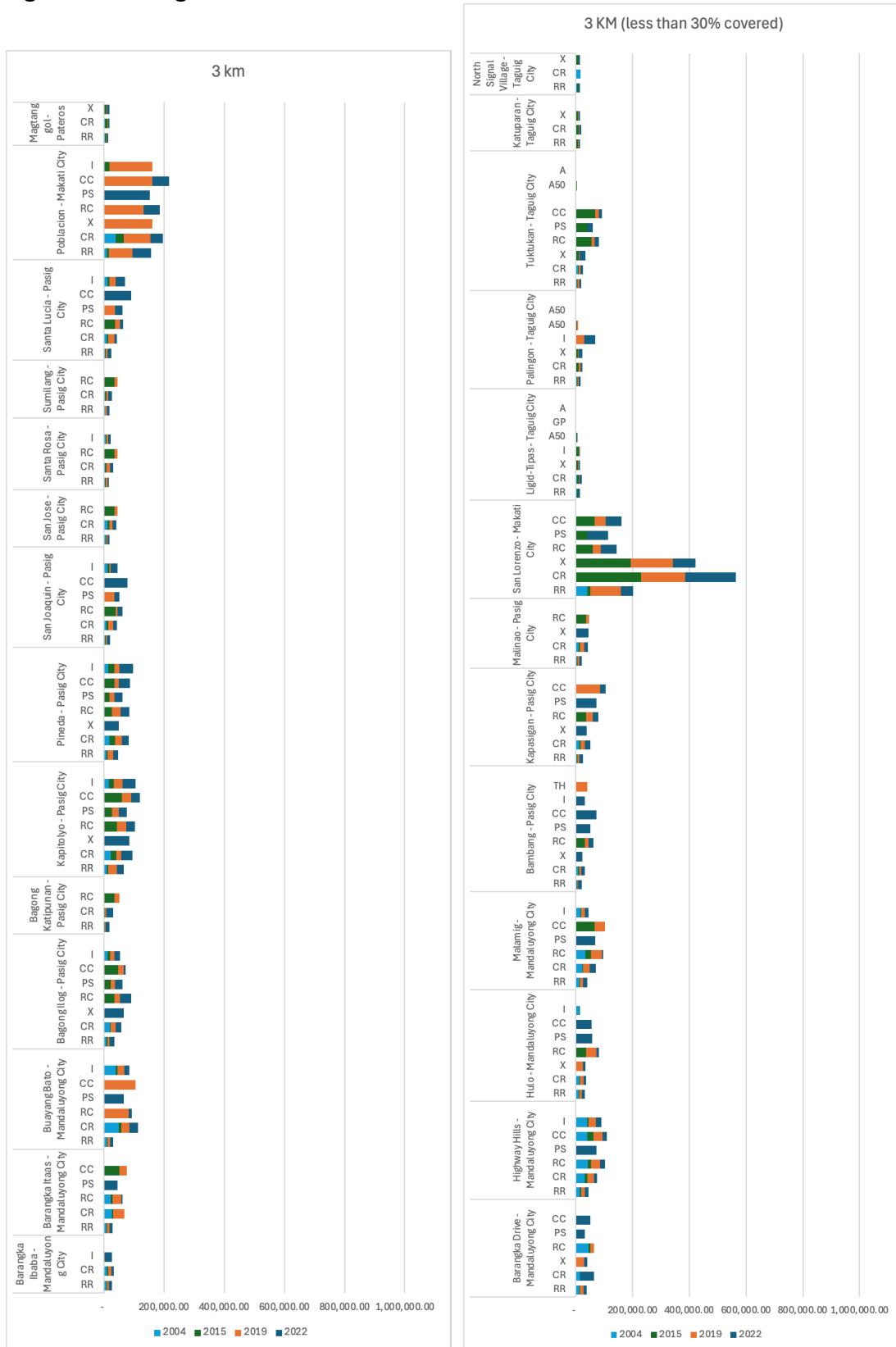


Source: Authors' summary of zonal values data from BIR

### 6.4.1.3 3-Kilometer Buffer Zone of BGC

The same pattern can be seen in the 3 km buffer wherein the zonal values are generally low except for some barangays that are part of Makati City (e.g. Barangays Poblacion and San Lorenzo) (Figure 16). These two barangays likely benefit from their proximity to the Makati CBD, as well as having prominent commercial spaces in their areas.

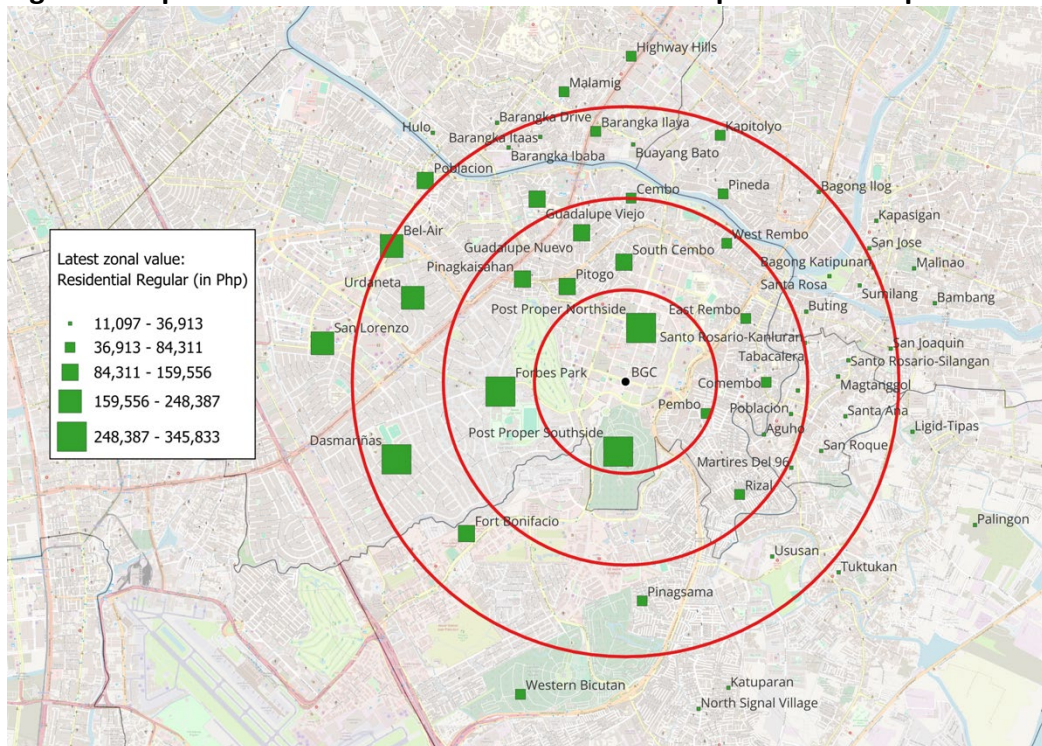
Figure 16. Changes in zonal values within 3 kilometers of BGC



Source: Authors' summary of zonal values data from BIR

Some barangays in this buffer zone, despite being near hotspots or the business districts such as Comembo, East Rembo, Pembo, and Post Proper Southside in Makati, and Ususan and Pinagsama in Taguig are traversed by the West Valley Fault Line, which is a geophysical risk that may have limited large-scale development or discouraged investor confidence (Figure 17). Other barangays, on the other hand, are characterized by limited urban infrastructure, including narrow road networks, flood-prone terrain, and inadequate public utilities. In a study by Noguiera & Diaz (2023) calculating the walkability and accessibility index of barangays in Pasig, they identified barangays with low walkability index as priority areas for development which they correlated to lack of adequate urban infrastructure. These included Barangays Santa Lucia, Bambang, and Pineda. Moreover, several barangays in Pasig and Taguig in the 1-, 2-, and 3-kilometer buffers are traversed by the body of waters such as the Pasig, Marikina, and Napindan rivers and Laguna de Bay making them prone to flooding (Frialde 2013; Subingsubing 2024; Canaverall & Refrima 2022). Consequently, despite their proximity to major growth centers, these areas continue to exhibit relatively low land values.

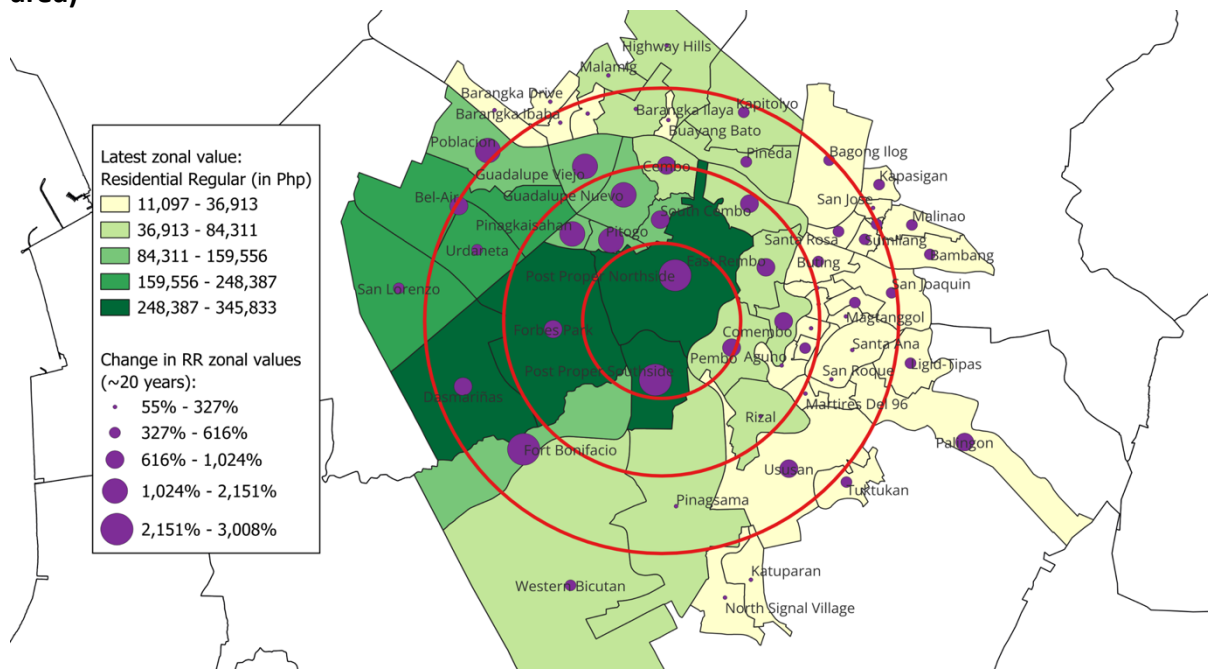
**Figure 17. Spatial overview of BGC area overlaid on Open Street Map**



Source: Authors' processing of licenses to sell data from DHSUD and zonal values from BIR

The figure below presents a summary of current residential zonal values and the magnitude of their changes over the past two decades, in relation to their geographic location (Figure 18).

