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Spanish Colonial Enclave Urbanism

Manila's Intramuros and how exclusion and waterway connectivity created the Binondo (Manila Chinatown) Trading District

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ABSTRACT

The neo-liberal privatisation of the built environment into enclaves is a contemporary global theme leading to today's range of socio-spatial disparities. Present-day Metro Manila has been hollowed-out, with a long-blighted historical core; and has seen most development turn its back from the Pasig River that carried trade and commerce during the Spanish colonial period. Most 'modern' economic activity has moved to the enclaves composed of business districts and gated villages outside of Manila; with long-range connectivity in the form of highways and tollways bypassing most of Metro Manila's fine-grained core. This study investigates the historical roots of this enclave urbanism using the quantitative methods of spatial network analysis under space syntax theory. This study uncovers the underlying spatial configuration and structures beneath the order imposed by the Spanish on Manila. These include the centre of political control – the civic plaza and urban grid within the walls of Intramuros; outside of Intramuros, the mission church plazas centring local populations around the Bajo de la Campana, serving as the base of *Reducciones* labour control; the unintended consequences of the Spanish defensive and exclusionary posture, and marginalisation of the *Sangley* Chinese trader population; and the underlying importance of the Pasig River and its network of waterways in the commercial spatial network of Spanish Manila. This study focuses on using a quantitative approach to reveal how modern Metro Manila's patterns of exclusion and privatisation has roots in colonial urban morphology, and how it can reconnect with the Pasig River for transportation and urban revitalisation.

KEYWORDS

Trading district, Enclaves, Exclusion, Spatial network, Historical Urbanism

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1 INTRODUCTION

1.1 Historical Roots of Philippine/Metro Manila Enclavisation

Austerity brought about by crises and neoliberal economic thought have seen the rise of privatisation and enclosure of the public realm into private property throughout the world. While this appears to be a contemporary phenomenon affecting all cities subject to the flows of contemporary global trade and neoliberal economic policy, Murphy and Hogan (2012) point to the Spanish Encomienda system (Doeppers, 1972) and the subsequent failure of American secularisation and land reform of Friar Lands, as the historical root of the privatisation and enclavisation of Philippine territory, and of Metro Manila's privatised edge city business districts and gated villages. The Spanish colonial administration of the Philippines imposed a semi-feudal division of agricultural territory outside of the *Reducciones* Church Plaza-centred towns and cities (Doeppers, 1972). This is a prototypical pattern found throughout the Philippines, and is centred in Spanish Intramuros, with its exclusionary nature and its surrounding mission *arrabales* or suburbs such as Binondo, San Nicolas, Quiapo, etc. documented by Armengol (1958), Quirino (1971), Shioda (et al, 2012), and Jimenez-Verdejo (et al, 2015).

1.2 Statement of the Problem

Contemporary Philippine urbanism has experienced the growth and explosion of enclaved, gated, car-centric private development, led by private developers as the primary means of production of new urban and suburban space. This enclosure of territory typologically recalls the imposition of order by the Spanish on Manila and its surroundings, through the establishment of the walled city of Intramuros. Centuries of colonial rule and independence has resulted to this socio-spatial condition and its discontents. Modern Manila and its suburbs, along with the Philippines other primary cities are characterised by the sharp disparity in living conditions between those within these private, walled developments, and those outside of them. These enclaves are usually connected by highways that divide communities and forget the historic waterside connectivity that cities were built on. The contemporary blanket acceptance of privatised enclosure and car-centric connectivity requires critical reflection and understanding, for Filipinos to improve not just the spatial condition of their built environment, but their social conditions as well.

1.3 Research Intentions / Significance of the Study

As Murphy and Hogan (2012) point out, Metro Manila's current dysfunctions have historical roots. While narrated in historical literature, these have not been documented and analysed using space syntax's methods. This study intends to provide a configurational analysis of the beginning of these historical narratives, to show how historical Manila's Spanish colonial spatial network and society reflexively influence each other– creating the spatial core and foundation on which today's Metro Manila is built around.

1.4   Research Questions

a.   What are the underlying historic patterns of spatial configuration and social exclusion that occurred within Spanish Intramuros?

b.   How did the Spanish impose control on Intramuros' surrounding socio-spatial fabric?

c.   Was Spanish Intramuros the true socio-spatial integration core of Manila?

d.   How did the Pasig River system affect trade/exchange on Manila's socio-spatial fabric?

2   THEORY

2.1   Socio-Spatial Reproduction

Hillier (2001) discusses "Cities of Reproduction" as a spatial means to re/produce society. In the case of Teotihuacan, instead of configuring around the daily socio-economic life of its occupants as an organically formed city did, its grand axis forms a "monumental core." This imposed a synchronic space-time order through ceremonies and practices that emphasised the societal hierarchy and power of its leaders.

Oramas-Dorta's (2012) study of Planned Political Capitals includes Washington DC (from which, Manila's original planner, Daniel Burnham draws considerable inspiration as part of the City Beautiful movement) as its earliest historical example, amongst the new modern capitals of Brasilia, Abuja, and Astana. It points out that their respective "monumental cores" are not activated as part of the daily socio-economic functioning of their respective urban fabrics — and instead belong to the background network of socially conservative spaces that preserve culture through ceremonial events. Conversely, this study points at how spatial networks, perhaps as a sign of "self-correcting" and filling a market demand, develop organic centralities (Hillier, 1999), even in neighbourhoods not intended to be vibrant districts.

The above discourse on socio-spatial reproduction point to how attempts to impose order on society through space, and, the ordering of space through the control of society, create both intended and unintended consequences on both the spatial and social configuration of the built environment.

2.2   Space Syntax – Axial Lines and Graphs

This paper examines Spanish Manila's historical and socio-spatial phenomena, using the methods that form space syntax theory's analysis of spatial configuration. Hillier and Hanson (1984) discuss the fundamental derivation of space syntax methodology. They present how settlements have organically developed, and how certain spatial phenomena take shape. They then propose the use of Axial Lines to represent and analyse these settlements as an interconnected network of spaces.

Axial lines represent the longest, straightest lines that pass through any system of spaces, as abstractions, they are useful in simplifying the underlying spatial system through the built environment. Emo (2014), has tested and illustrated the soundness and the cognitive roots of the axial lines as a method of representing space through a city, by testing and showing how humans visually perceive space, through the axial lines. Each street or path through a public space is represented as an axial line, and is then counted as a node, which, when grouped together according to their adjacent connections, for a network that can be mathematically analysed (Hillier and Hanson, 1984).

2.3 Space Syntax's Key Discourse, Order and Structure

Foundational to Space Syntax is the concept of Natural Movement (Hillier et al, 1993) — in which all things being equal, how space is configured influences its probability to generate pedestrian and vehicular movement, and correspondingly, social copresence and behavior. The potential for movement in cities is categorised according to two kinds of applied graph theory centralities. The closeness centrality, also known as integration, measures the probable capacity of the spatial network to foster movement towards specific close or integrated locations. The second is the betweenness centrality, also known as choice, which measures the probable capacity of the spatial network to generate through movement between any 2 points (Hillier et al, 1993).

These concepts are then used to describe cities as Movement Economies (Hiller, 1996), wherein cities also probabilistically create parts vs. whole relations, by virtue of the variances of activity in (closeness/integration), and movement through (choice/betweenness) certain places which spatial configuration encourages or discourages. Naturally – configuration, creates areas which are more vibrant and active, alongside other areas that are relatively quiet. The city as a whole has these separate areas as unique parts.

This describes the formation of a generic Dual-Network (Hillier and Vaughan, 2007) composed of the foreground network on which generative micro-economic activity fosters exchange and interaction, and the background network, which is conservative in how it maintains social and cultural relations within residential communities. This adds nuance to Hillier's (1999) discussion of Centrality as a Process, wherein he not only relates the relationship between land use and other factors to the idea of configurational centrality in cities, but also highlights that centralities grow, migrate, shift or diffuse over time as the foreground and background networks grow and develop.

Hanson (1998) for London after the great fire of 1666 and Karimi for Persia's ancient cities (2012) discuss how top-down imposed localised Order differs from global, or bottom-up Structure and how the two concepts intertwine and recede as one surfaces. Both discuss how attempts to impose order on seemingly disorderly spatial fabrics fall apart as underlying

centralities reemerge, forming a spatial structure to the network that serves to underpin socio-economic phenomena.

These key concepts serve as the underlying basis for the lens which this paper uses to analyse Spanish Manila's spatial configuration.

2.4 Metro Manila's morphological and historical layering

Metro Manila has grown to become a complex urban region, but as with most conglomerations, can be mapped typo-morphologically according to how it historically builds out and grows over time. The following is a narrative describing and annotating the morphological 'tree-ring' diagram shown in Figure 1.

2.4.1 Pre-colonial roots as a Trade Emporium

Manila's name comes from a contraction of the Tagalog-dialect: may-Nilad, or there is Nilad. The Nilad is a flowering mangrove plant that grew on the estuary of Pasig River and Manila Bay (Quirino, 1971). Pre-Spanish Manila was a collection of Sangley (Chinese traders) and Tagalog (Malay-Muslim Filipinos) settlements that thrived on the strategic trading position, locally at the mouth of the Pasig River (See Figure 1), and globally, within the Southeast Asian Mediterranean Monsoon Maritime Trading region. It follows Widodo's (2004) morphological model of the typical Southeast Asian Trade Emporium, with a Fortress/City governed by a Royal ruler, in this case by Rajah Soliman, as the seat of power.

