São Paulo: An Ecological View
Of A Theatre For Modernity
by
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A thesis
presented to the University of Waterloo
in fulfilment of the
thesis requirement for the degree of
Master of Architecture
in
Architecture

Waterloo, Ontario, Canada, 2006

AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made eletronically available to the public .

ABSTRACT

Future challenges for human civilization, especially in the developing world, will increasingly be characterized by both an urban and global condition. What will be the response by design in the face of the implications of this unprecedented scale of development? The thesis is a speculative analysis of the essential nature of the phenomenon of the global mega-city, and is a necessary first step in creating a framework to answer this question. The Brazilian city of São Paulo is chosen as this thesis case study because it is a 'matured' version of this Modern urban phenomenon. Underlying and guiding the creation of this picture of the mega-city is the assertion that the fundamantal nature of the phenomenon of São Paulo is essentially an ecological one. Like any other ecological analysis, the first stage of the inquiry is to identify the motivating force that orders the system and propels the change of the urban ecology. In the case of São Paulo, the thesis develope a picture of an urban agglomeration that has been driven by the unrestrained forces of the aspirations of global Modernism and the exploitation of growing urban multitudes by the personal avarice of capitalism. São Paulo is seen as an urban experiment that rests in the tacit gamble that the economic aspirations underlying São Paulo are limitless in the face of the obvious limits of the city' and globe's biosphere. This relationship between urban organism and host ecology is characterized as parasitic and like the economic and social propelling forces of Modernity, forms the fundamental underlying relationships of the ecology of São Paulo. These relationships in juxtaposition with the propellant force of Modernism, form the sketch of a framework that the thesis proposes for a responsible position for design in the mega-city. In light of this ecological sketch of São Paulo, the underlying perpective for design in the mega-city seeks to strike a balance between economy, ecology and should be founded on a view of the city as an investment that can be evaluated for its performance in providing the context for human flourishing in relations to its use of natural resources.

ACKNOWLEDGMENTS

I would like to make a special acknowledgement of the guidance and the criticism through out the development of this thesis by my Thesis supervisor, Val Rynnimeri, and my advisor, Dr. Brent Hall. In addition, I would like to recognize the unique perspective given to my thesis by Dr. Robert Jan Pelt and Dr. Liette Gilbert at the later stages of the development of the work.

I would also like to acknowledge the tireless support and encouragement of my parents, Paula and Antonio Gomes.

DEDICATION

To my parents...

and all the other brave Paulistas who make a home out of the grotesque

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Jacobs notes (1961) that in "The Death And Life Of Great American Cities", "Thinking has its strategies and tactics too, much as other forms of action have. Merely to think about cities and get somewhere (is not enough), one of the main things to know is what kind of problem cities pose. For all problems cannot be thought about in the same way. Which avenues of thinking are apt to be useful and to help yield the truth depends not on how we might prefer to think about a subject but rather the inherent nature of the subject itself".[1]

With a military government in power in Brazil during the mid-1960s, with individual political and civil rights suspended and a feverishly repressive apparatus at work crushing any dissent, the county's military ruler, General Medici, was asked by a foreign journalist about the current state of Brazil. Medici grinned and answered, "The economy is doing well"[2].

Throughout the developing world the process of migration into global mega-cities from ecologically devastated rural and wilderness areas continues unabated. The urban migrants continue to feed the growth of urban favelas or shantytowns creating an unplanned urban mosaic increasingly characteristic of the globalizing world. Not only are the developing world's mega-cities looking increasingly similar in urban form and function, but they usually share the same social and environmental degradation, and in the socio-economic disparities that plague the urban societies of the developing world. All the prognoses by The United Nations Centre for Human Settlements, point to the fact that the urban condition will be the predominant spatial condition in which most of the social and environmental problems of the developing world in the 21st century will be focused. At the same time, traditionally poor countries such as India, China and Brazil, the sites of many of those mega-cities, will have a much bigger geopolitical, economic, and ecological influence on the future course and order of the world than they had in the twentieth century.

These projections estimate that by 2030 five billion people, or sixty-one percent of the global population of eight billion, will be living in urban agglomerations like São Paulo in Brazil, with ninety percent of the growth in those urban populations occurring within developing countries.[3] The forecasts indicate that within a decade there will be twenty-six cities of more than ten million people, in comparison with the seventeen that existed in 2000.[4] If the developed world in general and Brazil in particular are any indication, the proportion of world's population living in an urban condition may go beyond the sixty percent level, reaching closer to 70%, for the year 2030.

Since French geographer Jean Gottman's 1961 pioneering work, "Megalopolis", first described the dynamism of the continuous urban agglomeration stretching from Greater Boston, through New York, to Greater Washington, mega-cities have developed throughout the world and growth in scale and complexity. Forty years later, new mega-cities continue to grow out. Like Calcutta, Lagos, Shanghai, and Mexico City, São Paulo has today become a one of the developing world's global nexus points for trade, production and consumption. Gottman writing latter in 1987

believes that, “concentration of population has been and remains a fruitful phenomenon, and that is probably why it has developed so much in societies clamouring for better life and asking for more”. [5]

A mega-city like São Paulo can be viewed as a prototypical urban manifestation of western industrial modernity’s domination of the developing world over the better part of 20th century. Since the world’s economic and cultural frontier today is arguably moving to the developing world, the constellations of new mega-cities will be the frontiers of the urbanizing world and consequently the location of the truly important future design challenges for the human-made environment The increasing presence of the city and its territory in the natural world makes the extreme scale of the mega-city the context from which to derive the questions and most relevant position for an urban and architectural design practice of the future.

The most pressing of these urban design questions relates to the relationship between human civilization and the natural world, and the future shape of the global socio-economic system in the 21st century. A particularly vital question central to this relationship concerns the position of the planning and design in those cities newly influenced by the global aspiration for sustainable development. Considering the extent of the social, economic, and micro-climatic affects of the human-made urban systems and spaces on the natural ecosystems underlying them, how can design satisfy the objectives of sustainable development for developing countries still aspiring to the ecologically dangerous social and economic promises of twentieth century modernity?

The city as an artefact is the ultimate means by which humanity chooses to define its place physically in the wider context of the earth, and is the most comprehensive instrument to form a human proposition for the way the world should ‘work’. Throughout human history, cities have formed an interface between society and nature, and between the individual and the social collective. The nature of the human-made environment is an important topic in the wider discussion that societies, like Brazilian society, must begin to undertake, because of the implications that the form of the built environment has on the development of society and the

relationship between society and the natural world.