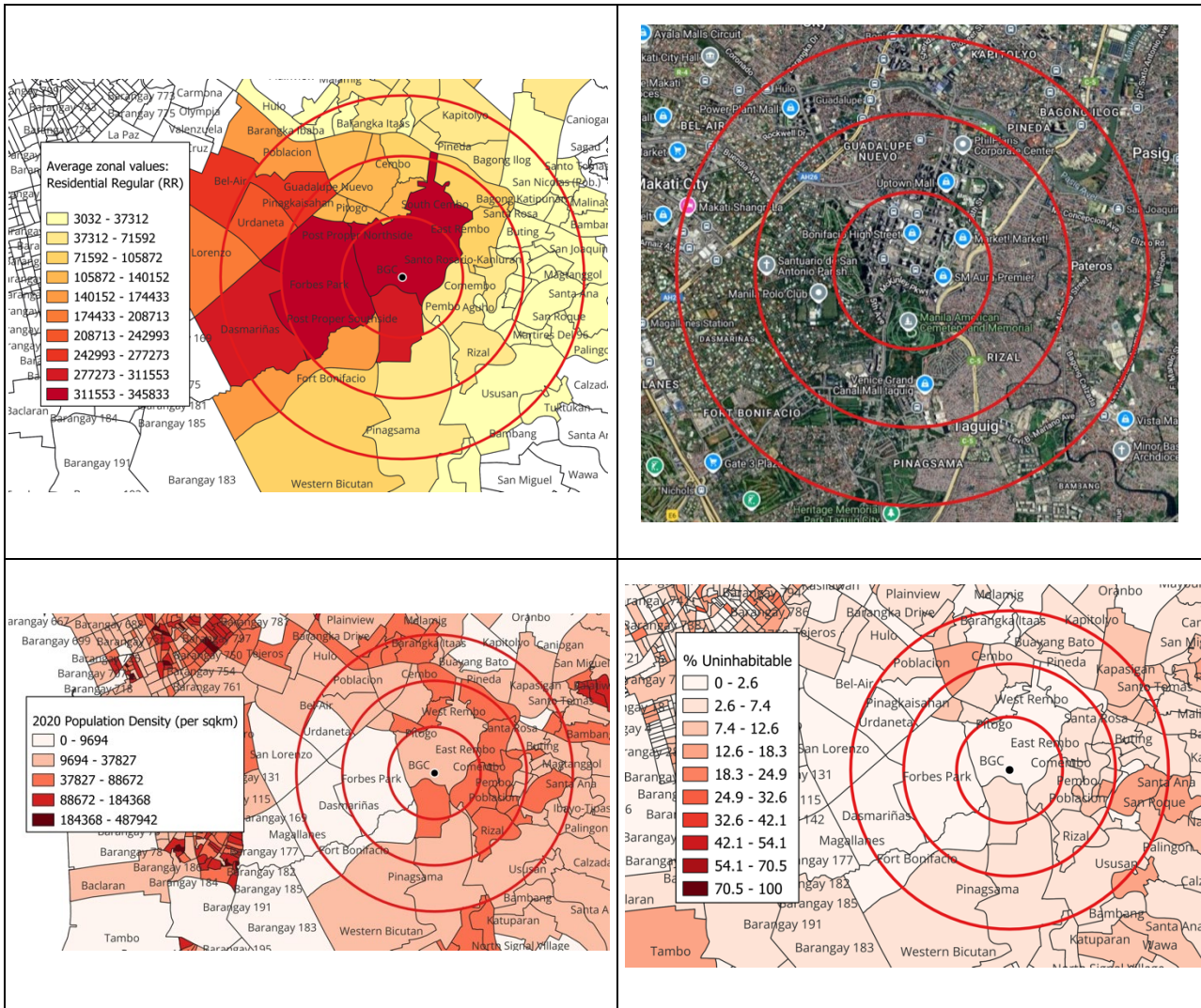
**Figure 18. Summary of residential zonal values and changes in BGC (+3-kilometer buffer area)**



Source: Authors' processing of zonal values data from BIR

Below are figures showing maps visualizing the study area in different variations using different indicators (Figure 19). In the satellite image of BGC, the barangays with relatively lower zonal values in Pateros and flood-prone barangays traversed by the rivers in Taguig and Pasig, are seen to be structurally dense with less noticeable street patterns as opposed to the more landscaped areas of Fort Bonifacio, Post Proper Northside, Forbes Park, Urdaneta, Dasmarias, San Lorenzo. In terms of population density and habitability, these same barangays with relatively higher zonal tend to have lower population density and percentage of uninhabitable units represented by lighter shades.

**Figure 19. Zonal values, satellite image, population density and habitability maps of BGC and the 3-kilometer buffer area**



Source: Authors' processing of non-sample 2020 CPH from PSA and zonal values data from BIR

### 6.4.2 The Case of Eastwood City

To provide a comparative perspective, we also examined the zonal values in the Eastwood area. Again, we looked at the barangays that are covered by Eastwood City, up to the 3-kilometer buffer using GIS. Below are the identified barangays:

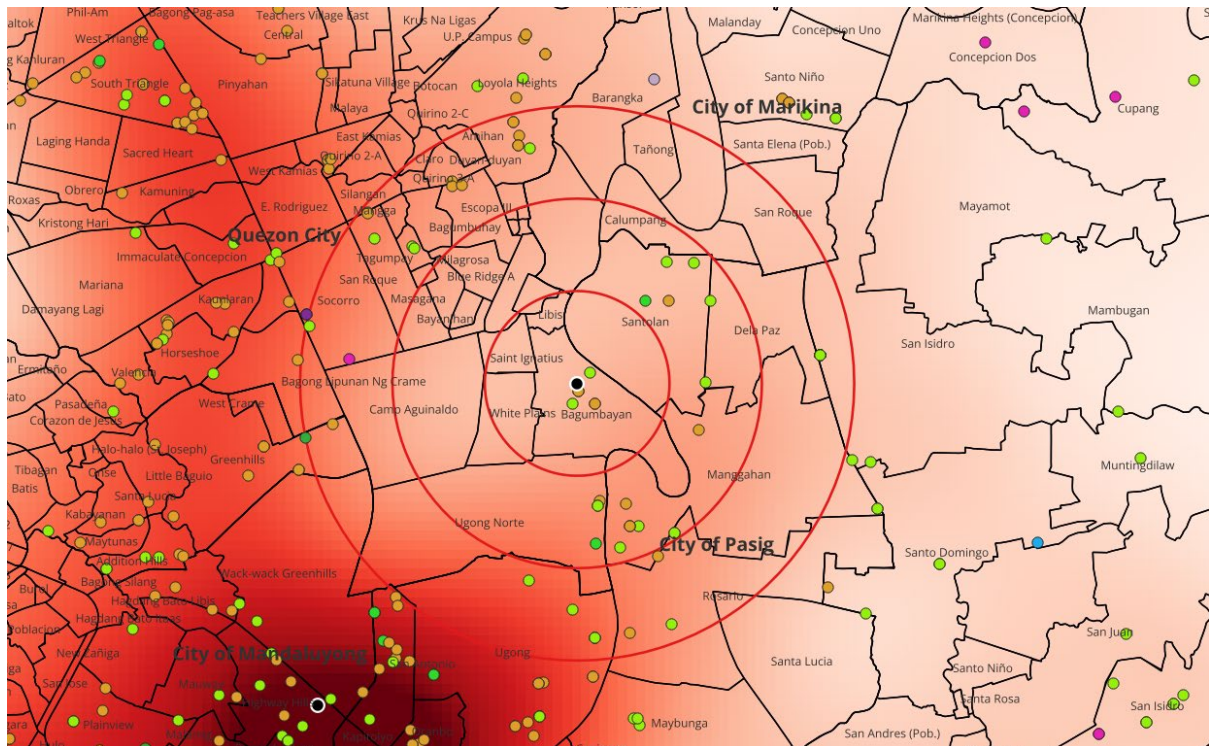
**Table 8. Barangays covered by the Eastwood City and the 3-kilometer buffer**

<b>1 km</b>	<b>2 km</b>	<b>3 km</b>
<i>Santolan, Pasig City</i> <i>Bagumbayan, Quezon City</i> <i>Blue Ridge B, Quezon City</i> <i>Libis, Quezon City</i> <i>Saint Ignatius, Quezon City</i> <i>White Plains, Quezon City</i>	<i>Calumpang, Marikina City</i> <i>Dela Paz, Pasig City</i> <i>Rosario, Pasig City</i> <i>Ugong, Pasig City</i> <i>Bayanihan, Quezon City</i> <i>Camp Aguinaldo, Quezon City</i> <i>Dioquino Zobel, Quezon City</i> <i>Masagana, Quezon City</i> <i>Milagrosa, Quezon City</i> <i>Villa Maria Clara, Quezon City</i>	<i>Jesus de la Peña, Marikina City</i> <i>San Roque, Marikina</i> <i>Tañong, Marikina</i> <i>Amihan, Quezon City</i> <i>Bagumbuhay, Quezon City</i> <i>Bagong Lipunan ng Crame, Quezon City</i> <i>Claro, Quezon City</i> <i>Duyan-duyan, Quezon City</i> <i>Escopa I, Quezon City</i> <i>Escopa II, Quezon City</i> <i>Escopa IV, Quezon City</i> <i>Quirina 3-A, Quezon City</i> <i>Silangan, Quezon City</i>
<b>1 km (less than 30% of the area covered by 1 km buffer)</b>	<b>2 km (less than 30% of the area covered by 2 km buffer)</b>	<b>3 km (less than 30% of the area covered by 3 km buffer)</b>
<i>Industrial Valley, Marikina City</i> <i>Manggahan, Pasig City</i> <i>Blue Ridge A, Quezon City</i> <i>Ugong Norte, Quezon City</i>	<i>Barangka, Marikina City</i> <i>Escopa III, Quezon City</i> <i>San Roque, Quezon City</i> <i>Socorro, Quezon City</i>	<i>San Isidro, Cainta</i> <i>Wack-wack Greenhills, Mandaluyong City</i> <i>Santa Elena (Pob.), Marikina City</i> <i>San Antonio, Pasig City</i> <i>Loyola Heights, Quezon City</i> <i>Mangga, Quezon City</i> <i>Marilag, Quezon City</i> <i>Quirino 2-A, Quezon City</i> <i>Quirino 2-B, Quezon City</i> <i>Tagumpay, Quezon City</i> <i>Greenhills, San Juan City</i>