2.4.2 Founding of Intramuros, the *arrabales, encomiendas,* and *haciendas*

Intramuros, or Spanish Manila, was founded by Martin de Goiti on 24 June 1571 on the ruins of the abandoned Fortress of Rajah Soliman. It was planned following King Phillip II's Laws of the Indies (Doeppers, 1972, p. 769-792), creating a grid of narrow streets (providing shade from the tropical sun) with a hierarchy of plazas that anchored churches, government buildings, and residences for the colonists, all within the walled fortress of Intramuros (See thin solid red outline, Figure 1). The evolution of this walled city was documented typo-morphologically by Shioda, T. et al. (2012, p. 2548) showing how it has remained an isolated enclave over time.
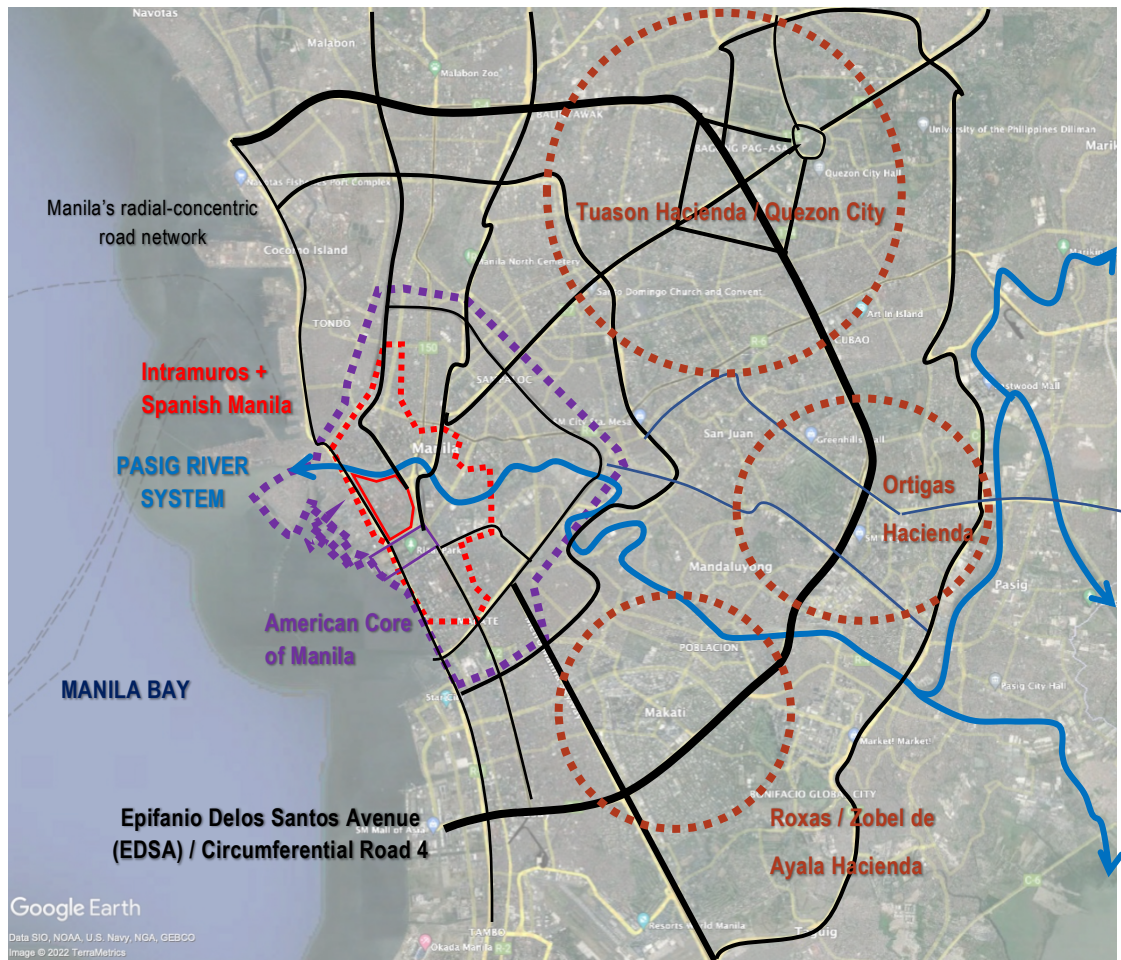
Figure 1: Satellite Photo of Metro Manila's core within Epifanio Delos Santos Avenue (EDSA) / Circumferential Road 4; Annotated by author to highlight key typo-morphological features and layers (Google Earth Pro, 2022).

Outside Intramuros (See dashed red outline, Figure 1), the Sangleys, flourished as trade with the Spanish grew (Kueh, 2013 and 2014). The Spaniards moved the Sangleys (due to fears of revolt, risk of fire and disease) to what was to be successively relocated parian (or missionary) districts.

First settling on Isla de Binondoc in 1573 (See Figure 2), then moving across the Pasig River to settle beside Intramuros on the 1st Parian District of Arroceros in 1581, then relocated by the Spanish back to Binondoc as the 2nd Parian district in 1588, and finally becoming established in Binondoc (today's Binondo) as the world's oldest established Chinatown in 1594 (Armengol, 1958, p. 127). The typo-morphological growth of Binondo and San Nicolas were documented by Jimenez, Shuzo et al (2015, p. 612).
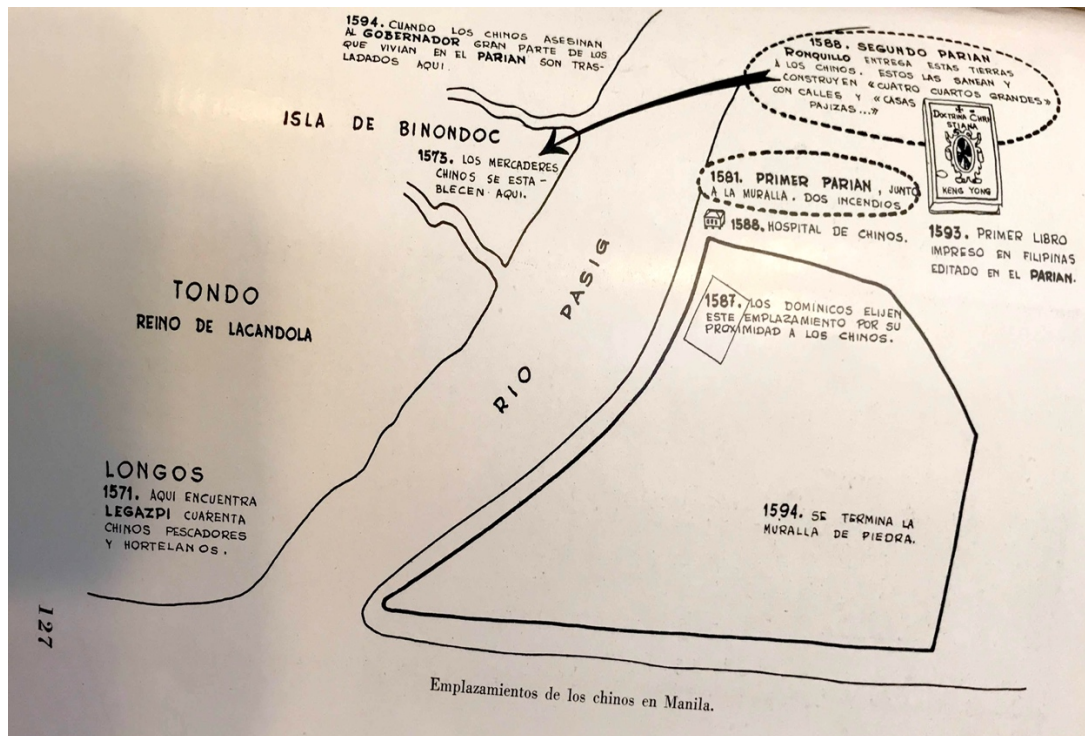
Figure 2: Chronological locations of Manila's Chinatown until 1594. Relocations done by the Spanish for security/health concerns (Armengol, P.O., 1958., p. 127)

Similar settlements in the surrounding *Arrabales* or suburbs around Intramuros became mission areas for Spanish church-building, effectively placing most of the populace under the bajo de la campana or "voice" of the bells. This policy was known throughout the Spanish new world as *reducciones*, and it was a typical pattern imposed throughout the archipelago as well. Spanish missionaries forcibly relocated indigenous (even nomadic) populations into church-centred towns that formed a network of throughout the archipelago (Doeppers, 1972).

These towns anchored the Spanish colonial administration's semi-feudal division of agricultural labour across divided territories consisting of *encomiendas* (Doeppers, 1972) tasked with the production of farmed goods. These *encomiendas* then later-on became the privatised farm *haciendas* that are to become the basis of modern-day land holdings and developed private estates.

The Spanish legacy of planning in the Philippines is summarised by Arguilla (1950, 14) as: "First for the purpose of defense and second for grandeur... Housing was not considered at all, as a public responsibility... The badly-housed were not the concern of the municipality." Ocampo (1992, p. 312) concludes: "The better intentions of Phillip II's instructions were forgotten. The colony took care only of its own." "While the church brought its converts 'under the bells,' Manila largely walled out the natives and other foreigners," and "charitable services were extended to both the natives and Spaniards, but on a segregated basis."