The first part of this thesis describes the urban phenomenon of São Paulo through an ecological perspective and as a representative case study of a mega-city in the developing world. In response to the challenges outlined in the description of the phenomenon of São Paulo, the thesis then proposes a sketch of the basic principles that should underlie a relevant and effective conception for developing a methodology to influence positively the further sustainable development of the urban fabric of São Paulo.

i.ii. AN ECOLOGICAL TRAGEDY OF THE URBAN PHENONMENON OF SÃO PAULO

São Paulo is a city that over the last one hundred years has served its nation, Brazil, in a brutal race to a shifting and ambiguous finish line. It is race where those nations who are leading determine not only the course of the race but also where it might end. It is a race towards economic development and social progress that is ongoing, that is being run at an exhausting rate, and that expands with an ever-growing number of participants. That race to develop a modern society is part of a broader race with the goal to coalesce, especially over the last 50-years of Western hegemony, the world's people and biosphere into an urban-centred global economic culture. The current edition of this global enterprise with a 500-year history increasingly rests on a gamble that unlimited human ambitions can be satisfied within the very limited ecological possibilities offered by global ecosystems. This thesis contends that São Paulo's future largely rests on this seemingly suicidal game. In reality, the gamble that Brazilian society is undertaking is not new, but is the ten thousand year enterprise of human civilization and the 'settled life', of which the present mega-city phenomenon of São Paulo is the latest historical version. Like other mega-cities around the world, São Paulo is one in a constellation of cities that bind the world's destitute multitudes by the shared promises of uninhibited modern Western urban civilization.

In Chapter III of this thesis, São Paulo is viewed as the embodiment of broad historical tendencies toward ecosystem exhaustion, which have traditionally plagued human civilization and are now at a critical moment in the world's human and natural history. Global economic development today has accelerated the longer historical pattern of gradually annexing the world's biogeography for the service of an increasingly 'parasitic' global socio-economic system. Larger and larger sections of the planet have increasingly become part of a resource network for the global economic apparatus, feeding an expanding constellation of interconnected urban agglomerations, increasing the level of global economic interaction, and the degree of interdependency within global society. Although there are many examples of past civilizations that have collapsed because of over extension of their ecological limits, the current global society is in a different situation. Because of the scale of both modern global societies' unprecedented appetite for natural resources and its ubiquitous control over the biosphere, collapse could be global in scale, and most likely irreversible rather than regional, isolated, and reversible. In light of this stark expectation, the urban phenomenon of São Paulo stands as an indictment of contemporary global civilization's repetition of the older historical pattern of avoiding a true assessment of the state of the relationship between the wider natural ecology and the evolution of a human civilization.

São Paulo's urban fabric is a typical result of the type of unprecedented gamble that the economically and socially lagging nations undertook with promises of Modernity during the 20th century, a gamble embodied especially in the post- World War 2 development ethos. Today's São Paulo is a result of striving, through state planned modernization, to change Brazilian society into a society that, according to cultural critic Wolfgang Sachs (1999), "is not a society that has an economy, but a society that is an economy". [6] Development in this context is a simple ethos that presupposes that the laws of economics should dominate the values of a society.[7] It is a perspective that recognizes only the functional achievements of a society, neglecting the inherent value of cultural viewpoints that are motivated by ambitions other than consumption and production. According to this perspective, the role of urban agglomerations and their value, like that of São Paulo in Brazilian society, are the city's ability to satisfy the unrestrained pursuit

of material wealth, and the social and spatial strategies of economic development plans. Space and land are today inevitably stripped of any other cultural meaning given by the expansion of global economic society and are valued primarily for their instrumental qualities. Such a simplistic view, in Chapter III, is seen as one, which historically feeds into the impending global ecological disaster and its tragic view of the hubris of globalisation.

i.iii. TRACING THE BASIC ECOLOGICAL PERSPECTIVE OF SÃO PAULO

The view of São Paulo developed in the two chapters of this thesis preceding Chapter III is as much a result of how the city is conceived as what is conceived in its definition. Such a characterization of São Paulo is itself primarily based on a deep and essential assertion that the fundamental nature of large human settlements is in essence ecological (see Figures i.i & i.ii). The human-made ecological nature of an urban phenomenon like São Paulo, and true to any ecosystem view, is an emergent and dynamic one. São Paulo's urban fabric exists and behaves very much like any other natural or social ecosystem. Urban ecosystems and their resulting materialization in the city's urban fabric are an aggregate product of the interplay between the continuous decisions of individuals, corporations, and the public, such as institutional agents. Described in economic terms, it is also an urban order, and type of change that emerges from the interplay between capital, labour, and real estate markets, all of which are affected, in turn, by capital accumulation as part of the national development plans of the country overall. In other words, São Paulo's urban fabric is a spatial and morphological manifestation of a broader combined emergent natural and cultural ecosystem; an ecosystem that Jane Jacobs (1961) has categorized as "organized complexity". [8]

The economic and material presence of São Paulo is not discrete from global natural ecologies. Rather, it is intimately tied, embedded, and dependent on the global biosphere for the exchange of the resources that make a society and economy a viable one. Placed in the natural historical context, São Paulo's urban fabric is another morphological presence on the continuous fabric of the earth's surface.

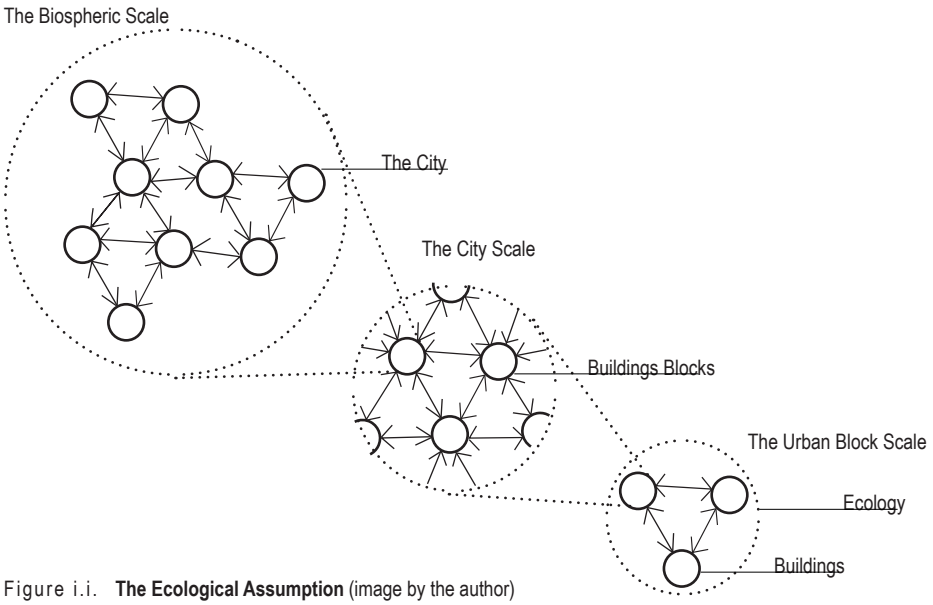


Figure i.i. **The Ecological Assumption** (image by the author)