Source: Authors' processing of Philippine Administrative Map (ADM4) data

A spatial overview of these barangays is shown in the accompanying map, with concentric circles representing the 1 km, 2 km, and 3 km buffer zones (Figure 20). The map is overlaid with the density analysis heatmap discussed in the previous section to situate Eastwood City and its surrounding zones within the broader urban context. This overlay allows for a clearer understanding of how land valuation trends around Eastwood relate to nearby development clusters in Quezon City, Pasig City, Marikina City, and Mandaluyong City.

**Figure 20. Spatial overview of barangays covered by Eastwood City and the 3-kilometer buffer area**



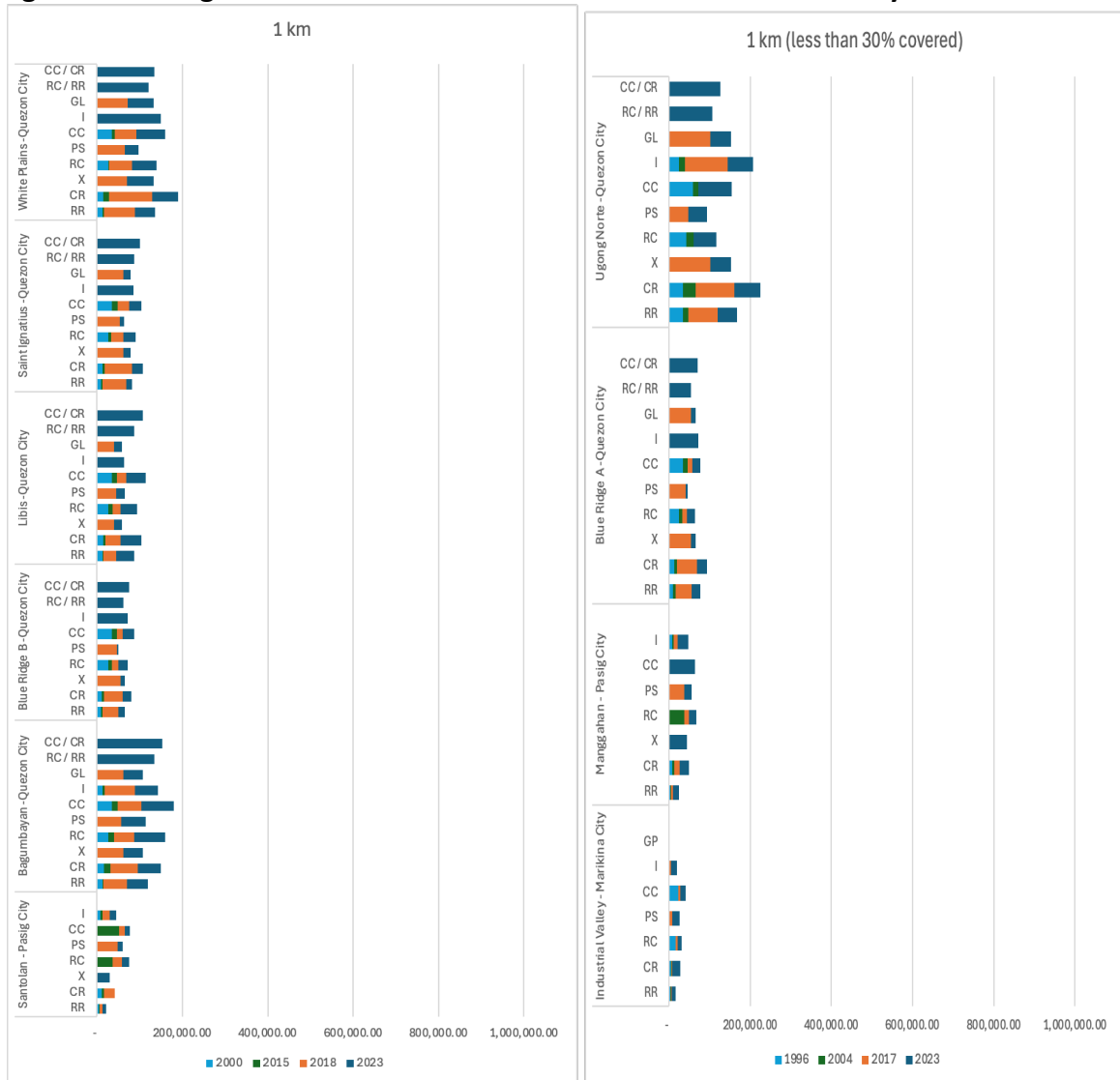
Source: Authors' processing of licenses to sell data from DHSUD and Philippine Administrative Map (ADM4) data

#### 6.4.2.1 1-Kilometer Buffer Zone of Eastwood City

As can be seen, the zonal values of the barangays within the 1-kilometer buffer have consistently increased over the years (Figure 21). The changes in the land use classifications in these areas should also be noted, especially for Barangay Bagumbayan and Libis, where Eastwood City is specifically situated. From having only 4 to 5 classifications in the 1990s (represented by the lighter blue bars), these barangays now have almost 10 classifications (represented by the dark blue bars). This reflects the area's transition from predominantly industrial and residential land uses to a more mixed-use area including commercial, institutional, and high-density residential developments.

Another noteworthy observation is the relatively high zonal values of Ugong Norte, which can be related to its proximity to the development hotspot (darker red) near Mandaluyong City as shown in the map above (Figure 20). In contrast, the areas farther from the hotspots (lighter red) have relatively lower zonal values (e.g. Brgys. Santolan, Manggahan, and Industrial Valley) despite being in the 1 km buffer zone of Eastwood City. Consistent with the case in BGC, distance alone may not be sufficient to influence land values and spur developments in adjacent areas.

**Figure 21. Changes in zonal values within 1 kilometer of Eastwood City**

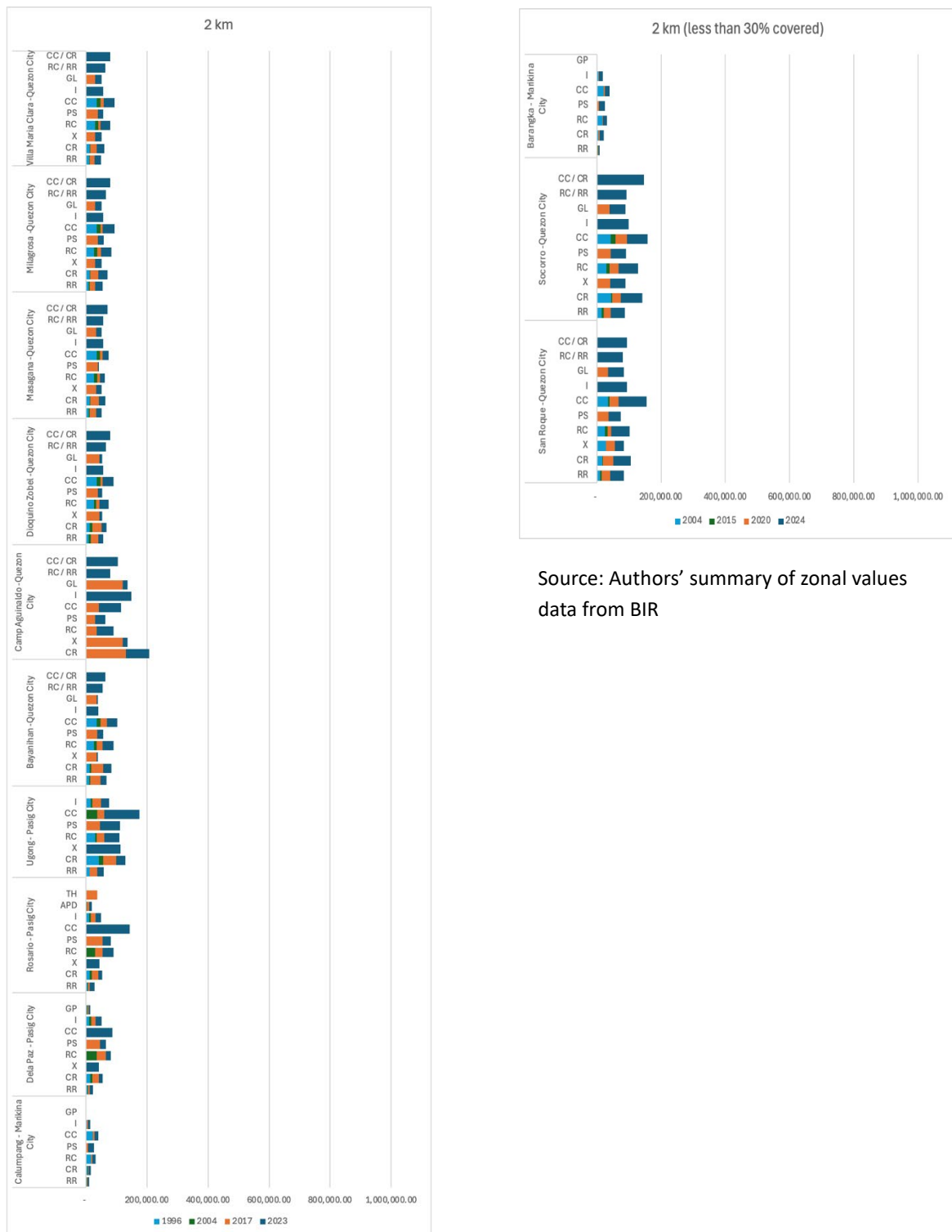


Source: Authors' summary of zonal values from BIR

#### 6.4.2.2 2-Kilometer Buffer Zone of BGC

Within the 2-kilometer buffer, zonal values are generally lower, with few exceptions such as Barangays Camp Aguinaldo, Socorro, and San Roque in Quezon City, and Barangay Ugong in Pasig City (Figure 22). Similar to the pattern observed in the 1-kilometer buffer, the relatively higher zonal values in these areas may be attributed to their proximity to development hotspots (darker shades of red on the map) in Quezon City and Mandaluyong City such as the Ortigas CBD. Moreover, major highways such as EDSA and C5 with established transport networks traverse these barangays making it more accessible (Figure 23). This pattern is also consistent with the case in BGC wherein other barangays that are near other business districts nodes tend to capture greater land value increases, even if they are not directly adjacent to the focal township.