2.4.3   The American 'City Beautiful' Masterplan

After the Spanish-American war that ended in 1898, America consolidated its hold on its new Philippine territory through President McKinley's proclamation of "benevolent assimilation", which sought to "sell" America to Filipinos by bringing social, civic and practical reforms to the "backward" Philippines — like sanitation and infrastructure (Miller, 1982).

Ocampo (1992) discusses how Daniel H. Burnham, and his associate, Pierce Anderson were invited to the Philippines by the new administration, to prepare the Masterplan for Manila. Burnham and Anderson prepared the plan as a piecing-together of existing projects that had already been in the works (Duque, 2009) — with their intent to unify Intramuros and its *arrabales* into a grand capital with a civic core (See thin solid purple outline, Figure 1). Completed in early 1905, the plan sought to preserve the city's heritage in Intramuros, preparing for Manila's rapid population growth and dispersal with the development of industry, agriculture, and transportation. Burnham's intention was for the plan to be revised and adjusted to meet existing conditions and demand for real estate. Parsons (1915) writes:

"An integrated spatial pattern was prescribed by Burnham for the city, with classic long, straight lines and rectangular units and, on top of a basic grid, a circulation system radiating from a government building site near Intramuros. Circumferential and diagonal arteries and parkways would link this and another building group to the Northeast with parks and different sections of the city."

Ocampo recounts Burnham's plan strove for function as well: "The esteros gave Manila the flavour of an Oriental Venice. Burnham thought that some of the esteros offered environmental refreshment and should be widened for commercial transport." Burnham concluded his plan proposal by remarking: "On the point of rapid growth, yet still small in area, possessing the bay of Naples, the winding river of Paris and the canals of Venice, Manila has before it an opportunity unique in history of modern times, the opportunity to create a unified city equal to the greatest of the Western world with the unparalleled and priceless addition of a tropical setting"

William E. Parsons, a Beaux-Artes graduate, was appointed as Consulting Architect to the Insular Government in November 1905 (Ocampo, 1992). He was tasked to oversee and implement the Burnham plan on what was to be Manila's original American core (See dashed purple outline, Figure 1). He defined the arterial framework for construction, along with the plots for the various civic buildings, then to meet demand for industrial land for production, re-zoned Pandacan and the southern banks of the Pasig River from residential into industrial uses (Arellano, 1919 and Mapua, 1929). This erased Burnham's riverside drives and promenades to make way for large industrial parcels that cut-off direct access of people and trade goods to and from the river.

One can see how present-day Metro Manila turns its back on the Pasig River and trace it to this decision to maximise the river as industrial frontage for ferrying of raw materials and finished goods, and for sourcing of coolant and/or discharge of waste products for and by the various industrial uses alongside it.

2.4.4   Post-war Suburbanisation into Enclaves

Parson's successors continued to oversee the growth of Manila, until the Japanese invasion of World War 2, and Manila's eventual destruction in 1945, as it became a battleground for liberation forces as they had to clear the Japanese from the city through block-by-block shelling and fighting.

Murphy and Hogan (2012, p.26) point out that past catastrophic events leading to the destruction of cities, such as the Great Fire of London (discussed by Hanson, 1989; and expounded on by Karimi, 2012) and the fires that devastated San Francisco and Chicago (both re-planned afterwards by Daniel Burnham) have been impetus for a flowering of civic spirit amongst wealthy private interests to rebuild and improve on their cities – Manila's elite, on the other hand, in an exercise of private interest, sought to move away from the devastated heart of Manila, and leave rebuilding it to the government. What were once colonial haciendas became the fertile ground for privately led expansion and development (See brown dashed outlines for haciendas turned into privatised suburban expansion, Figure 1).

The Tuason hacienda to the northeast of Manila, became the new Philippine capital of Quezon City (Pante, 2018, p. 15-38), whilst the Ortigas and Roxas / Zobel de Ayala haciendas then became privatised suburban developments with gated enclaves and private Edge Cities (Garrido, 2013, p. 171-172).

These suburban edge cities were connected by what was to become Metro Manila's primary growth corridor, Epifanio Delos Santos Avenue, a circumferential highway that linked these car-centric developments and that bypassed the historical core of Metro Manila (See thick black circumferential road, Figure 1).

2.4.5   Contemporary Issues: Pasig River Expressway, Binondo-Intramuro

Bridge and continued suburban enclavisation

Present-day Metro Manila sees the intensification of these post-war edge cities into full-blown Central Business Districts (CBDs) (Ortega, 2016; Shatkin, 2004, p.391-394; Kleibert and Kippers, 2016, p. 373-395), surrounded by a carpet of gated residential development. These constitute what Corpuz (2000) describes as implant-bypass urbanism wherein privatised and

isolated islands of production and consumption are implanted into an informal fabric that they effectively bypass through highway and transit infrastructure.

It is this same urban enclavisation that is driving both car and infrastructure demand, with recent infrastructure proposals including the proposed Pasig River Expressway (SMCI, 2021) which seeks to build an elevated toll highway on top of the Pasig River; and the recently completed Binondo-Intramuros bridge (PNA, 2022), which connects both historical sites by spanning the Pasig River with a viaduct that runs on the (also historic) Estero de Binondo (one of the few remaining canals which Burnham remarked as reminiscent of Venice's own).

These infrastructure projects emphasise Manila's disengagement with the Pasig River and regressively denies the global effort to move away from car-centric planning, to revitalise riverside communities, and to capitalise on heritage and riverside tourism as magnets for urbanism.

3   DATASETS AND METHODS

3.1   Study Area / Historical Timeframes

This study will focus on the spatial network and points-of-interest documented in the 1898 Map of Manila and its suburbs (See Figure 2), and the 1851 Map of Intramuros (See Figure 3). These maps are selected for their completeness in terms of points of interest, and for capturing the tail-end of urbanisation during the Spanish colonial rule which ran from 1521-1898. The spatial networks documented in the above historical maps are encoded into a consolidated spatial graph composed of axial lines and layered points of interest which is then used as the basis for space syntax analysis.

3.2   Methodological Framework

This study uses space syntax's method of angular segment analysis (Turner, 2000; Turner, 2001; Turner, 2005; Dalton, 2001; Turner, 2007; Charalambous, N. and Mavridou, M., 2012), to produce measures of Normalised Angular Integration (NAIN/closeness centrality) and Normalised Angular Choice (NACH/betweenness centrality) (Hillier et. al, 2012) for the traced historical spatial network. These values vary from local/pedestrian to macro/vehicular scales.

The values derived from the spatial analysis of these timeframes are to be compared against various points-of-interest (POIs) (Yang, 2015), including historical landmarks and enclave entrance thresholds and boundaries found in the historical maps. These are used to aggregate and distill the socio-spatial narratives from reviewed historical literature. These are analysed using descriptive statistics and are discussed to highlight the differences in socio-spatial configuration between portions of the spatial network that are within and outside the boundaries of Intramuros.

In response to the first research question, this study compares the values aggregated by Intramuros' various government, military, religious, commercial, and other POIs using descriptive statistics. By comparing values relative to their location within Intramuros; certain patterns of configuration surface and show both the ordered/sacred (ceremonial or civic) uses vs. the profane/structured (commercial) uses that endure today. By comparing religious POIs relative to the mean of Intramuros spatial network and the network outside of it, a pattern of local religious anchoring consistent with the mission church plaza planning morphology emerges outside of Intramuros.

In response to the second research question, this study uses the same methodology, this time comparing military POI values with the mean values of the spatial network both within and outside Intramuros. This shows how power was projected and order was imposed by military camps and fortifications on critical routes and areas outside of Intramuros.

In response to the third research question, this study uses the NAIN Rn values of the network to highlight the difference between Intramuros as the 'centrally-positioned' enclave of the colonial urban panopticon, imposing order on Manila; whilst showing how it was actually Binondo that emerges as the structural integration core of Manila, with how it tied and linked the Spanish colonial road network.

For the fourth research question, important commercial POIs such as the *Alcaceira de San Fernando* (the Chinese silk market in the edge of Binondo), *Calle Escolta* (the Spanish and American colonial high street), and *Puerto Magallane*s (the Galleon Port at the edge of Intramuros) amongst other market sites are examined in detail. Their respective values are first compared with the road-based spatial network inside and outside of Intramuros.

This study then adopts Psarra's (2018) methodology of using water-based routes as part of the spatial network by including the system of esteros and the Pasig River in the spatial network analysis to see how these commercial POIs benefit from water-based transport. This combined analysis provides a more holistic picture that highlights how crucial waterways were to colonial long-range movement and trade.

4   RESULTS

4.1   Intramuros

4.1.1   The Ordered Center of Spanish Manila

The Spanish Walled City of Intramuros (literally, within the walls), was designed to defend against competing regional mercantilist powers such as the Portuguese, Dutch and the British; and to keep Chinese pirates and subversives out (Doeppers, 1972, p. 769-792; Murphy and Hogan, 2012, p. 7-9).

The 1898 Map of Manila and its surrounding settlements (see Figure 3) draws Intramuros as the center of Manila, with a defensive buffer of the Pasig River and Luneta around it. This is an imposed order on the city and its surroundings. The popular interpretation is that by placing Intramuros as the figurative center of the city, its guns are positioned not just to defend the mouth of the Pasig River, but also aimed at the traditional native settlements across and surrounding it, like a panopticon.