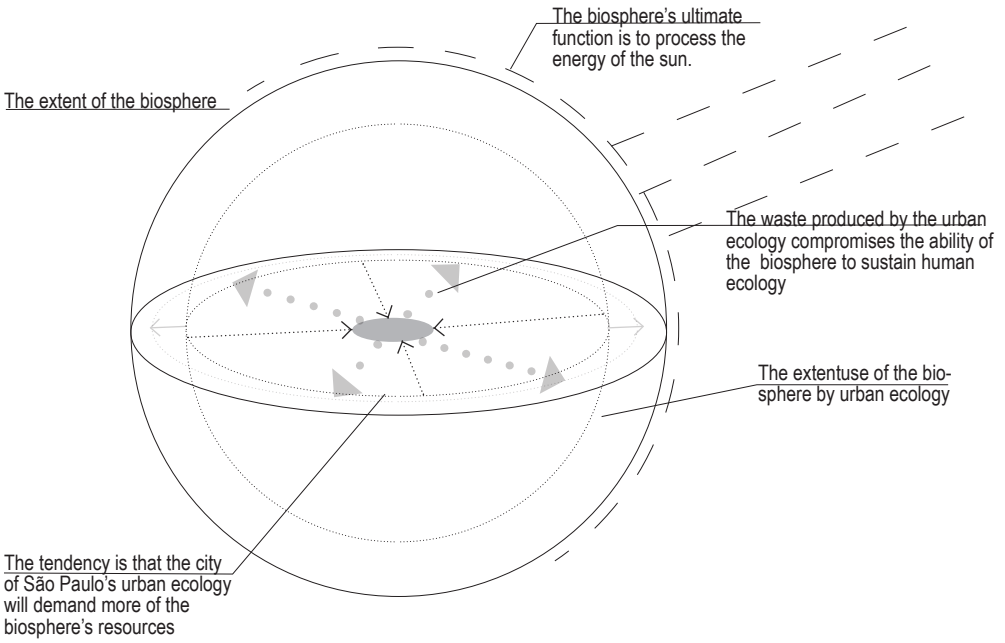


Figure i.ii. **The Relation Between The City And The Biosphere. This** diagram describes the parasitic nature of the fundamental relationship between the biosphere and the urban ecology of São Paulo. The diagram also shows the fundamental function of the biosphere in translating the suns energy for the use in all the earth's functions, including sustaining human activity and life. (image by the author)

Two basic ecological questions shape this thesis sketch of São Paulo as an ecological phenomenon, and are posed and explained as follows:

(1) What is the nature of the propellant force of the urban ecology of São Paulo? Like natural ecosystems, São Paulo's ecology is transformed and ordered by a propelling force. In the case of the globe's natural ecosystems, the propelling force of change and order is solar energy and the organizing laws are those of thermodynamics. Order and change in an urban ecology, however, are also propelled predominantly by human cultural values. Human culture determines the way people relate to each other in civilizations as well as the way human societies relate to the natural world. By setting and defining society's motivations and objectives, cultural values organize people in space. They order how society's human and natural resources are allocated, and the overall historical direction of societies development. Another role of human values is the resulting nature of the relationship between human society and the natural world, which takes us back to global natural ecosystems and leads to the next question.

(2) What is the nature of the essential and concrete relationship between the mega-city and the wider host ecosystems: first the regional and then the global biosphere? The condition of this specific set of relationships is fundamental in understanding and describing the phenomenon of São Paulo and the sustainability of the city as a cultural proposition and as an object of design that is discussed in Chapter III.

i.iii.i. DESIGN PARADIGMS FOR SÃO PAULO: A REVIEW OF LITERATURE AND CONCEPTS

The works of both Brazilian cultural historian Nicolau Sevcenko (1993) and historian and novelist Ronald Wright (2004) are the major launching points in this thesis for the search of answers to the two ecological questions. Sevcenko examines the obsession of French modernist poet, Blaise Cendrars, with the power and the effects of the modernity in 1920s São Paulo in Chapter I. In his poem, entitled São Paulo (page 24), Cendrars forms the most accurate testament of the modern ethos as the principal cultural propellant force to shape the growth and development of the future city. The maximum pursuit of the possibilities for economic development and the adoption of the organizing principles of both a modern market and industrial society by Brazilian governments propelled a sequence of significant historical changes in the urban geography of São Paulo. The pursuit of such promises of modernity has its historical roots in the global connections made originally by the Brazilian coffee industry. The expansion of the international coffee complex between the middle 19th century and the early part of the 20th century set the course and the socio-economic conditions for the modernizing of the country during the 20th century. Through Cendras' eyes in 1924, the worst possible aspect of modernity were played out in São Paulo as the drive of unrestrained avarice unleashed a seemingly unbounded real estate market fed by desperate ambitions of rural migrants flooding into the city. These unleashed forces resulted in vertical and horizontal sprawl which has become the endemic and characteristic morphology of the world's mega-cities in general and especially of those in the developing world.

To make matters worse, such an official adoption of a modernizing project by Brazilian government and society continues today and has exacerbated the nature of the relationship between civilization, the city, and the wider natural ecosystems. Chapter II relies on work of Ronald Wright (2004) to identify the nature, history, and ramifications of human interests played out on the natural ecologies throughout history, encapsulating what Wright (2004) characterizes as," humanity's experimentation with civilization". [9] Wright suggests that the rise of the "settled life" and the repeated historical extinction of human civilizations, like the Anassazi civilization

of the American South West and the RapaNui in Easter Island, are in fact based on the consistent lack of accountability by the range of human cultures of the reality of their dependence on the limited natural provisions. Wright argues that, the same disastrous pattern is present in current global society, except that, as has been alluded to, before the effects of an eventual collapse will be much worse than in the past. Viewed from this perspective, the Brazilian race toward economic development over the last century has not only reorganized the structure of Brazilian society, but also increased the parasitic nature of the relationship between São Paulo and its biosphere. In other words, the logic of the social and economic system that sustains and propels the evolution of the urban ecology of São Paulo compromises the very existence of the city's urban ecology. Wright warns that human civilization has always relied on the tacit belief in the limitlessness of nature to sustain a ballooning human ambition, and in modern civilization this belief may sink the experiment at the global scale.