**Figure 22. Changes in zonal values within 2 kilometers of Eastwood City**

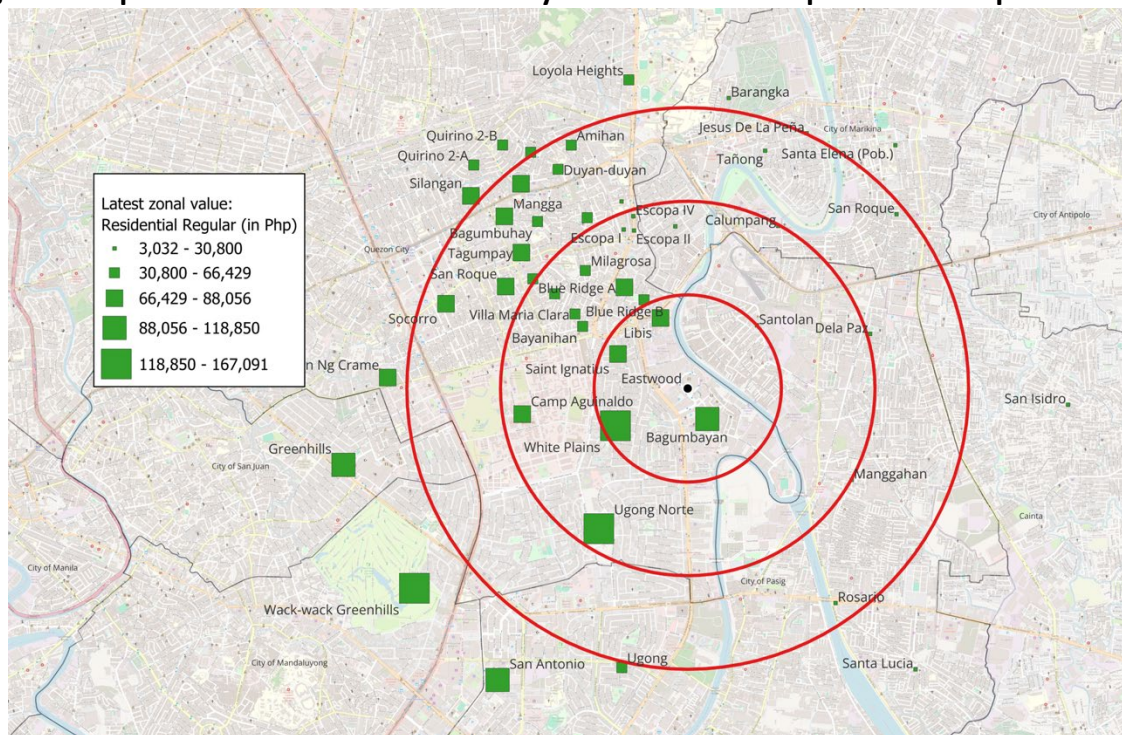


Source: Authors' summary of zonal values data from BIR

Meanwhile, some barangays in such as Calumpang and Barangka in Marikina City and Dela Paz and Rosario in Pasig City continue to have relatively lower zonal values despite their inclusion within the buffer (Figure 23). This reflects the uneven diffusion of development pressure from Eastwood toward the Marikina and Pasig side, which may be attributed to limited

urban infrastructure and exposure to environmental risks in these areas (Espina 2018; Noguiera & Diaz 2023). As discussed in the previous section, most of the township development projects are built in the northern and southern parts of Metro Manila and there have been no notable prominent township development projects in the eastern, where Marikina and Pasig is located, and western portions of Metro Manila. Marikina City has been historically flood prone (Espina 2018; Ortiz et al 2009). In particular, Barangays Calumpang, Dela Paz and Rosario are all located along the Pasig-Marikina River making them vulnerable to flooding possibly constraining large-scale investmetns. Citing again the study by Noguiera & Diaz (2023) calculating the walkability and accessibility index of barangays in Pasig that identified priority areas for development. These barangays included Barangays Rosario, Dela Paz, and Manggahan in the 1-km buffer.

**Figure 23. Spatial overview of Eastwood City area overlaid on Open Street Map**



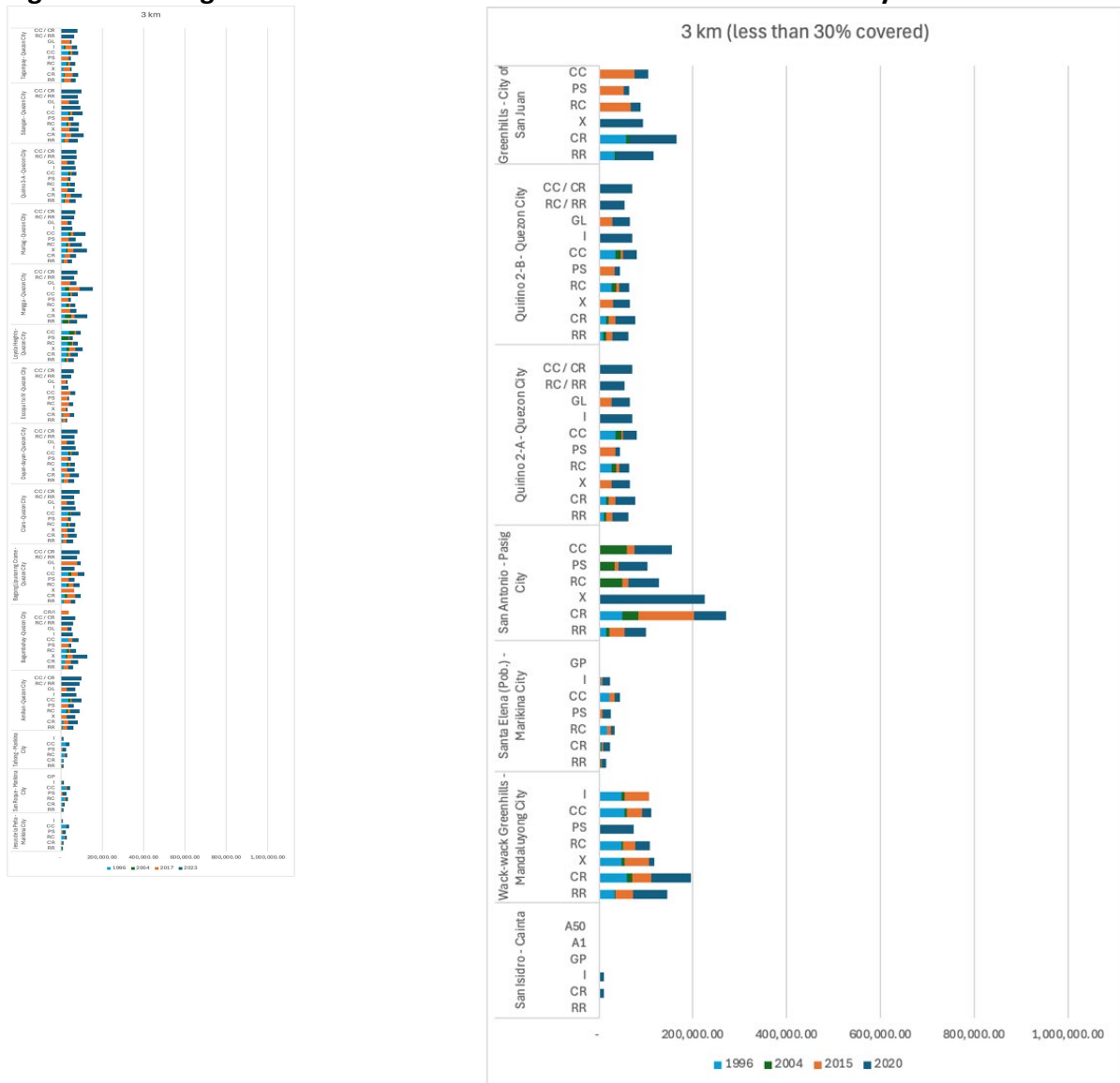
Source: Authors' processing of licenses to sell data from DHSUD and zonal values from BIR

#### 6.4.2.3 3-Kilometer Buffer Zone of BGC

The barangays within the 3-kilometer buffer area generally exhibit relatively low zonal values (Figure 24), except for those located near major township developments and CBDs, shown in darker shades of red on the map (Figure 20). These include Barangays Greenhills in San Juan City, San Antonio in Pasig City, and Wack-Wack Greenhills in Mandaluyong City. Moreover, there is a noticeable disparity between the zonal values of barangays in Quezon City and those in Marikina City (Figure 23). The comparatively lower zonal values in Marikina may be attributed to the absence of prominent township development projects as discussed above. While a number of barangays in both Quezon City and Marikina City are traversed by the West Valley fault line (e.g. Barangays Libis, White Plains, Ugong Norte, and Loyola Heights in Quezon City; Barangays Barangka and Industrial Valley in Marikina City), Marikina City is also known to be prone to flooding (Espina 2018), which may have further discouraged large-

scale investments and constrained the city’s overall development potential. These factors, as well as the others discussed above, may collectively explain the slower pace of land value appreciation and urban development in the eastern portion of the buffer, on the Marikina and Pasig City side.