Figure 3: 1898 Manila and its surrounding suburbs / Plano de Manila y sus Arrabales 1898, showing reducciones mission areas outside Intramuros (de Gamoneda, F.J., 1898)

The core of Intramuros was the grid centered around the Plaza Mayor (loosely defined/bordered in red, Figure 4) This was a socio-spatial reproduction of the European town and socio-spatial correspondence wherein colonial administrators, military officers, and laity kept within a contained urban footprint. Access going into and out of the walled city are through specific puertas/gates that are strategically located as shown (green circles, Figure 2).
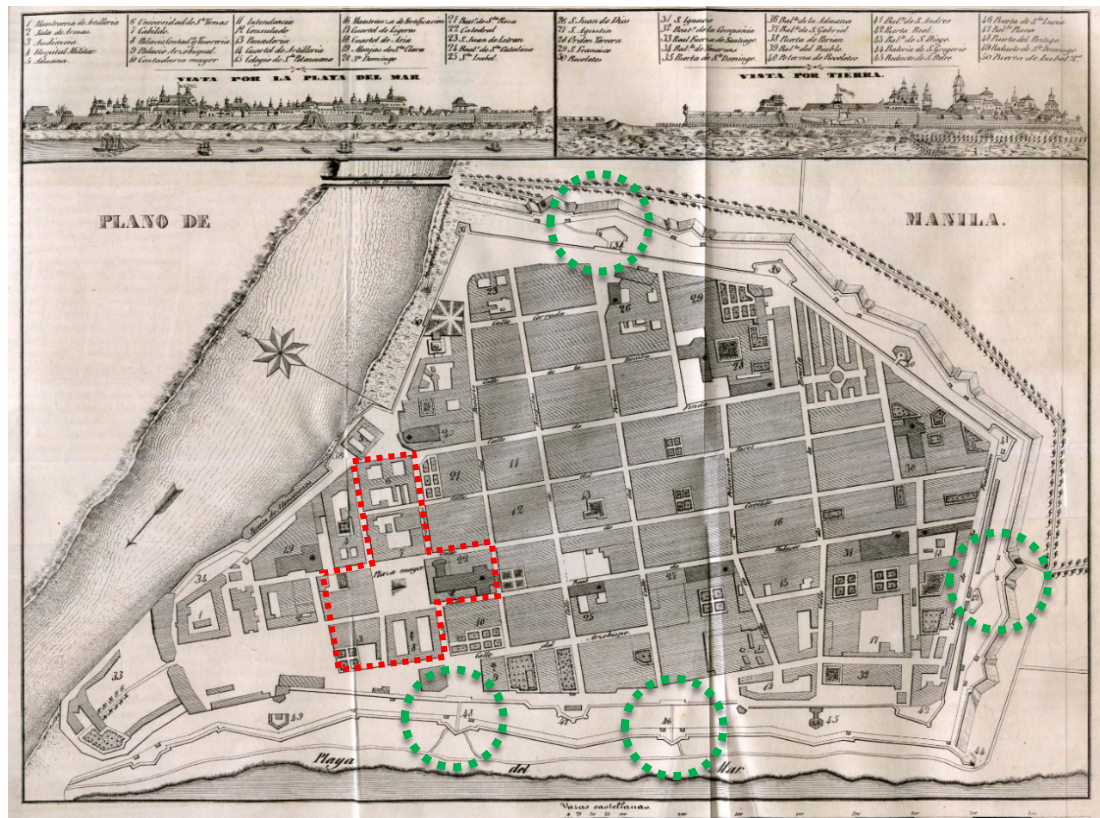
Figure 4: 1851 Map of Old Manila / Intramuros (Diccionario Geografico-Estadistico-Historico De Las Islas Filipinas, 1851) Red Outline: Plaza Mayor / Civic Core, Green Outlines: Access Points into the walled city.

4.1.2 The Sacred and Profane endure in Intramuros

The above 1851 map is translated into an axial spatial network graph and analysed to understand its centralities for different ranges of travel (See Figure 5). This graph shows global integration or nearness centralities (NAIN Rn).

This shows which segments are most accessible as destinations to and from all other segments within the system (inside Intramuros) being analysed. Then, the Points of Interest defined in the legend of the 1851 Map are then layered onto the graph and each point absorbs the values of the closest street segment it is on. This allows us to put a value on how accessible each point of interest is on the graph, thereby surfacing latent spatial properties (See Table 1).
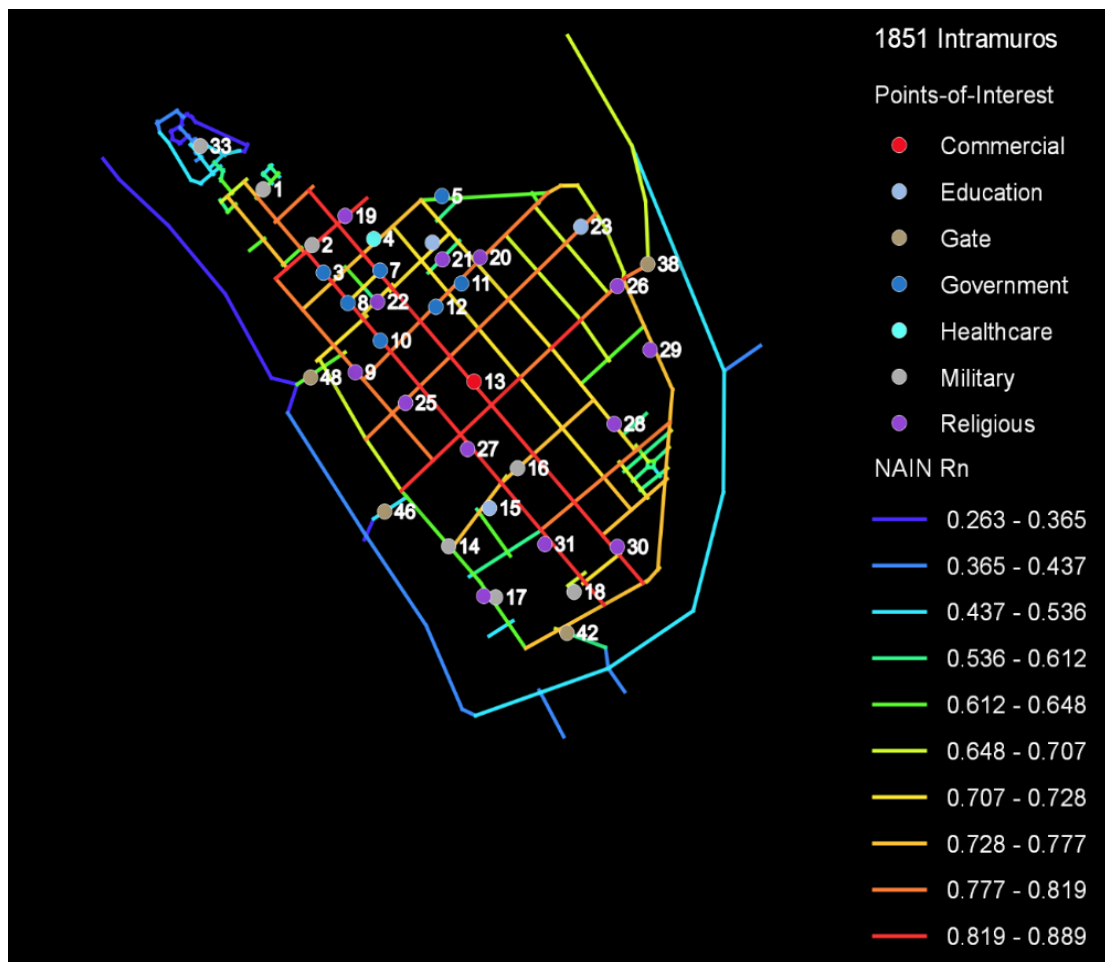
Figure 5: 1851 Manila, NAIN radius N - showing Intramuros' Points of Interest. With Major Government Buildings located on globally integrated segments of the 1851 Intramuros Enclave Network (see Table 1).

The graphing of the 1851 map and the overlay of mapped points-of-interest, could give us a view of how the typical colonist resident of Intramuros saw the world within the walls of the city during this time period. Everything else outside of the walled city could be considered peripheral to the civic society and "court" formed by the urbanism and social correspondence within the walls.

Looking at the bottom of Table 1, one can see that the Government Points of Interest (Points 3, 5, 7, 8, 10, 11, 12) – on average, had higher Global Integration / Nearness Centrality (NAIN) and Choice / Betweenness Centrality (NACH) Values compared to the rest of the other Points of Interest within Intramuros. This signifies the role of Intramuros, as it houses and contains the colonial government's institutions (shown in blue dots of Figure 5) and major religious institutions (shown in the purple dots of Points 20, 21, 22, 9,19 of Figure 5), which cluster around the general area of the plaza mayor. Because of its imposed government and religious order, the plaza mayor could be considered the sacred grid and ordered core (Hillier, 2001) of Intramuros.