For Cendrars, it is the belief in the limitlessness of human ambition and avarice, an extreme version of Wright's tragic view that has driven the creation of São Paulo. Chapter III opens with Cendrars (1924) accounts of the unchecked consequence of this belief and outlines three challenges that need to be faced to consider São Paulo within its ecological limits. The first and foremost challenge for the thesis is to derive a perspective of the city as an urban ecology and economy embedded and limited by the natural one of the biosphere, which is not the traditional composite of political, economic, social, and anthropological perspectives of the city. This because the nature of São Paulo's configuration continues to be predominantly organized by the dynamism of the market place, and the city must have concepts that correspond to this economic nature for management and direction of the evolution of the city overall.

The historical outlook for São Paulo described above is based on a type of cost benefit concept of the city. In this limited view, the urban fabric of a mega-city like São Paulo is a cultural construct in service of satisfying human ambition, one that is unavoidably dependent on the limits of the natural provisions of ecology. Chapter III proposes are an alternative definition of the common good that the city can bring to Brazilian society, one equated to the optimal

relationship between the ability of the city to provide a theatre for human flourishing and its benefits with the minimum use of the resources of the biosphere. Human flourishing is a political concept adopted from urban thinker, John Friedmann. In his 1998 book, "The Common Good: Assessing The Performance Of Cities" the human ambition is to elevate the quality of the environments for human physical, social, economic and spiritual flourishing. He asserts that the right for human flourishing is an implicit human right in Western democratic thinking. Based on this political understanding of the relation between human civilization and the city, Chapter III proposes two indicators, applied to three case studies, integral for the minimum physical and socio-economic flourishing of the residents by São Paulo's urban fabric.

In addition to the concept of "human flourishing," the ecological footprint concept developed by Rees and Wackernagel in 1996 is used in this thesis to flesh out and express the ecological cost used to satisfy that aspiration for human flourishing by abstracting the total use by a human population of the biosphere's natural wealth as a total unit area of the biosphere. The ecological footprint in this thesis employs estimates of São Paulo population's yearly use of natural resources by the summation of the total per capita consumption levels by all socio- economic classes in the city. The total unit area is the addition of the total required natural resources to sustain human economy and the land that is required to absorb the waste generated by São Paulo's population. In the case of the human ecology of São Paulo, the ecological footprint assesses the impact that the historical type of development processes of extraction of resources, production, consumption of goods, and the emission of wastes characteristic of Brazil's current socio-economic system has on the wider urban region's natural ecology.

Although already incorporated within the ecological footprint calculation, the physical loss of vegetation within the footprint of the city is especially highlighted by the use of a Lansat-7Etm surface temperature scan taken from São Paulo City Hall's electronic atlas. This indicator highlights the difference between the human-made and natural morphology in absorbing solar energy. From such images it is clear how the morphology of São Paulo's expanded urban fabric is replacing natural forests and fields that was used by the regions original biosphere to process

solar energy through photosynthesis instead of reflecting it as heat into the atmosphere. The subsequent ability of the mega-city's urban fabric to provide a viable microclimate for the physical flourishing of Brazilian society is thus readily measured with the use of the Lansat-7Etm surface temperature scans. Along with a range of air quality readings, this satellite scan is a primary indicator of the condition of the basic microclimatic relationship between solar energy and both natural and human-made morphologies.

The second challenge of the eco-political perspective outlined in Chapter III proposes a way to think about how to direct the urban growth of the city and offers conceptual instruments that correspond to the complex organization of the mega-city . The urban fabric of São Paulo has been historically configured by the dynamism of the speculative real estate market, so its future instruments of control must correspond to the complex capitalist nature of the organization of the city. Chapter III suggests a more sophisticated manipulation of economic variables like taxes and interest rates for each geographic region of the city in order to influence the economic processes of the real estate market in relation to the underlying ecosystem conditions, and consequently proposing new instrument to direct the growth of the urban fabric.

Finally, because of its elemental role in São Paulo's urban system, architecture has an aggregate affect on both the immediate ambient quality of the urban context and the 'metabolic' relationship with the wider host ecology, the biosphere. The challenge for both architectural and urban practice is to derive a new design process to replace the limitations of Modernist design techniques that up to the present have directly affected the ecological conditions of contemporary São Paulo. Modernism historically and today has been seen as a comprehensive design philosophy that establishes programmatic, functional, urban concepts, generates the appropriate architectural forms, and gives the buildings their particular material presence and their supporting systems. Buildings, like the city fabric, embody the cultural ethos that motivates and define their meanings. The implication beyond Modernism is that future physical interventions in the city must be judged in reference to their ability to impact positively on the ecological reality of São Paulo.

It is important to briefly note here what the thesis will mean by global economy, global Modernity and global biosphere. The thesis understands that the idea of historical global economy to be the global economic phenomenon that has stitched together, over the last five hundred years the peoples of the word. The socio-economic organization of the world's many populations has increasingly been influenced by the market economy and industrial imperatives developed and spread by the western world. The latest phase of this evolution is popularly known as globalization. This idea of global Modernity is related to the idea of a global economy. Global Modernism is understood in the thesis to mean the set of concepts, ideas and values at the core of western culture that have come to affect an increasing number of countries. These values have shaped the economy, society and the geography of many peoples. Concepts like the nation state, ideas of linear social, political and economic progress, and national and individual self-determination are components of global Modernism. Furthermore, global economics and Modernism are understood as ideas that have increasingly affected the global biosphere. That biosphere is the part of the earth and its atmosphere in which living organisms exist or that is capable of supporting life. In this thesis the concepts of global Modernity, economy and biosphere are meant to place São Paulo within a globalizing network of values and to illustrate its affects on the natural systems which comprise the global biosphere.

i.iv. SÃO PAULO MEGA-CITY: THE GEOGRAPHIC BOUNDARIES OF THE THESIS

Why São Paulo as the case study? Being one of the oldest of the global mega-cities at a population of 22 million inhabitants, São Paulo has been a theatre of seemingly chaotic and unrestrained land speculation in an increasingly market oriented society for close to a century. From before the foundation of the Brazilian coffee era in the middle of the 19th century, the characteristic function of São Paulo in Brazilian society has been as an instrument for the accumulation of wealth. During the 20th century, São Paulo has become a theatre of social and spatial systems required for the satisfaction of societal demand for the accumulation of large-scale economic capital, and for the pursuit of personal wealth. Since São Paulo's inception, the

city has been a nexus point for an expanding and highly exploitative global economic network. Brazil is one of a growing number of developing countries that have in the latter 20th century, radically shifted their socio-economic organization away from an agrarian structure to an urban industrial structure. São Paulo because of its age and exposure to the global market is an excellent example from which to speculate on a position of the future of urban and architectural design in the large urban areas of the developing world. A dissection of the phenomenon of São Paulo may point to some general trends that can guide and study and develop more profound principles to deal with other newly emerging mega-cities such as Lagos in Nigeria.