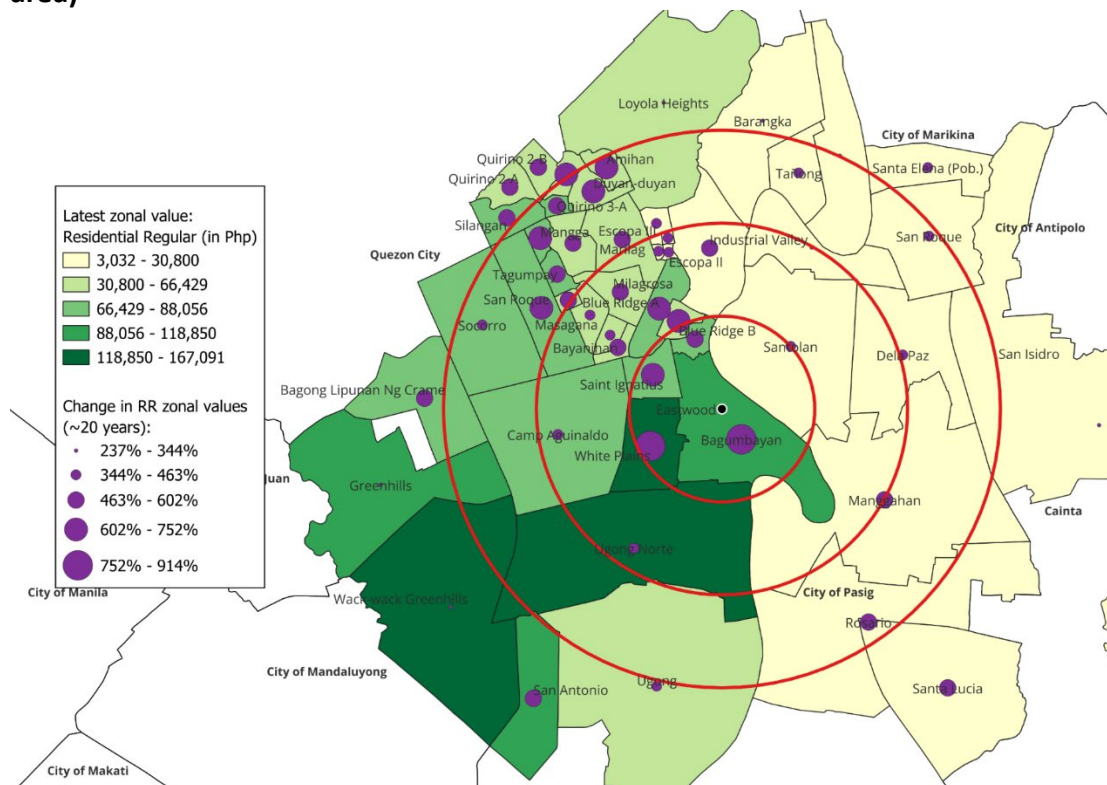
**Figure 24. Changes in zonal values within 3 kilometers of Eastwood City**



Source: Authors’ summary of zonal values data from BIR

The figure below presents a summary of current residential zonal values and the magnitude of their changes over the past two decades, in relation to their geographic location (Figure 25).

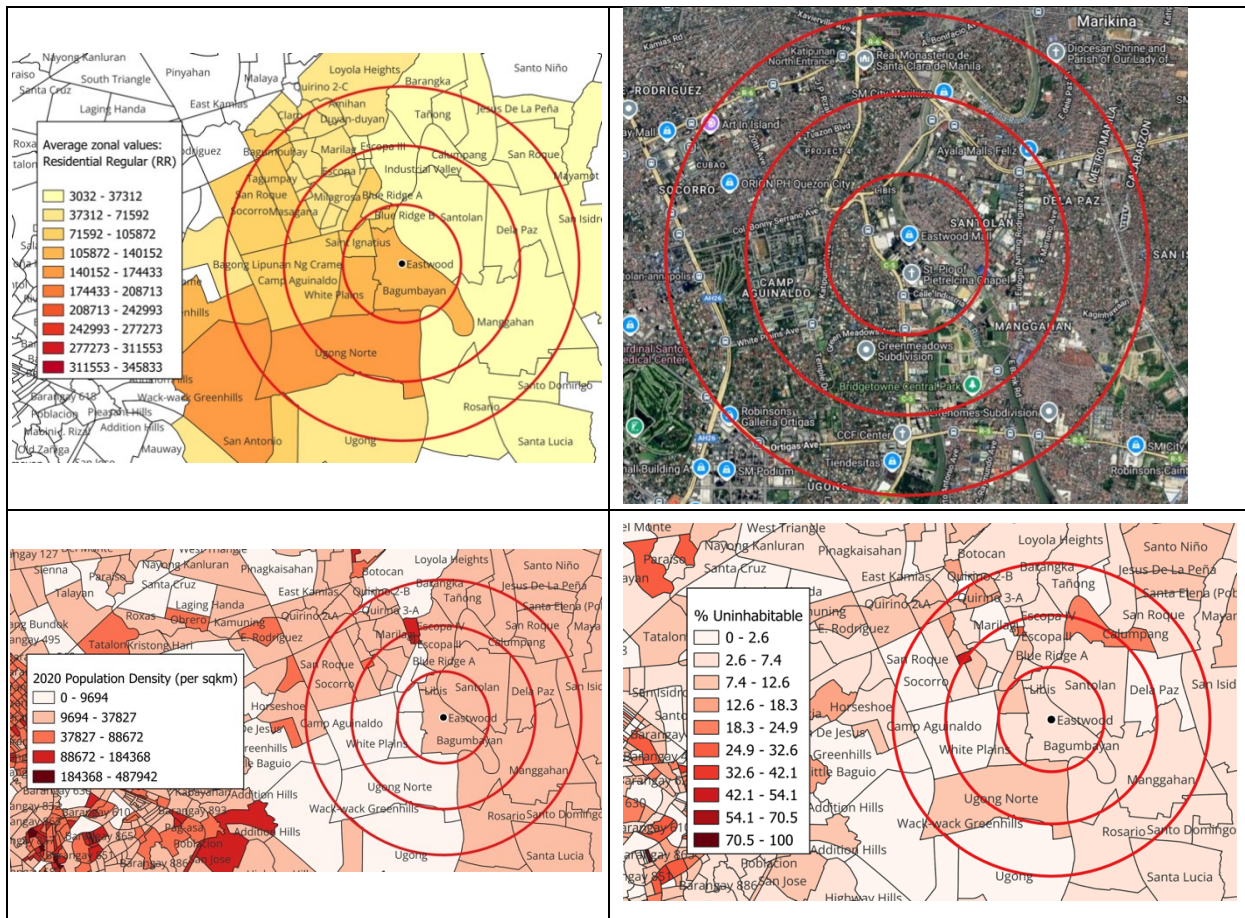
**Figure 25. Summary of residential zonal values and changes in Eastwood City (+3-kilometer area)**



Source: Authors' processing of zonal values data from BIR

Below are figures showing maps visualizing the study area in different variations using different indicators (Figure 26). In the satellite image of the study area, the barangays in Quezon City, and Marikina and Pasig side to the right, with relatively lower zonal values, are seen to be structurally dense with less noticeable street patterns. In terms of population density and habitability, barangays with relatively higher zonal values such as Barangays White Plains, Ugong Norte, Camp Aguinaldo, Ugong, Greenhills, San Antonio, and Wack-Wack Greenhills tend to have lower population density and percentage of uninhabitable units represented by lighter shades.

**Figure 26. Satellite image, population density and habitability maps of Eastwood City and the 3-kilometer buffer area**



Source: Authors' processing of non-sample 2020 CPH from PSA

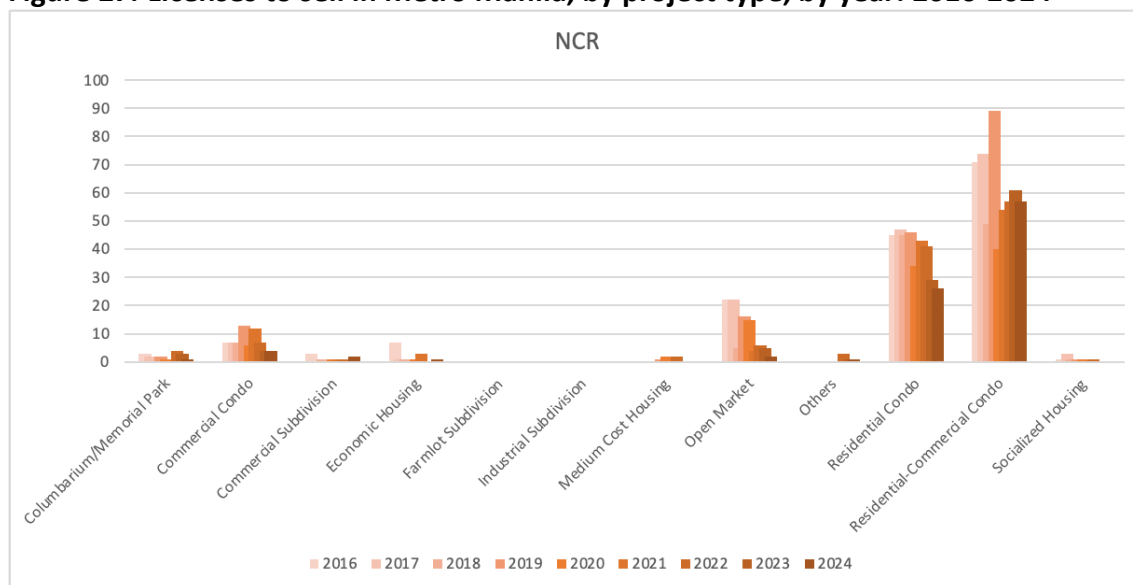
In summary, across both cases, findings indicate that township developments can indeed drive urban land market transformation, however their impacts are spatially uneven. While proximity to these developments tends to influence increases in land values, the extent of change also depends on a combination of other factors such as the presence of established urban infrastructure, accessibility, and exposure to environmental or geophysical risks.