Tag	1851 POIs	Type	NAIN Rn	NACH Rn
1	Maestranza de Artelleria	Military	0.63898	1.17631
2	Sala de Armas	Military	0.85201	1.46889
3	Real Audencia	Government	0.88667	1.29259
4	Hospital Militar	Healthcare	0.7401	1.03334
5	Aduana	Government	0.62345	0.21254
6	Universidad de Sto Tomas	Education	0.7252	1.03006
7	Cabildo	Government	0.88712	1.47711
8	Palacio Cortada y Tesoreria	Government	0.72294	0.83623
9	Palacio Arzobizpal	Religious	0.79635	1.04314
10	Contaduria mayor	Government	0.88717	1.32119
11	Interdencia	Government	0.77817	1.16001
12	Consulado	Government	0.77836	1.17934
13	Panaderia	Commercial	0.8875	1.44794
14	Cuartel de Artilleria	Military	0.6133	0.9571
15	Colegio de Sta Potenciana	Education	0.76572	1.2254
16	Maestranza de Fortificacion	Military	0.75801	1.09985
17	Cuartel de Ligeros	Military	0.61261	0
18	Cuartel de Asia	Military	0.69165	0
19	Monjas de Sta Clara	Religious	0.84775	0
20	Sto Domingo	Religious	0.71948	1.10075
21	Beato de Sta Rosa	Religious	0.61016	0.88205
22	Catedral	Religious	0.61176	0.86957
23	San Juan de Letran	Education	0.77863	0.95263
25	Sta Isabel	Religious	0.78008	0.96919
26	San Juan De Dios	Religious	0.73772	1.17989
27	San Agustin	Religious	0.88886	1.34622
28	Orden Tercera	Religious	0.72039	1.01729
29	San Francisco	Religious	0.73674	1.18727
30	Recoletos	Religious	0.88759	1.17801
31	San Ignacio	Religious	0.88561	1.21884
32	Beato dela Compania	Religious	0.61261	0
33	Real Fuerza de Santiago	Military	0.45348	1.20249
38	Puerta de Parian	Gate	0.6978	1.30846
42	Puerta Real	Gate	0.65681	0
46	Puerta de Sta Lucia	Gate	0.52608	0
48	Puerta del Postigo	Gate	0.64796	0
50	Parian 1	Commercial	0.60612	0.87899
	Mean Rn 1851 Intramuros		**0.731106**	**0.8987214**
	Mean Rn Government		0.823405	1.2110783
	Mean Rn Religious		0.756546	0.9224785
	Mean Rn Military		0.660006	0.84352
	Mean Rn Gate		0.632163	0.327115

Table 1: 1851 Manila, NAIN radius N - showing Intramuros' Points of Interest. With Major Government Buildings located on globally integrated segments of the 1851 Intramuros Enclave Network (See Figure 4).

Interestingly, Intramuros' Panaderia/Bakery (represented by the red dot numbered 13 in Figure 5) is found not on the sacred grid of the plaza major, but on the major transverse street that runs the length of Intramuros. This street also happens to be amongst the highest integration/nearness centrality value in the graph (the street shows up in red), and as shown in the Table 1, the Panaderia has amongst the highest integration and choice values amongst all the Points-of-Interest, second only to the Sala de Armas for route choice.

What this shows is that, while the Spanish centred the sacred functions of Intramuros – its government and main cathedral around the civic core, the profane/daily functions such as baking and selling bread are found along the most accessible routes and pathways, following the Movement Economies discussed by Hillier (1996), and echoing the similar present-day tendency of commercial establishments to aggregate along paths with the highest footfall and traffic. While map information does not include other commercial points, one can conjecture that other similar commercial stalls and activities located themselves along similar movement channels, forming Intramuros' internal movement economy.

The interesting thing to note is how this "profane" grid endures until today. An overlay of the existing major stores and restaurants within Intramuros will match the locations of the most integrated streets on the original 1851 spatial graph (shown in red, see Figure 6) – even with changes on the surrounding road structure and entrance/access points into the walled city.
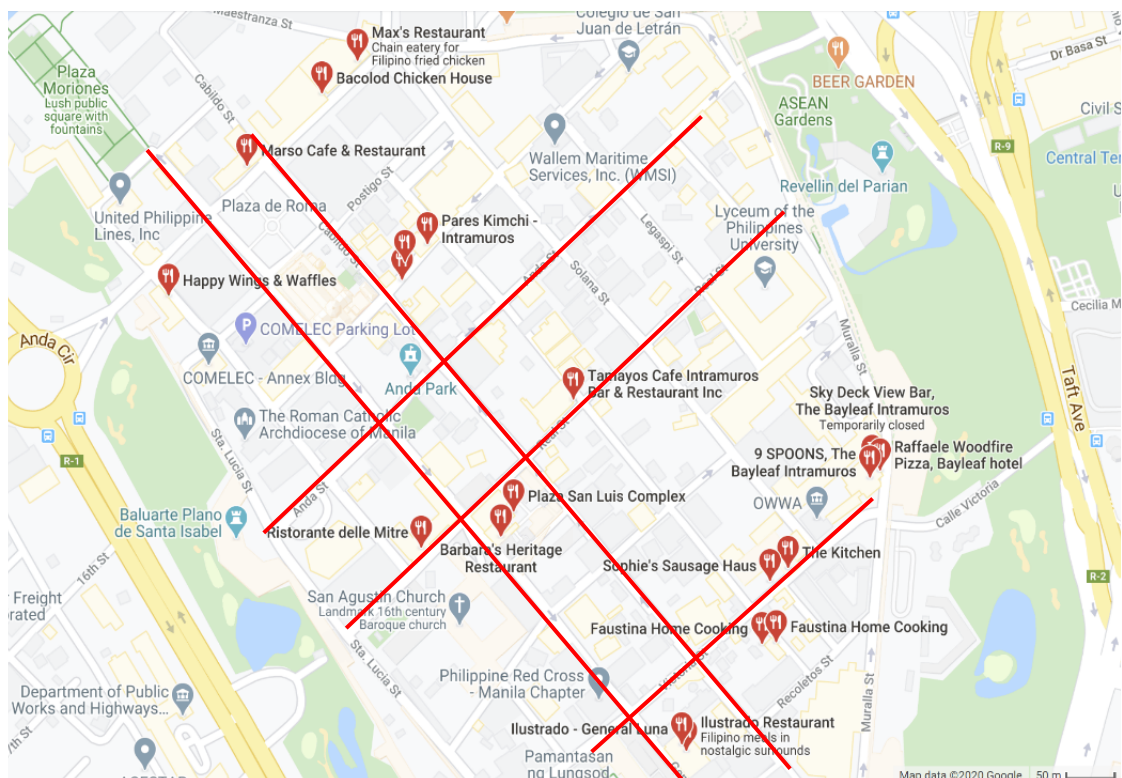

Figure 6: Overlay of 1851 most integrated streets with the highest nearness centrality values on present day Google (2020) map of Intramuros, showing major retail and restaurant establishments.

4.1.3 Plazas as Spatial Devices for Local Socio-Temporal Control

The NAIN 400m spatial graph produced from the 1898 map of Manila and its suburbs presents three centuries of *reducciones* as a policy of socio-spatial order and control during the Spanish period. Outside of Intramuros, local pedestrian nearness centralities emerge. These are the church mission areas that have higher average local integration when compared to Intramuros' churches (see Figure 7, warm/red gradients below and Table 2).
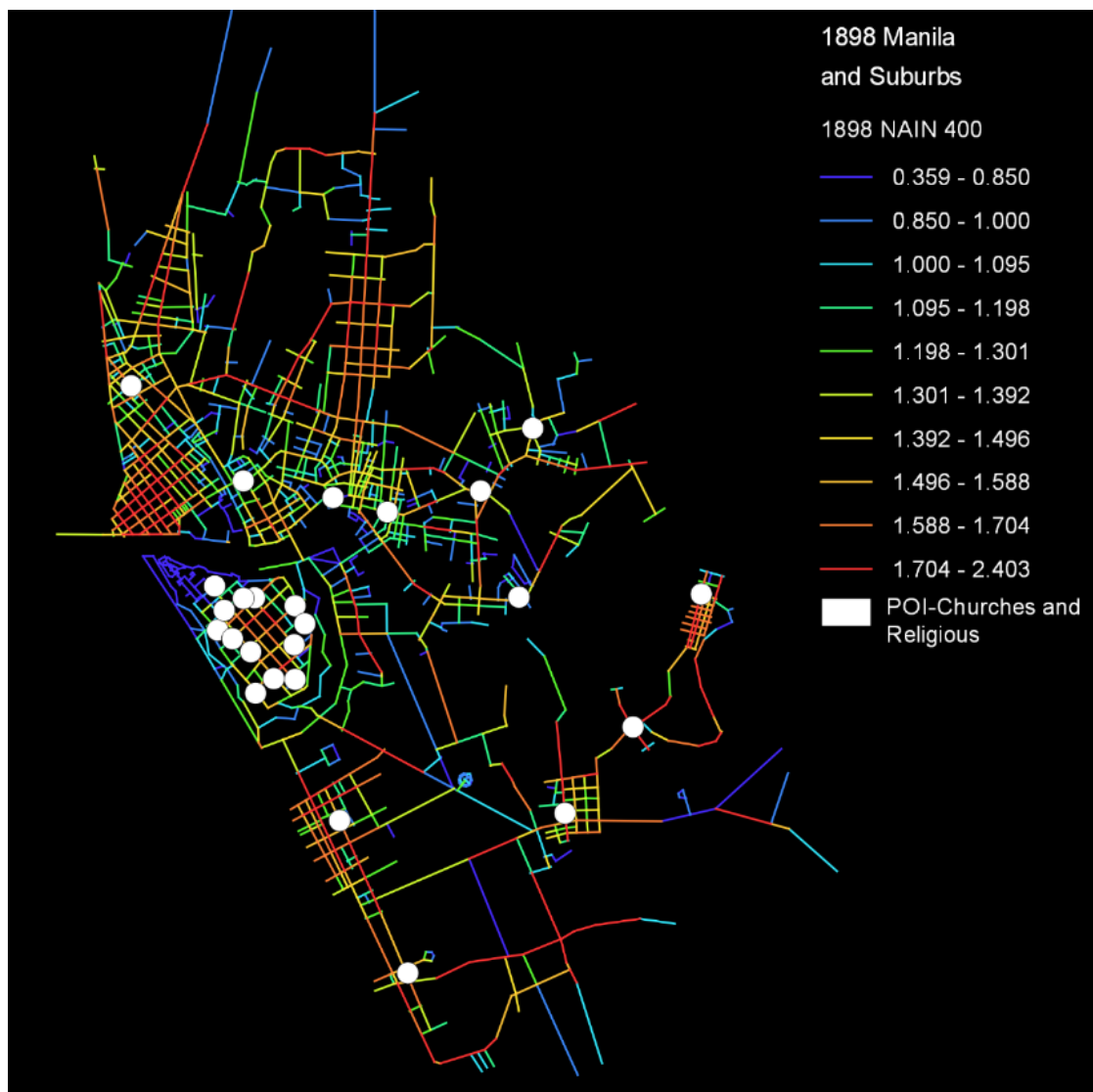