São Paulo is the capital city of the Brazilian State of São Paulo and the biggest municipality of thirty-nine in the greater São Paulo Region (see Figure i.iii.). Because of its enormous size and a new political and administrative shift toward decentralized administrative power, São Paulo's thirty-four "sub-prefeituras" (sub-municipalities or sub-mayoralties) have control over their own budgets and administration within the overall vision of São Paulo municipality. The population of the municipality of São Paulo in the year 2000 was 10,400,000 with 22,000,000 within the larger continuous regional urban agglomeration of São Paulo, the third largest such urban agglomeration in the world.[10] São Paulo's broader urban region has a built area of 8,051 square kilometres and the smaller municipality of São Paulo itself has 1,509 square kilometres). [11] The population of the region of São Paulo accounts for about 59 percent of the population of the State of São Paulo (37,000,000), and 12 percent of Brazil's overall population of 180,000,000. São Paulo has a density of 6,900 people per square kilometre, with a regional average of 2,215 people per square kilometre.[12]

Ecologically, São Paulo is located on the "Paulista Plateau" within the Tiéte River watershed. The city is 800 metres above sea level and is approximately an hour's drive from the port city of Santos on the Atlantic Ocean (see Figure i.iv). The city is nestled between the Cantareira mountain ridge located on the northern outlining region of the city and the southern mountain regions of the Serra do Mar. Both mountain ridges are part of the "Mata Atlantica" in the southeastern State of São Paulo. Tiéte River and its two major tributaries the Pinheiros River,

the Tamuanduatei River affect the urban structure of the São Paulo directly. Most of the water used by the city is drained form the Cantareira and Serra do Mar mountain ridge into two reservoirs, the Guarapiranga and the Billings. Both of these reservoirs are located within the Embu nature reserve located to the south of the original city but are now increasingly being absorbed by the fabric of the larger agglomeration.

For the purposes of this thesis much of the mapping work is focused on the São Paulo proper described in figure i.iii on pages 28 and 29. The São Paulo municipal digital atlas has been one of the primary sources of information for this thesis, but the work has also relied on the I.B.G.E. (Brazilian Institute Of Geography And Statistics) and I.B.A.M.A. (Brazilian Institute OF Environment And Renewable Natural Resources) for the statistical information and satellite information. All the data was easily available through the Internet, due to the fact that the institutes are government institutions offering the most reliable source of accurate demographic, cartographic, and satellite information. Because of the much more limited information for the surrounding cities of the greater São Paulo metropolitan area, the A.B.C.D. (Santo Andre, São Bernardo, São Caetano and Diadema), the boundaries of the case study have been limited to the São Paulo City itself.

The region of São Paulo produces 33.42% of the annual GNP of Brazil, with São Paulo region and the city combining to produce yearly $150,000,000 US.[13] The city's economic activity is spread between services at 55%, manufacturing at 17.6%, commerce at 16.2%, domestic services at 8.3 %, and construction and 2.3%.[14] São Paulo's industrial complex is not only large but also very diverse. The city still has a strong food processing and textile base that it inherited from the early 20th and late 19th centuries. However, automotive, military, aerospace, electronic and petrochemical industries have now overtaken these older industries in prominence.

i.v. DESIGN

As an economic machine São Paulo has few challengers in the developing world, while it is