In general, the barangays where the township developments are directly located evidently experienced high gains. While adjacent areas with relatively developed infrastructure, accessible transport networks, and existing commercial activity or proximity to other CBDs also benefited. However, areas constrained by inadequate infrastructure and other risks remained to have minimal or limited growth, reinforcing the uneven geography of development and spatial inequalities within Metro Manila. The spatial patterns observed in BGC and Eastwood City highlight the need for more inclusionary urban development strategies to achieve more balanced and equitable urban growth across metropolitan areas.

### 6.5 Spatial expansion trend of residential development

As discussed, the rapid urbanization of Metro Manila has led to the rise of numerous township development projects across the region. In particular, the licenses to sell data showed a consistently high number of residential and residential-commercial condominium projects over the past decade (Figure 27).

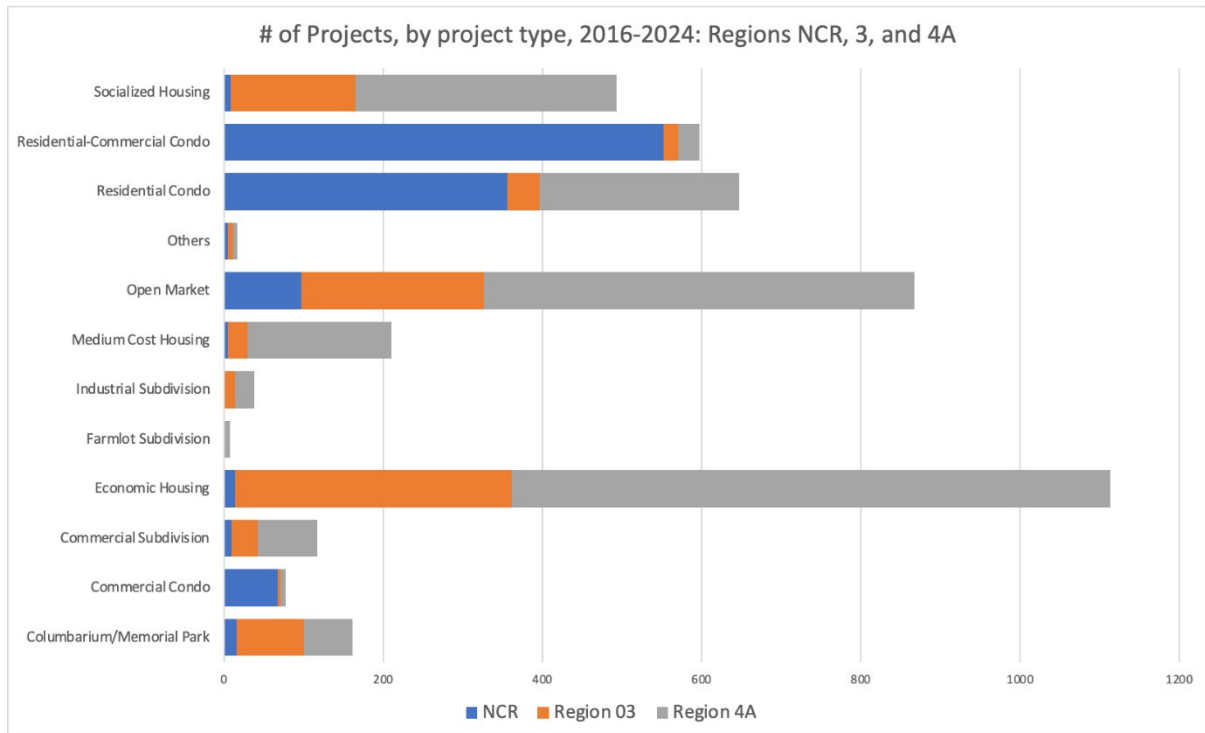
**Figure 27. Licenses to sell in Metro Manila, by project type, by year: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

To contextualize the impacts of Metro Manila's continuing urban expansion on its neighboring areas, project developments in the adjacent Regions III and IV-A were also examined. The data revealed that over the last decade, while condominiums were being established in Metro Manila, economic and socialized housing projects were mostly being built in Regions III and IV-A (Figure 28). Among all project types across the three regions, economic housing had the most number with 1,241, most of which is located in Region IV-A with 752, and 347 in Region III. Similarly, most of the socialized housing projects are in Region IV-A with 328 projects. There are also a number of open market properties in these regions, as well as residential condominiums and medium-cost housing projects, particularly in Region IV-A.

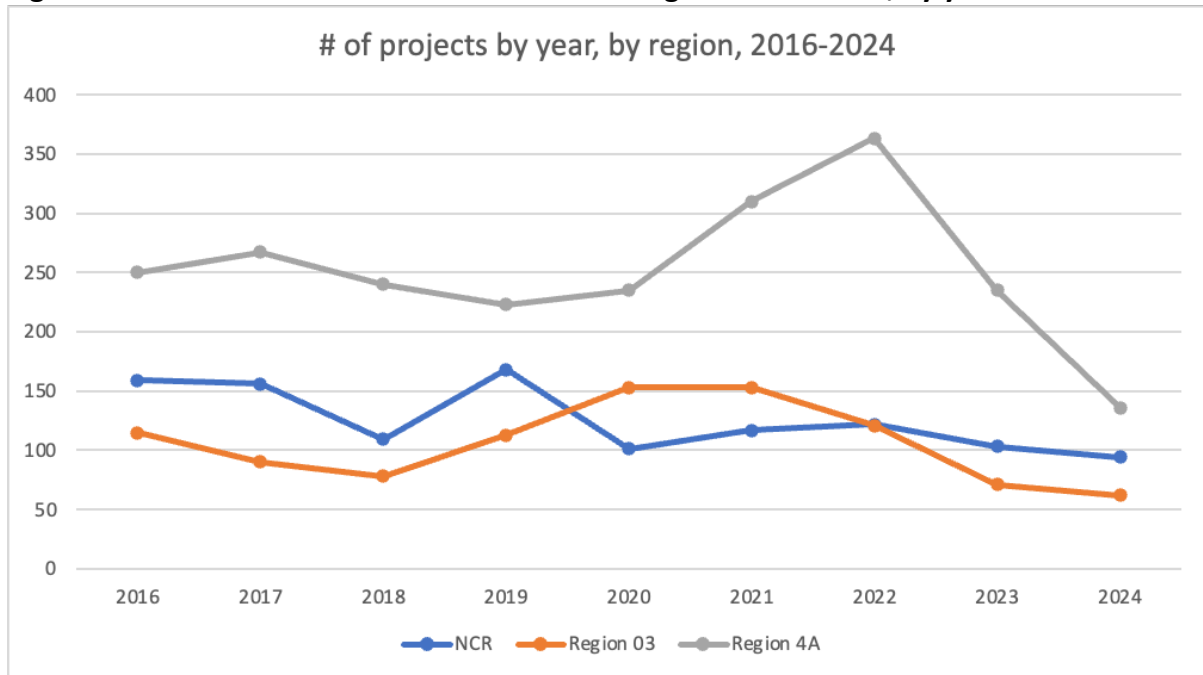
**Figure 28. Licenses to sell in Metro Manila and Regions III and IV-A, by project type: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

A comparison of the number of licenses to sell issued from 2016 to 2024 across the three regions showed that Region IV-A recorded the highest number with 2,259 projects, followed by Metro Manila with 1,129 and Region III with 956 (Figure 29). These high numbers of projects in the adjacent regions suggest a spillover effect of Metro Manila's urban growth, wherein the nearby provinces are also experiencing a consistently high number of development activities.

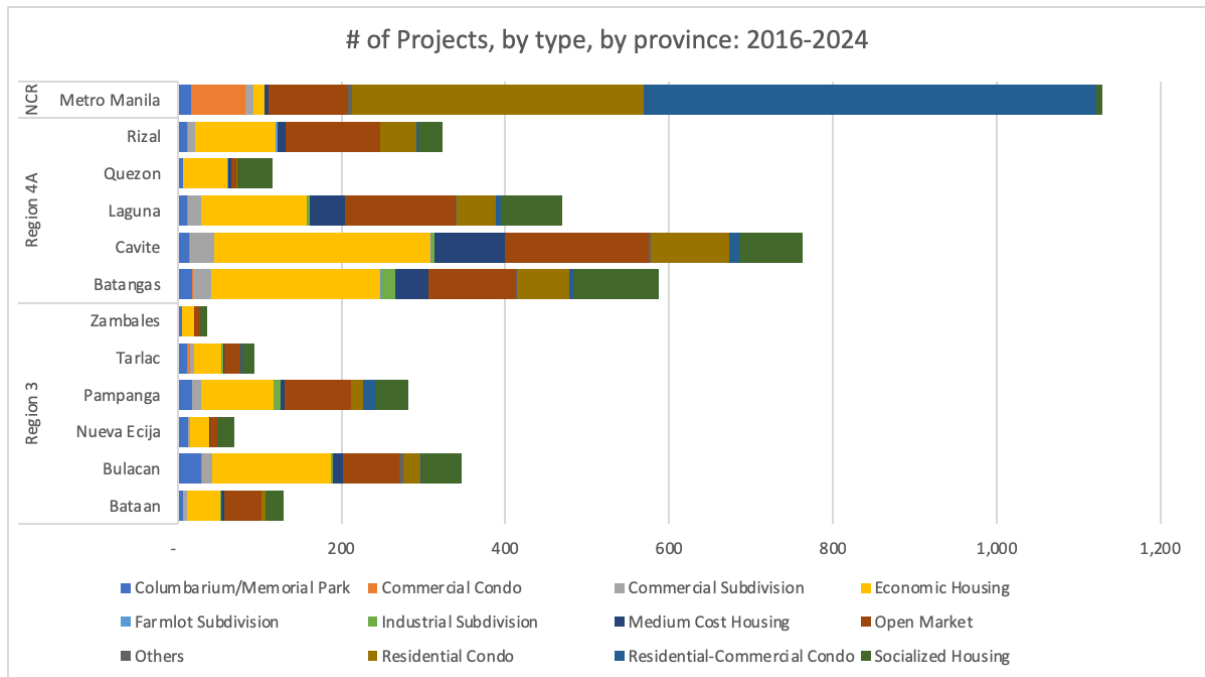
**Figure 29. Licenses to sell in Metro Manila and Regions III and IV-A, by year: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

Further disaggregation of the data by provinces, excluding Metro Manila, shows that Cavite has the highest number of licenses to sell with 763, followed by Batangas with 587, and Laguna with 469 (Figure 30). For Region III, Bulacan has the highest number of projects with 346, followed by Pampanga with 282. Most of the developments in Cavite and Batangas are economic housing projects with 264 and 206, respectively. For Laguna, the majority are open market properties with 135, however, it is closely followed by economic housing projects with 129 projects. Similarly in Bulacan, most of the projects are also economic housing projects with 145 projects.