Figure 7: 1898 Manila, NAIN radius 400 - showing 1898 Spanish Manila's Churches / Religious Points of Interest. With Mission Churches located on locally/pedestrian integrated segments of the 1898 Network. See Table 2 for Church/Religious POI Values.

id	1898 POIs	Type	IntraExtra	NAIN_0400
26	San Juan De Dios	Religious	Intramuros	1.34042
29	San Francisco	Religious	Intramuros	0.9787
28	Orden Tercera	Religious	Intramuros	1.27419
20	Sto Domingo	Religious	Intramuros	1.53103
21	Beato de Sta Rosa	Religious	Intramuros	1.12637
19	Monjas de Sta Clara	Religious	Intramuros	0.95903
9	Palacio Arzobizpal	Religious	Intramuros	1.36901
22	Catedral	Religious	Intramuros	0.94637
25	Sta Isabel	Religious	Intramuros	1.20604
27	San Agustin	Religious	Intramuros	1.46049
30	Recoletos	Religious	Intramuros	1.32122
31	San Ignacio	Religious	Intramuros	1.59183
32	Beato dela Compania	Religious	Intramuros	1.45652
51	Iglesia de Paco	Religious	Extramuros	1.728
52	Iglesia Malate	Religious	Extramuros	1.42863
53	Iglesia Ermita	Religious	Extramuros	1.67066
57	Iglesia Pandacan	Religious	Extramuros	1.57252
58	Iglesia Penafancia	Religious	Extramuros	1.82628
68	Iglesia Sta. Cruz	Religious	Extramuros	1.03888
69	Iglesia Ongpin Binondo	Religious	Extramuros	1.15038
73	Iglesia Tondo	Religious	Extramuros	1.40591
75	Iglesia Sampaloc	Religious	Extramuros	1.32684
77	Iglesia San Miguel	Religious	Extramuros	1.41099
79	Iglesia San Sebastian	Religious	Extramuros	1.23211
102	Iglesia Quiapo	Religious	Extramuros	1.33779
Average	System Ave	Average		1.267238025
Average	Intramuros	Average	Intramuros	1.217285
Average	Extramuros	Average	Extramuros	1.307200444
Average	Religious	Average		1.3476084
Average	Rel. Intra	Average	Intramuros	1.27394
Average	Rel. Extra	Average	Extramuros	1.427415833

Table 2: 1898 Manila, NAIN radius 400 – 1898 Spanish Manila's Churches / Religious Points of Interest. With Mission Churches located on locally/pedestrian integrated segments of the 1898 Network, having consistently higher values over classified/system averages. See Figure 6 for Church/Religious POI Graph and Legend.

Manila's reducciones mission church districts in the arrabales/suburbs of Intramuros, were centered around Church Plazas, much like Intramuros' Plaza Mayor. These effectively placed most of the populace under bajo de la campana or "voice" of the bells. These formed a network of missions to replicate the parochial society of christian Europe through the synchrony of church bells and rites throughout the liturgical calendar (Doeppers, 1972, p. 774-779). Table 2 shows that Extramuros churches (outside of Intramuros) were more accessible to surrounding pedestrians than those found within Intramuros. This presents evidence of the how mission churches anchored the spatial localisation imposed on the surrounding fabric, as part of the reducciones policy. Space becomes a device to replicate social behaviors. One example of this is the annual procession of the Black Nazarene on the feast day of 9 January, which sees millions crowd along the route as the statue of Jesus Christ is paraded around the city back toward Quiapo Church and its plaza. Quiapo Church is one of the original reducciones mission churches outside of Intramuros.

4.1.4   Spanish Manila's network of power projection on major routes/crossroads

The NACH Rn graph of Manila (See Figure 8) shows the locations of *Cuartels* (barracks) and *Campos* (military camps) and *Baluartes* (forts) and other similar fortifications (in white) which became the means for the Spanish to project military spatial control. Outside of Intramuros, they are located on major betweenness centralities, or major routes within Manila's spatial fabric, specifically routes leading into or out of Intramuros, routes into and out of Binondo (to monitor and control the sangley Chinese population), routes leading to the Malacanang Palace (along Escolta and the San Miguel), and on routes fronting the Manila Bay shoreline.
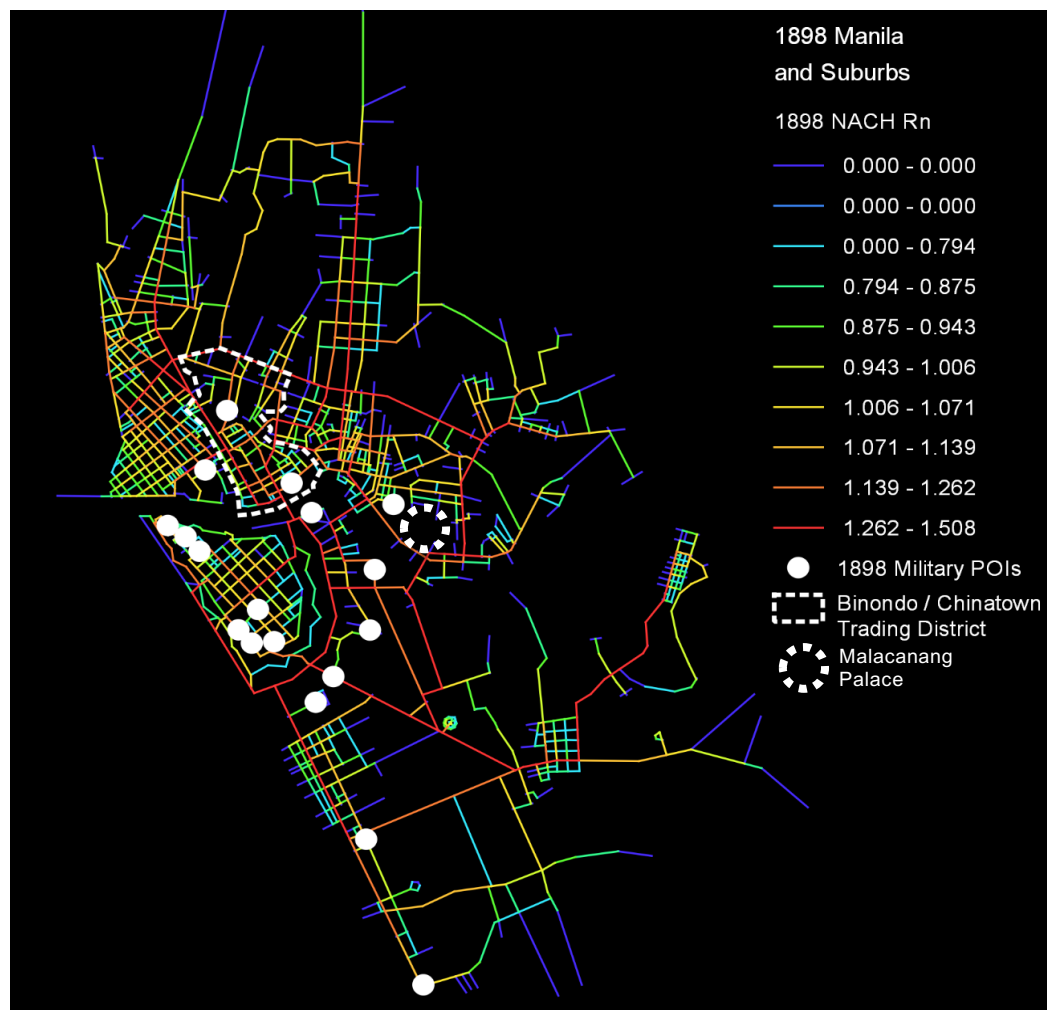

Figure 8: 1898 Manila, NACH radius N - showing 1898 Spanish Manila's Military Camps. These are located on major global routes of the 1898 Network. Binondo/Chinatown Trading District emerges as a crossroads for 1898 Manila's spatial network (See Table 3).

From the NACH Rn graph (See Figure 8), what becomes apparent is that Binondo – Manila's Chinatown, has the highest/warmest values of Route Choice / Betweenness Centralities on the network. It emerges as the crossroads for 1898 Manila. This provides spatial evidence to the historical reputation of Binondo as Manila's trading and business district and puts to question the long-held primacy of Intramuros as the center of Spanish Manila.