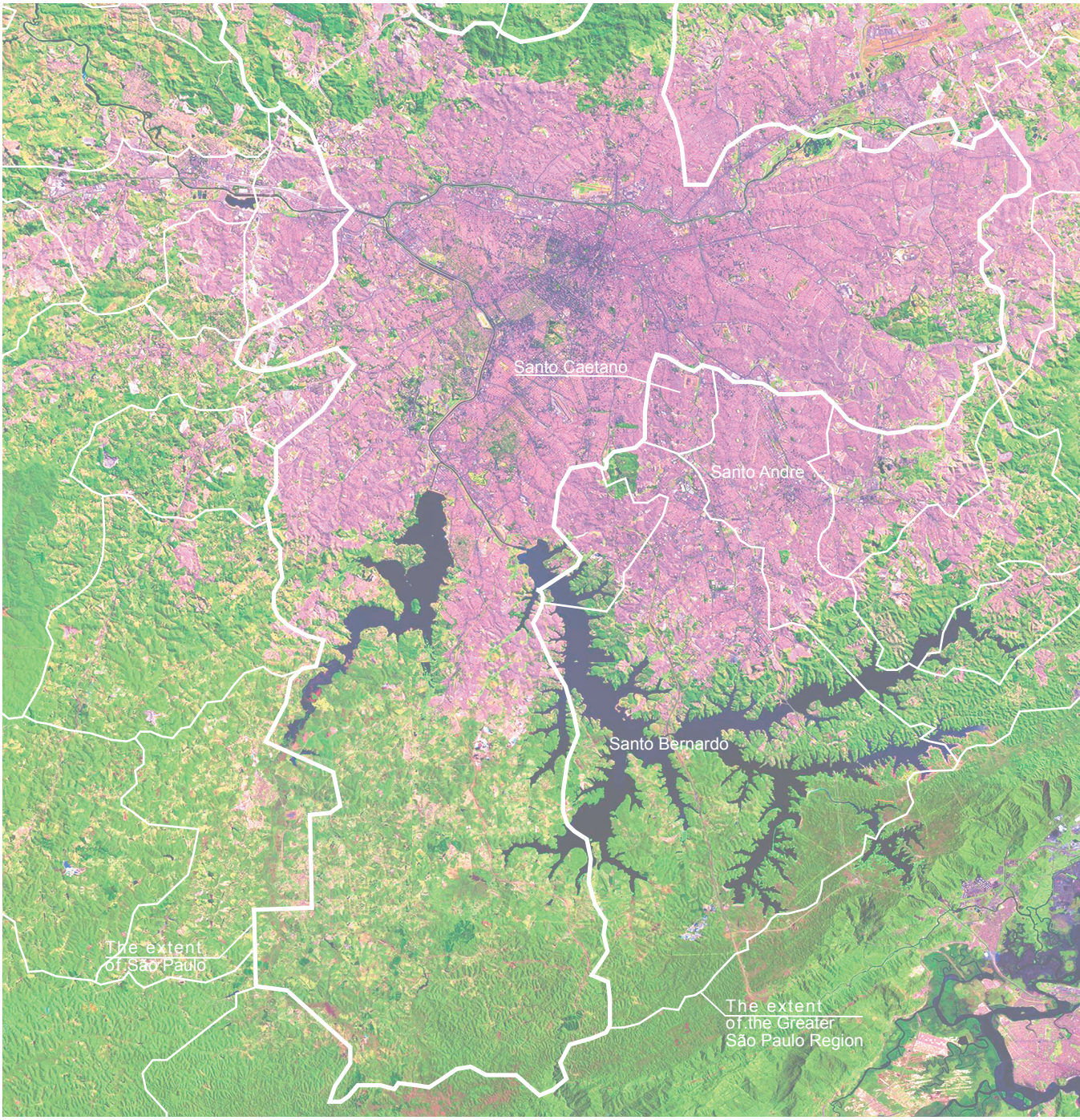
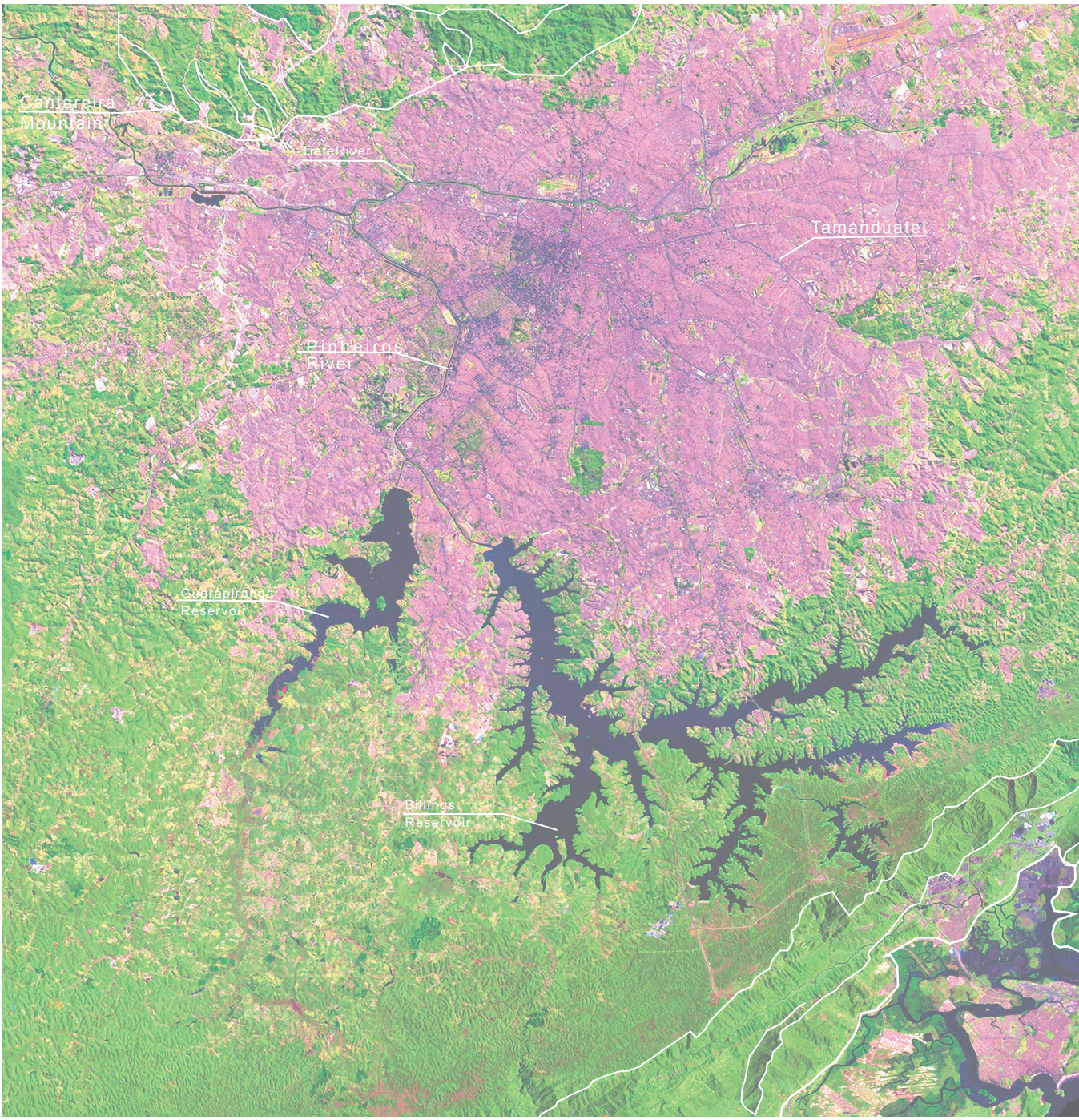

Santo Caetano
Santo Andre
Santo Bernardo
The extent
of São Paulo
The extent
of the Greater
São Paulo Region

Figure i.iii. **The Municipality And Its Context**

[Image by the Author, based on images provided by Ibama (Brazilian Institute Of Environment And Of Renewable Natural Resources www.ibama.gov.br)]


Cantareira
Mountain
TieteRiver
Tamanduatei
Pinheiros
River
Guarapiranga
Reservoir
Billings
Reservoir