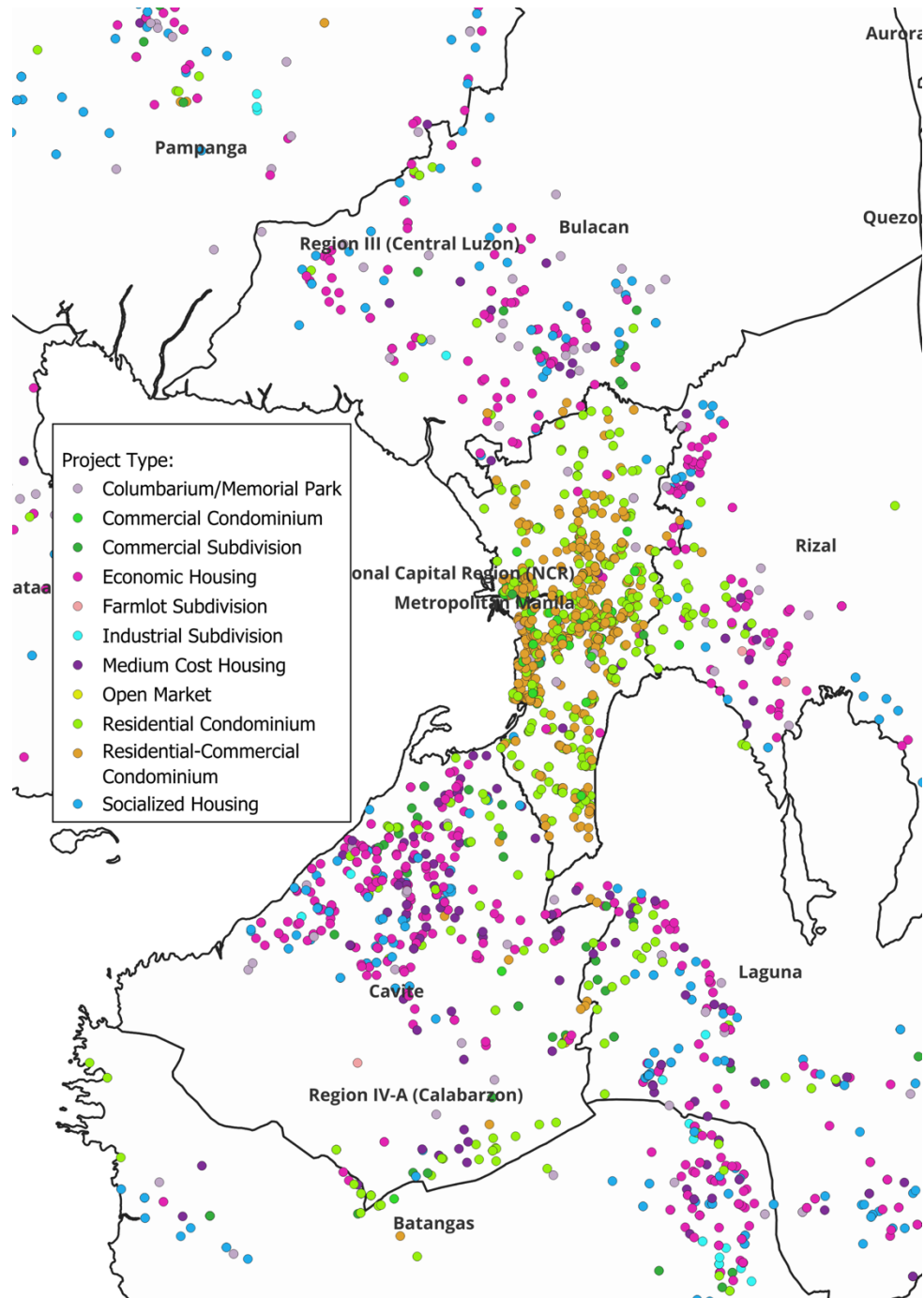
**Figure 30. Licenses to sell in Metro Manila, Regions III and IV-A, by project type, by province: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

The figure below visualizes the spatial distribution of these project types across the three regions (Figure 31). Evidently, most of the projects in Metro Manila are residential and residential-commercial condominiums represented by yellow green and orange points, respectively. Meanwhile, economic and socialized housing projects are dispersed in the provinces of the adjacent regions, with an apparent clustering near the borders of Metro Manila.

**Figure 31. Distribution of licenses to sell by project type, Metro Manila, Regions III and IV-A, by project type: 2016-2024**



Source: Authors' summary of licenses to sell data from DHSUD

## 6.6 Demographic and Housing Analysis of Metro Manila and Adjacent Regions

We also examined some demographic changes in Metro Manila and the adjacent regions and found that the population of Metro Manila increased by around 12% from 12,010,051 to 13,387,394 in 2020 (Table 9). Meanwhile, the populations of Regions III and IV-A rose by 22.53% and 28.43%, respectively. Population density within Metro Manila likewise rose by about 14%. This may be expected given the proliferation of high-rise developments over the years, allowing these areas to hold more people per unit of land area. Meanwhile, the population densities of Regions III and IV-A also rose by around 23% and 14%, respectively.

In terms of habitability, Metro Manila showed an increase of around 8%, suggesting a general improvement in housing quality or a shift toward better living conditions. In relation to this, space sufficiency also improved during the same period. These trends can be related to several factors such as: growing prevalence of condominium housing, which typically offers better structural quality compared to low-cost housing (economic and socialized housing) (Ballesteros et al. 2024); declining average household size in the National Capital Region (NCR); and the rising number of single-person households, reflecting shifts in demographic patterns and lifestyle preferences (Ballesteros et al. 2024). These demographic changes suggest that people's housing needs and preferences are evolving, and that the government and other urban planners might have to take these things into account in future developments (Ballesteros et al. 2024).

On the other hand, improvements in habitability, space sufficiency, and the share of formally owned lots may also be partly attributed to the clearing and relocation activities associated with large-scale township development projects. Such projects often involve the displacement and resettlement of informal settlers, usually to the adjacent regions. Correspondingly, the percentage of households residing in lots without consent of the owner or informal lots increased by 10.55% in Region III and 17.77% in Region IV-A, suggesting a possible spillover effect of urban redevelopment effort in NCR.

**Table 9. Summary of demographic and housing changes in Metro Manila and the adjacent regions**

	Metro Manila/NCR			Region 3			Region 4A		
	2010	2020		2010	2020		2010	2020	
Population	11,855,975	13,484,462	13.74	10,137,737	12,422,172	22.53	12,609,803	16,195,042	28.43
Density (# of people/area sqkm)	19,137.00	21,765	13.73	463.00	567.00	22.46	854.00	977.00	14.40
% Habitable	85.80	92.68	8.02	86.25	89.63	3.91	86.64	90.29	4.21
% Uninhabitable	12.37	6.70	(45.84)	12.25	9.88	(19.36)	12.23	9.29	(23.99)
% Sufficient space	63.11	71.12	12.69	63.72	77.42	21.49	71.18	78.62	10.46
% Insufficient space	36.89	28.88	(21.71)	36.28	22.58	(37.75)	28.82	21.38	(25.83)
% lot with no consent	5.11	4.66	(8.81)	1.42	1.57	10.55	1.86	2.19	17.77

Source: Authors' processing of data from the non-sample CPH 2010 and 2020 datasets from PSA; Density of Regions - PSA

Note: For lot with no consent variable: different variables were used, 2010: tenure of lot only since there is no variable for tenure of unit in the non-sample dataset; 2020: tenure of unit and lot, and no separate variables for tenure of unit and lot

While urban revitalization can drive growth and attract investments, it may also lead to gentrification and uneven development, reinforcing existing social and spatial divides. This is particularly evident in Metro Manila, where rapid urbanization has increased land values and population, yet the supply of affordable housing has remained limited. Despite having a large population of informal settlers and low-income households, most economic and socialized housing projects continue to be built outside the region, particularly in the adjacent provinces of Regions III and IV-A. Within Metro Manila, new developments are mostly residential and commercial condominium projects, which usually caters to higher income groups. Over the past decade, only 8 socialized housing and 14 economic housing projects were awarded in Metro Manila. This pattern suggests a growing spatial divide in the housing market. Moreover, this may also indicate a mismatch between housing demand and supply, revealing a gap between urban growth and housing affordability.

## 7. Conclusions

From the perspective of urban expansion and revitalization, this study examined the pattern of residential development and agglomeration using spatiotemporal methods. Between 1990 and 2020, residential development increased significantly and improved quality in Metro Manila, particularly in the last two decades when urban revitalization strategies surged with economic growth. High rise condominium, multistorey developments became prominent.

In terms of urban space, the spatial growth of residential and commercial stock showed a distinct multi-center pattern formed at the southern and northern part of Metro Manila. The growth of residential stock is concentrated at the edge of the central or core district, and expansion to the urban edges of Metro Manila in the direction of the hotspot areas is also growing rapidly.

While affordable housing developments are pushed beyond the peripheral boundaries, we note pockets of urban poor areas interspersed between hot spot areas and core districts indicating market dualism, whereby a housing market in poor or undeveloped settlements co-exist with speculative market from business development firms.

In revitalized areas, land values increase by an average of 500% to 600% within a 3-kilometer buffer. The increase within a 1-kilometer buffer is even more immense. Zonal values reflect not only the effect of asset creation in these areas but also the differences between low-income communities and communities within the 2 km radius of the revitalized area.