Table 3 shows the NACH Rn (Global Route Choice) values of the Spanish military camps outside of Intramuros had a much higher average value than the overall system's average, and this shows how even with passive socio-spatial segregation and the reducciones system applied onto Binondo and the Parian districts, the Spanish still made sure to project hard power and control over the surrounding fabric outside of Intramuros by guarding placing these military camps on locations that had higher route choice.

id	1898 POIs	Type	IntraExtra	NACH_Rn
1	Maestranza de Arteller	Military	Intramuros	0.79028
33	Real Fuerza de Santia	Military	Intramuros	0.49424
18	Cuartel de Asia	Military	Intramuros	0.75672
17	Cuartel de Ligeros	Military	Intramuros	1.09716
2	Sala de Armas	Military	Intramuros	1.07588
14	Cuartel de Artilleria	Military	Intramuros	1.08078
16	Maestranza de Fortific	Military	Intramuros	0.84444
55	Polvorin de san Abab	Military	Extramuros	1.07325
60	Cuartel de Luneta	Military	Extramuros	0.91318
61	Ruinas de Hospital de	Military	Extramuros	0.84359
63	Baluarte de Carlos IV	Military	Extramuros	0.64481
64	Cuartel de Fortin	Military	Extramuros	0.85544
65	Cuartel de Soda, Esco	Military	Extramuros	0.78557
72	Cuartel de Felipe II	Military	Extramuros	1.16116
85	Campo Concepcion	Military	Extramuros	1.24018
89	Cuartel Malate	Military	Extramuros	1.01062
100	Cuartel De Urbiztondo	Military	Extramuros	1.05162
101	Cuartel de San Miguel	Military	Extramuros	0.5809
Average	System Ave	Average		0.8934396
Average	Intramuros	Average	Intramuros	0.9351589
Average	Extramuros	Average	Extramuros	0.8600642
Average	Military	Average		0.9055456
Average	Mil. Intra	Average	Intramuros	0.8770714
Average	Mil. Extra	Average	Extramuros	0.9236655

Table 3: 1898 Manila, NACH radius N - showing 1898 Spanish Manila's Military Camps. Military Camps outside of Intramuros have higher average NACH values than system average (see Figure 7).

4.1.5 Intramuros vs. Binondo (Ordered Center vs. the Structural Center)

To the Spanish colonist - Intramuros was the center of the network around it, outside, they placed defensive positions to guard against the populace. But their imposed order focusing on the walled city, was subsumed by the spatial structure of the suburbs around it.

The global integration or closeness centrality (NAIN Rn) analysis of 1898 Manila's spatial fabric shown in the graph (See Figure 9, see streets with warmer gradient), presents the true underlying structural centre of Manila, which is Binondo, across the river from Intramuros. This, along with the global route choice graph (NACH Rn, see Figure 8) provides evidence to show the role of Binondo as the crossroads of the 1898 spatial network, as it takes advantage of being across the Puente Espana/Bridge from Intramuros, becoming the primary route connecting both north and south banks of the Pasig River.

Figure 9: 1898 Manila, NAIN radius N - showing 1898 Spanish Manila's Spatial Integration Core found in the Binondo/Chinatown Trading District.

This underlying spatial advantage enables the sangley (Chinese-Filipino) traders to form what effectively became Manila's primary trading / business district in Binondo (which was the oldest founded Chinatown on record). The sangleys who were once marginalised and excluded by the Spanish colonists end up occupying the most opportunistically located integration centrality that was to become Manila's primary business/trading district up until World War 2. After which, saw the suburban expansion of Manila which saw the emergence of new privatised business districts outside of Manila's edges.

The irony of this would not be lost on today's Filipino-Chinese community who have experienced historical racism and exclusion, but by circumstance have also become the most primely positioned to local and global trade. What this points to is how imposed spatial order executed through planning intent, creates unintended consequences on the underlying structure of the spatial network and the consequent overlay of socio-spatial interaction.

4.2   Spanish Manila's Commercial Spatial Network

4.2.1   Calle Escolta: High Street or Suburban Mall?

One could say that – to the Spanish colonist within Intramuros, Binondo was the first suburban edge city (Garreau, 1992) – a place of commerce and trade outside Intramuros, with Calle Escolta (See Legend on Figure 9) becoming the high-street for the colonial elite. The street's name draws from the presence of the Royal Escorts headquartered on Callejon Soda (See Legend on Figure 9) along Escolta (Armengol, 1958; Quirino, 1971).

These Royal Escorts ensured the security of the Spanish governor generals who travelled between their residence in Malacanang and Intramuros. Their presence provided security for the elite venturing outside Intramuros as they shopped and transacted with the locals. Gonzaga (2014) similarly points out that given the circumstances, Escolta could be considered Manila's first secured shopping mall, with the Royal Escorts, its first iteration of present-day Manila's omnipresent "blue guards.".

4.2.2   Alcaiceira de San Fernando (Silk Market)

One aberration to Binondo's high spatial integration values, is the Alcaceira de San Fernando or the Chinese Silk Market, an octagonal structure constructed as the 1st and largest Commercial Structure built by the Spanish in Manila. It can be seen in the 1898 Map of Manila, as the octagonal structure located beside the river (See the red octagon beside the river on Figure 2). Its location, as shown in the global integration graph (See Legend on Figure 9) is just off Binondo's active core. It looks to be inaccessible from the rest of the street network and does not have the same high integration values as the rest of Binondo (See Table 4). Table 4's point-of-interest values are all taken from the NAIN Rn values of the street network.

id	1898 POIs	Type	IntraExtra	NAIN_Rn
13	Panaderia/Baker	Commercial	Intramuros	0.63359
66	Mercado Echague (Market	Commercial	Extramuros	0.79091
67	Mercado Oscaris (Market)	Commercial	Extramuros	0.77621
71	Alcaicera Silk Market	Commercial	Extramuros	0.58548
81	Mercado Paz	Commercial	Extramuros	0.88152
86	Mercado Arroceros	Commercial	Extramuros	0.62594
104	Puerto Magallanes	Commercial	Extramuros	0.87726
103	Escolta	Commercial	Extramuros	0.76087
Average	System Ave	Average		0.64837
Average	Intramuros	Average	Intramuros	0.58839
Average	Extramuros	Average	Extramuros	0.69636
Average	**Market/Commercial**	**Average**		**0.74147**
Average	**Market/Comm Intra**	**Average**	**Intramuros**	**0.63359**
Average	**Market/Comm Extra**	**Average**	**Extramuros**	**0.75688**

Table 4: 1898 Manila, NAIN radius N - showing 1898 Spanish Manila's Markets without access from the Pasig River.

One may take a hint as to why this is the case, from Daniel Burnham's impressions of Manila, wherein he points out (Burnham, 1905) that Manila possessed the bay of Naples, the winding river of Paris, and the canals of Venice.

Psarra (2018) used space syntax in analysing Venice and its dual network of both pedestrian streets and waterways as its holistic socio-spatial network brought together by dock-edge interfaces like steps that connect plazas/walkways to the water.

This paper adapts Psarra's methodology, by using the edges of the esteros and Pasig River as an interface between the on-grade street network and the waterways. This expands the spatial network of Manila to include Manila's waterways as shown by the expanded 1898 NAIN Rn graph which includes the Pasig River and its system of *esteros* (canals) as part of the spatial network (See Figure 10).

Considering the waterways as part of the spatial network results to higher global spatial integration values not just for the Alcaiceira, but also raises the average of all the market and commercial points of interest outside of Intramuros (See Table 5). This presents quantified evidence as to how Manila's waterways were integral to commercial trade, acting as the long-range conduits of movement for the city.
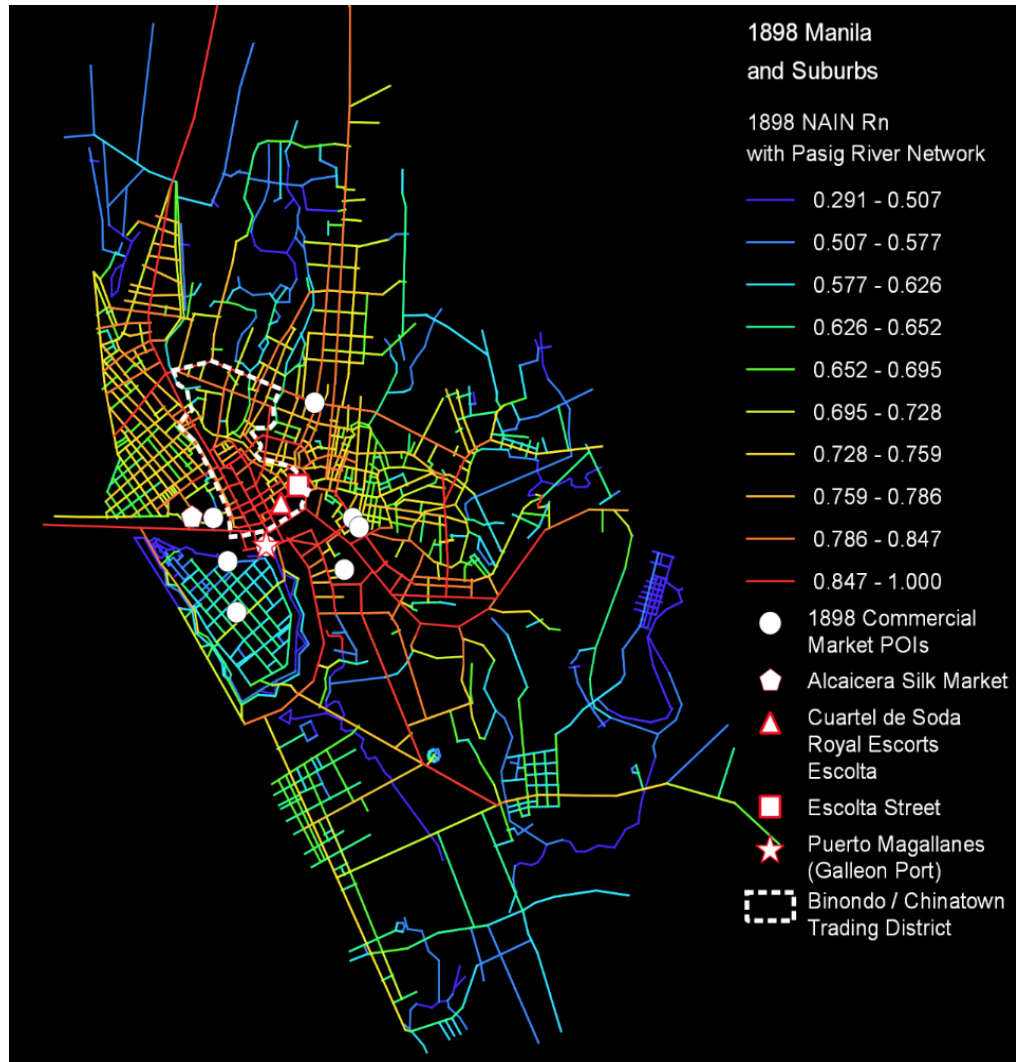
Figure 10: 1898 Manila, NAIN radius N - showing 1898 Spanish Manila's Markets with access from the Pasig River.