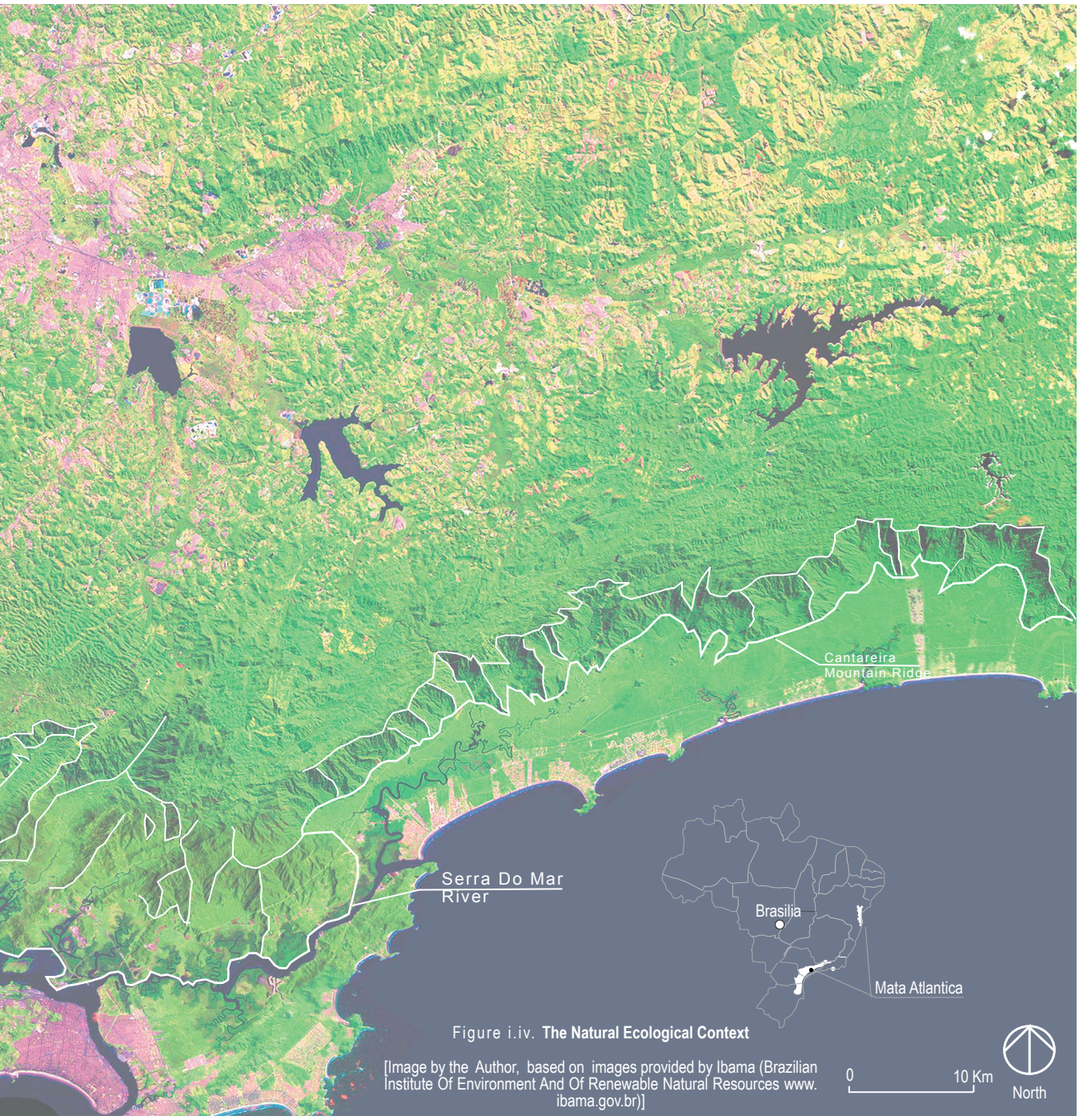


Figure i.iv. **The Natural Ecological Context**

[Image by the Author, based on images provided by Ibama (Brazilian Institute Of Environment And Of Renewable Natural Resources www.ibama.gov.br)]

still remains a city of social disparities, crime, and increasing socio-economic segregation. It is also a city with a diverse number of nationalities that unlike the cultural mosaic of Canada, offers a different way to deal with cultural differences. São Paulo stands both as a microcosm of Modernity in Brazil, encompassing its contradictions and effects, and represents, beyond the statistics and the profiles, an unfulfilled promise of Modernity.

Considering the huge sacrifices involved in creating São Paulo, it seems that Brazilian society would benefit greatly from an assessment of at least the urban aspect of their that embodies the promises of Modernity. There is also a recognition of the cultural hurdles that need to be overcome to find a new way to live in the city, namely the post-war notions of progress, economic growth, and the parallel virtuous pursuit of ever increasing consumption embodied by the promises of development that continue to be, for the majority of Brazilians, faithfully unquestioned. To overcome this politically conservative obstacle, this thesis envisages that the potential of urban design and architectural practice does not lie on a naïve Modernist belief that form and the traditional preoccupation with formal and compositional fetishes of the last century alone can change society. The potential of urban and architectural design lies in their ability to participate in the incremental changes that all of Brazilian society must make to reverse and redirect the course of São Paulo's urban condition toward assuring the environmental viability of Brazilian national development aspirations.

During the early decades of the 20th century design, architecture, and urban design grasped the implications on the human-made environment through changes in society. Led especially by Le Corbusier and the Congress International D'Architecture Moderne (CIAM), Brazilian architects and designers, ike Oscar Niemeyer attempted to respond to the challenges that were propelling the world. Le Corbusier and others who were at the forefront of Western design were proposing the parameters of a mission for architecture and urban design.

Today, more than ever before, however, there is a similar need for design to search for a mission especially in the construction of the cities in which we live. However, unlike the concepts and

ambitions of Modern architecture, the ‘broad mission’ for design today, should be derived from the pursuit of the full reality of the impact of the built environment on a complex society and even more complex natural world. The abstract speculation on how things ‘should’ be that has plagued architecture and urban design in the latter part of the century is to be avoided in this thesis. Design should seek to grasp the complexity of the new human built environment in its relations ships to its natural underpinning and strive consciously to engage with its implications for society’s most pressing issues. As people continue to be drawn into mega-cities around the world, design must lift its head out of the sand of aesthetic debate and try to clarify the nature of the emerging phenomenon and hosw to approach its design. This thesis provides an opportunity to broaden the range of disciplines and technologies that describe and can express the many aspects of the human-made environment and its relation to the surrounding natural environment.

Figure 1.1 Downtown São Paulo image by the author(*Source:* Chaffee)

São Paulo

I adore this city
São Paulo is a place after my heart
No tradition here
No prejudice
Whether old or new

Nothing matters but that furious greed that absolute
confidence that optimism that daring that work
that toil that speculation which have ten houses
built per hour in every style ridiculous grotesque
beautiful big small northern southern European
Yankee cubist

With no other concern but keeping up with the statistics
foreseeing the comfort the utility
the increase in value and attracting a large
number of immigrants

All countries
All Nations
I love that

The two three old Portuguese houses left are pieces of blue china

Blaise Cendrars (1924) [1]

This chapter answers the question: in order for São Paulo to be viewed as an ecological phenomenon, what is the nature of the force that generates and organizes São Paulo? The analysis moves through the major socio-economic periods of the country and correlates these periods with their effects on the spatial and formal structure of São Paulo. The first part of this chapter develops the idea that Modernism and the power of avarice was unleashed, at times brutally by Brazilian society, and has effectively propelled change in the country and São Paulo. It focuses on describing the broad transition of Brazilian society from a primarily slave owning agrarian social organization to market and industrial organized country through the promises of economic and social progress embodied through the development ethos. The chapter concludes first by highlighting the resulting socio-economic class structure underlying the configuration of the city and the endemic horizontal and vertical expansion of the city. Finally the chapter suggests that the most pressing condition of São Paulo discussed in the subsequent chapter (Chapter II São Paulo: A Parasitic Ecology), is not just the implications of the city's shape, but city's parasitic relationship with the biosphere.