The results show that urban revitalization projects exacerbate housing inequities in Metro Manila. It facilitated urban sprawl as land prices in Metro Manila have risen significantly thus the expansion growth of affordable housing has been pushed to the urban fringes. The results also highlighted the spatial inequities and the presence of communities lacking basic infrastructure amid urban modernization. Despite significant wealth creation realized from urban revitalization projects, the extent of value capture for public interests and equitable access to shelter is not evident. Instead, displacement of low-income households is significant.

## **8. Policy Implications and further studies**

The intensifying tension between market-driven urbanization and equitable access to shelter is real. The Philippine government policy addressing housing affordability mainly through subsidies (e.g. interest subsidies; income tax exemption; tax holidays, etc) and expansionary land supply magnifies this problem. The improvement and increase in road infrastructure leading to Metro Manila will not address housing affordability. Urban sprawl leads not only to inefficiency but requires a reliable high speed transport network. Moreover, as road infrastructure expands, the peripheral areas are urbanized as well, pushing further to the frontier affordable housing developments.

The Philippines “new” urban agenda as contained in the National Housing and Urban Development Sector Plan 2040 (NHUDSP) and the Philippine New Urban Agenda (PNUA) recognizes urbanization as a catalyst for inclusive growth and carries with it the principles of inclusive urban development. Among the key strategies is the adoption of “spatially and thematically integrated settlements” that includes the following (DSHUD 2022, p. 6): “(1) development of integrated neighborhoods and sustainable communities particularly for low-income households” (DHSUD 2022, p. 7); (2) “intensify implementation of alternatives and innovative solutions in addressing the housing needs of the lower income classes and vulnerable sector such as public rental housing, mixed income and mixed-use housing development” (DHSUD 2022, p. 7). The NHUDSP has provided the framework to guide the management of growth in cities; to strengthen housing as a platform to reduce poverty and

vulnerabilities among the low-income sector and to ensure that the objectives of inclusive and sustainable cities can be achieved.

The framework is supported by the Urban Development and Housing Act (UDHA) or Republic Act 7279 of 1992, which is the legal basis to enable the implementation of the strategies outlined in the NHUDSP. For inclusive/socialized housing developments, the law provides for the following: (1) “implementation of humane resettlement for informal settlers” (RA 7229, Sec. 2); (2) “identification of lands for socialized housing” (RA 7279, Sec. 8); (3) “the expropriation of land for social housing purposes” (RA 7279, Sec. 12); and (4) “the balanced housing requirement for developers of non-socialized housing, whereby developers of open-market subdivision and condominium projects are mandated to allocate 15% of the total cost of main subdivision project and 5% of the total condominium project cost for socialized housing development” (RA 10884, Sec. 2).<sup>3</sup>

These provisions do not really address the issue of land governance for inclusive housing. First, humane resettlement is focused on the manner/process of resettlement, ensuring that a resettlement site is available, which may not be necessarily in-city. Second, the identification of lands for socialized housing is simply a listing and because of the fast pace of land use changes, the land may no longer be available for socialized housing purposes in the near future. Third, expropriation of land whether government or private owned, may conflict with constitutional rights specifically that the socialized housing purposes under the government current program involves eventual transfer of ownership to an association or individual. Fourth, balanced housing requirement provides potential funding support for government affordable housing programs but does not address spatial integration for inclusive housing.

The UDHA provisions as indicated above are insufficient if not linked to land governance and mixed-income planning. Government, both national and local governments, must move away from a reliance on land revenues and direct/regulate the allocation or rezoning of certain areas for affordable housing. This means ownership expropriation in select cases and/or development expropriation (even informal settlements) through zoning regulations, which are approaches that are legally available to both the national and local governments.

National and local government should mandate mixed-income planning for urban revitalization projects including infrastructure development (e.g. Transit-oriented Developments (TODs) framework). Escrow funds from the balanced housing regulation can be used by the government to co-fund urban revitalization projects. The government needs to take a comprehensive development approach in urban revitalization projects ensuring that existing low-income communities are not fenced off from these developments but are part of the transformation process.

Ownership expropriation may be implemented for community land trust housing programs of government, whereby landownership remains in trust, governed by corporate guidelines rather than the real estate market.

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3. Republic Act No. 10884 (2016), also known as the "Balanced Housing Development Program Amendments," which modified Republic Act No. 7279 (1992), the Urban Development and Housing Act (UDHA) of the Philippines

Finally, further studies are suggested to compel the government to act on the housing crisis in the country.

- Linking socio-spatial polarization and housing inequality with public health and other socio-economic factors
- Estimation of the extent of wealth creation from urban revitalization projects to provide insights on the magnitude and allocation of development gains from government infrastructure development and the extent of value capture for public interest from these projects
- Urbanization has a positive role in promoting economic growth. Examining the role of urbanization in bringing about economic agglomeration and consequently the role of economic agglomeration on the development of cities or subregions.

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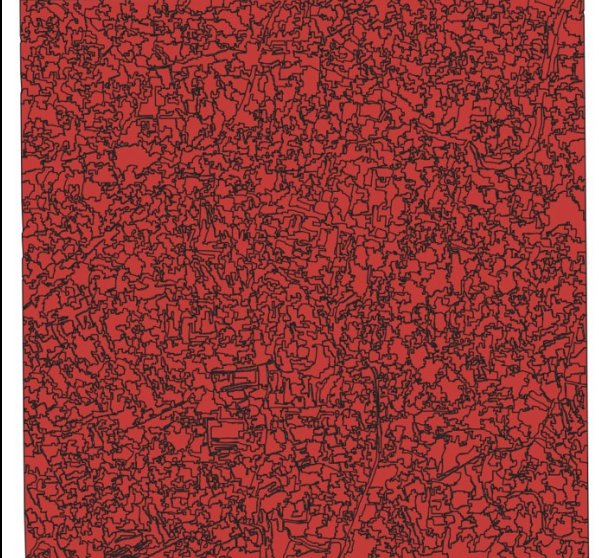
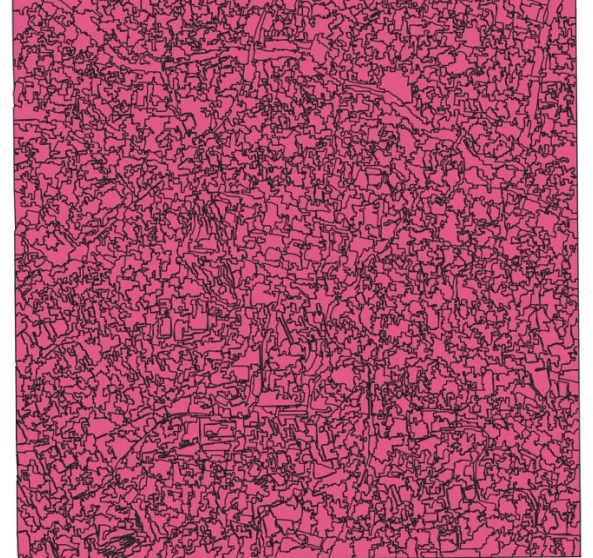
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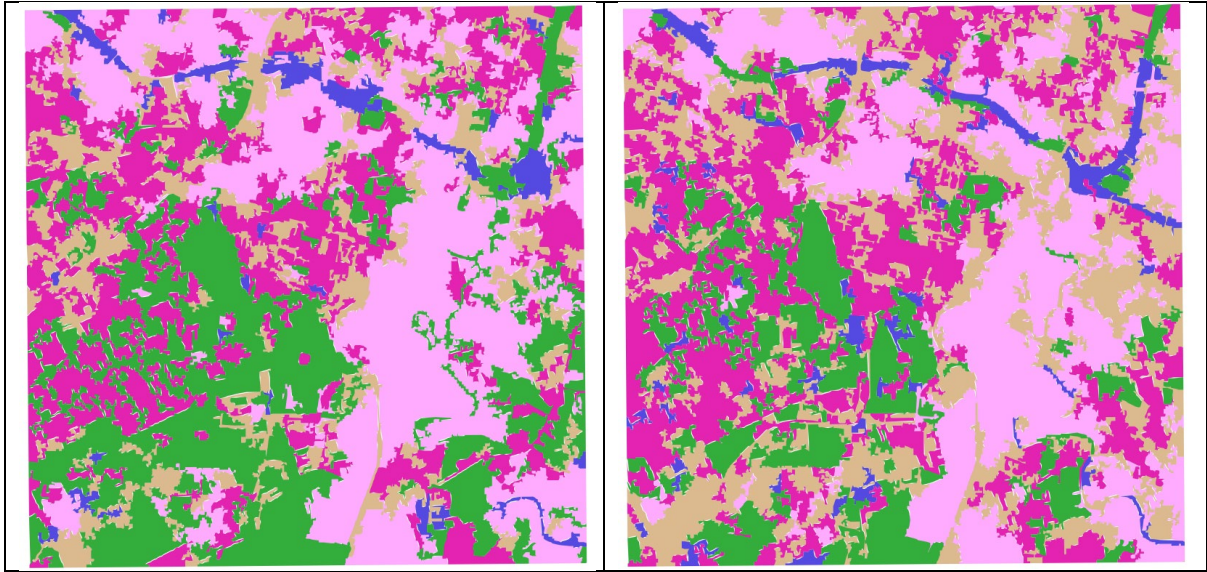
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## 10. Annex

### Annex 1. Results of the Object-Based Image Analysis

2015 Satellite Image	2025 Satellite Image
 A satellite image of a city area in 2015, showing a dense urban landscape with a central green park area and a winding river.	 A satellite image of the same city area in 2025, showing significant urban expansion and changes in land use compared to 2015.
2015 Result of segmentation	2025 Result of segmentation
 A segmentation map of the 2015 satellite image, showing the city area divided into numerous small, irregular polygons representing individual objects.	 A segmentation map of the 2025 satellite image, showing the city area divided into numerous small, irregular polygons representing individual objects.
2015 Result of classification	2025 Result of classification



Source: Authors' processing of satellite data from ESRI – Copernicus Sentinel-2A

Cover Classification:

- Water
- Road
- Green/Open spaces
- Built up building
- Built up small