id	1898 POIs	Type	IntraExtra	NAIN_Rn	w/River NAIN_Rn
13	Panaderia/Baker	Commercial	Intramuros	0.63359	0.66477
66	Mercado Echague (Market	Commercial	Extramuros	0.79091	0.91897
67	Mercado Oscaris (Market)	Commercial	Extramuros	0.77621	0.91874
71	Alcaicera Silk Market	Commercial	Extramuros	0.58548	1.01252
81	Mercado Paz	Commercial	Extramuros	0.88152	0.87068
86	Mercado Arroceros	Commercial	Extramuros	0.62594	1.04249
104	Puerto Magallanes	Commercial	Extramuros	0.87726	0.93758
103	Escolta	Commercial	Extramuros	0.76087	0.88337
Average	System Ave	Average		0.64837	0.73206
Average	Intramuros	Average	Intramuros	0.58839	0.64581
Average	Extramuros	Average	Extramuros	0.69636	0.80106
Average	**Market/Commercial**	**Average**		**0.74147**	**0.90614**
Average	**Market/Comm Intra**	**Average**	**Intramuros**	**0.63359**	**0.66477**
Average	**Market/Comm Extra**	**Average**	**Extramuros**	**0.75688**	**0.94062**

Table 5: 1898 Manila, NAIN radius N - showing 1898 Spanish Manila's Markets with access from the Pasig River. NAIN Rn values rise substantially when factoring in water transport and access along the Pasig River.

The Alcaiceira was built for the Sangleys who used the monsoon winds to travel from coastal China to the Philippines to trade silks and ceramics. They lived and sold their wares within the same structure as they waited for the monsoon winds to change with the seasons. Almost opposite the Alcaicera is the Puerto Magallanes (See Legend on Figure 10 and Table 5) which was where the Spanish Galleons docked. These galleons are what connected Manila to Acapulco, Mexico. From this one can see the primacy of the Pasig River as a hub for global trade, and how colonial Manila (on both the sangley and Spanish sides of the social divide), relied on this trade and exchange for economic activity.

Expounding on this further, one can see how the Alcaceira also had a higher global integration value (accounting for the Pasig river network) compared to the Puerto Magallanes (which is attached to the walled enclave of Intramuros), perhaps an indication of how much broader a catchment population the Alcaiceira serves as its market (the rest of Extramuros Manila) and not just Intramuros and its colonist residents (who had access to the Galleon trade with Mexico) as with the case of Puerto Magallanes.

4.2.3 Outside Manila

Understanding the interconnectedness of the Pasig River System and its various tributaries, one can see how this waterway network served as the superhighways that connected the encomiendas and haciendas outside of Manila.

Not only did the Pasig River system connect Manila to the outskirt towns and farmland, one could see how these also connected the many mission settlements established on the banks of the Laguna de Bay. It was these semi-privatised encomiendas and haciendas that were to become the backbone of colonial agrarian and industrial production, and the base for export of goods to Mexico, China, and the rest of Asia.

5 DISCUSSION / CONCLUSIONS

5.1 Responses to Research Questions

In response to the first research question, this study highlights how Metro Manila's spatial configuration is like a recurring fractal, patterned after Intramuros' sacred/civic grid of civic order and profane grid the profane grid of trade and commerce. This pattern repeats and unravels as it is uncovered outside Intramuros – in the Plaza-centered reducciones, the rise of Binondo and Escolta as the city's primary trading district and high street respectively, and the importance of the conduits of long-range travel (river transport network) in commercial trade and exchange. These find echoes in our present-day patterns of spatial configuration – in our secured shopping malls, reliance on car-centric highways, our voluntary encasement within walled/gated villages, and the continuously overlooked slum areas and grids that often turn out to be the most socially and economically vibrant portions of our city.

In response to the second research question, this study has shown that while the Spanish projected a network of force and power on the spatial network outside of Intramuros, in the end, these attempts to control the external environment, subsume Intramuros to Binondo. Spanish socio-ethnic control faded in comparison to the control that the Sangley community began to enforce over the economy of the city, no doubt influenced by the primacy of Binondo on the socio-spatial network.

In response to the third research question, this study has shown that whilst Intramuros was the sacred / ordered or planned socio-spatial core of Manila, the true profane and organic socio-spatial hub of Manila's structural spatial network was the Chinese trading district of Binondo. This shows that attempts to control and order complex systems (like cities) often pale in comparison to the organic ability of said systems to surface its own structure.

Responding to the last research question, this study has used the accessibility values as proof of the importance of the Pasig River system for Manila's commercial trade. By including the Pasig River system as part of the spatial network analysis, this study shows an increase in accessibility values for previously less accessible market sites beside the river and away from the main roads of the land spatial network. The Pasig River allowed people to move goods to and from further away, at higher speeds and bigger volumes, all important in mercantile exchange.

5.2   Limitations

All spatial accessibility analysis is undertaken using a combination of QGIS and Depthmap X software (depthmap X development team, 2017), with statistical analysis using IBM SPSS software. Majority of this study was undertaken offsite in the United Kingdom (based in London), for a period of approximately five months. It relies on available historical maps from archival sources online and from the British Library; and remotely collected data sourced from: Open Street Map, Google Earth, and the Philippine Geoportal for checking against the present-day spatial network.

Regarding spatial network analysis, it is a probabilistic method based on applying graph centralities to analyse the spatial configuration of cities. As this is a historical assessment of spatial configuration, this study does not weigh these graphs for historical land use, density, road right-of-way width, and actual vehicular or foot traffic counts. This study instead uses parallel data as proxies for historical socio-economic behavior and human interaction (enclave boundaries, historic points-of-interest from historical maps and historiographic narratives) to form a broader methodology in line with space syntax theory. It is by comparing these data with configurational values using descriptive and analytical statistics that this study is able to show how Spanish Manila's embedded spatial properties correspond with its underlying historical narratives and spatial cultures.

5.3   Conclusions and Reflections

This study finds that, in the case of Spanish Manila, attempts to enforce socio-spatial order creates its own network of unintended consequences. These effects can be understood not just through historiographic scholarship, but also through the use of multi-layered methods like space syntax. Space syntax helps strip away and test historical narratives vs actual accessibility values to shed light on and understand history with more nuance than before.

As Intramuros' "method" of private enclosure and limitation of access to and from their surroundings is reproduced and applied on the fabric of the Philippine built environment, there is a need for further study on the effects of this privatised order, not just on the spatial configuration, and use of our cities, but on our society as well. This self-partitioning between Intramuros' colonists and the local populace finds echoes in the current segregation of local elites and surrounding masses. It is telling to learn that the modern Spanish translation for Arrabales is slum area, and not merely a suburb (Google Translate, 2020). It resonates through centuries of history that modern gated Intramuros-like villages and districts, are juxtaposed with slums and informal settlements outside their walls. By submitting to the order defined by walls and gates, do locals, like the Spanish colonists, turn away from the organic economic vibrancy and social diversity of the bottom-up latent structure found in centralities such as Binondo. How much economic value and social vibrancy is lost in this exchange for the peace and order of walls, gates, malls, and guards? It doesn't take much conjecture to guess at how this could tear apart the cohesion not just of Metro Manila's urban society, but of the country as well, as these socio spatial divides echo throughout the Philippines' provincial towns and cities.

And lastly, in terms of connectivity, recent efforts to expand Metro Manila's expressway (Pasig River Expressway) and road network (Binondo-Intramuros Bridge) by infringing on Manila's historic network of waterways ignore the untapped potential of these same waterways in connecting downtown Manila with the rest of the Metropolis through the Pasig River System, Manila Bay, and the Laguna de Bay via mass water transport. This study supports various historical accounts testifying to the vitality of these waterways in historically activating Manila for trade and commerce. Building on these waterways would scar and divide the metropolitan region even further and hinder future efforts to transform the banks of Pasig River. To allow these efforts to continue would be catastrophe on multiple levels and spits on the face of historical evidence.

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