1.1. DEVELOPMENT AS THE PROPELLING FORCE OF URBAN CHANGE IN SÃO PAULO

1.1.1. THE MOST FRAGILE ADVENTURE

Cultural historian Nicolau Sevcenko, in his 1993 essay entitled, "São Paulo: The Quintessential Uninhibited Megalopolis As Seen By Blaise Cendrars In The 1920s"[2], tries to answer why Modernist poet Blaise Cendrars left the intellectual and artistic luxuries of Paris for the scarcely known city of São Paulo. "After all", Sevcenko writes, "Cendrars was considered by his contemporaries in the 1920s to be, along with Apollinaire, one of the founding fathers of modern poetry. He was a cofounder of the so-called 'cubist poetry'.[3] Cendrars' self-imposed exile didn't seem at the surface to make any sense to Sevcenko. However, for Cendrars, São Paulo was clearly an obsession. According to Sevcenko (1993), Cendrars had visited São Paulo three times from 1926 to 1928 staying long periods of time, [4] with one year spent going back and forth between Europe and Brazil eleven times.[5] Cendrars still considered Brazil, especially São Paulo a "second spiritual homeland". [6]

Sevcenko suggests that São Paulo satisfied a great appetite for Cendrars. The city, like no other experience for him, was quintessentially modern. Since his adolescence, Cendrars had thrown himself at experiencing the global transformations being thrust onto the world. Sevcenko writes that Cendrars showed a sharp sensibility to the experience of modernity[7] and believes that "his poetry was born as a result of his direct, close exposure to some of the remarkable feats of recent technology and engineering" [8] of the Brazilian metropolis.

Since an early age, Cendrars dedicated himself to experiencing the transformations of Modernity. Early in life, he had spent his adolescence travelling to Siberia witnessing modernity's expansion by the Trans-Siberian Railway. Cendrars later exposed himself to the skyscrapers and overcrowded ports of New York as well as the industrial boom of Chicago with its social conflicts and labour and criminal violence[9]. Moreover, Cendrars was, of course, also intimately involved in the Parisian modern urban experience[10] all of his life. São Paulo,

however, for Cendrars, still represented much more. The city became the quintessential theatre for witnessing a truly uninhibited force of Modernity. In São Paulo, Cendrars could observe the unconstrained affects of the market system, of the industrial process, and the faith in progress, played out on the urban condition. According to Sevcenko, "for Cendrars, modernity displayed its character in São Paulo with a didactic eloquence".[11]

In Cendrars experience, more than anything else, the inner forces of Modernity "were displayed and perpetually in parade with no hindrance or inhibitions whatsoever". [12] In São Paulo Cendrars witnessed the confluence of all the forces of an unbridled savage modernity. This included the flood of poor immigrants mixing together in precarious lodgings with the destitute black remnants of the previous slave era. Cendrars was an eyewitness to the brutal effects of the demands of industrialization not subject to guidance by a comparatively compassionate and reform minded social and political elite similar to that of England. In fact, what Cendrars saw was a ruling elite that "considered the hopes, despairs and the discomfort of the multitudes as an alternative source of profit".[13]

In Sevcenko's view, Cendrars' poetry expressed the "rhythms and energies, which were imposed upon the world".[14] The energy that Cendrars saw in São Paulo was captivated by the fact that, " the whole population was supposed to be involved in a sort of collective race, with people striving to win an ever bigger trophy".[15] Moreover, as indicated by Sevcenko, " the multitudes which gathered in São Paulo were held by the most fragile, artificial and hazardous adventure… the whole reality of São Paulo was based on little more than gambling on a gigantic scale".[16]

1.1.2. SÃO PAULO: AGENT OF 'DEVELOPMENT'

For Brazilian society in general, São Paulo has the dual meaning of being at once an instrument for chasing after Modernity through economic and urban 'development' and, at the same time, being one of the 'payoffs' of Brazilian society's gamble in embracing the optimistic but often vague promises of Modernity. In common language, 'development' is usually taken to mean

a process through which the potentialities of an object, organization or organism are released, until it reaches its natural, complete fully-fledged form.[17] Development in national contexts implies a step-by-step evolution towards a higher economic, political, or cultural condition. In the context of the United States, economic and cultural critic Gustavo Esteva (1992) notes that, "development meant nothing less than projecting the American model of society onto the rest of the world".[18]

It is still an unquestioned belief in Brazilian society that the mature fully-fledged form of development is American industrial and consumer society.[19] That is why the potential of Brazilian society and the societies of the developing world are often reduced in critical discourse to measures of economic terms, rather than other non-economic values. The development phase of a historical process is seen as a culmination not only of national or international geo-political ambitions, it is also one of ethical, technical and cultural thinking; an ideal that has its roots in the 18th century European Enlightenment and has continued in altered forms into the Industrial Revolution of the 19th century and the comprehensive Modernism of the 20th century. Historically, the ideal began with a series of suppositions about the inherent rationality of human nature, society, and the universal application of scientifically-based techniques and organization. Development still reflects Western European cultural ideas, appropriated and expanded in the twentieth century by American thinking, which continues to shape beliefs of how the world works.

The development ethos, over the last five decades of the twentieth century, has also projected an image of a rational society that was organized by the invisible hand of the market place, a society that was urban-centred, industrial, and was driven by a desire for material and technological progress. This Modern development phase in world history is only the most recent episode of a five hundred year expansion of Western cultural principles throughout the world. The goal of development that has evolved over these centuries has been to change traditional societies into modern Western forms according to economic and rational principles.[20] As well, up until shortly after the end of World War 2, the colonial framework for global hegemony by the West built

over that period of European imperial expansion also influenced the concept of development. Here, development applied first and foremost to global resources exploitation and not the development of the people or societies geographically proximate to those resources.

The late 20th century objective and impetus for this race toward development in the years after World War 2 can be traced back to American President Harry Truman's 1949 State of the Union address. It was a speech that was to be a galvanizing and catalytic force for change throughout the world for the second half of the twentieth century.

> " We must embark (President Truman said) on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism-exploitation for foreign profit-has no place in our plans. What we envisage is a problem of development based on the concepts of democratic fair dealing" (January 20, 1949).[21]

The speech consolidated the belief throughout the world that the advancement of a society is measured by its universal accessible ability to produce and accumulate material wealth efficiently. Through the American perspective, national success can only come in the form of a democratic consumer society dedicated to the maximum growth of production and consumption through the application of rational thought and planning.

After the end of World War 2, when the United States became the most powerful military and economic power in the world, there was a marked global acceleration in changing the organizing principles of the world's many societies. Because of America's overwhelming material wealth and productive power, it became the brightest example of the success of the principles and techniques of Western Modernity. [22] The United States had, in the post war years, hegemony and power over the Western world and was an example of the most advanced stage of the evolutionary development process of the market and industrial system.[23] In addition, the United

States also became the example of the technological and organizational success of modern industrial and consumer society. The United States was the representative champion of the modern Western market society and the most formidable capitalist agent of the 'First World' to face the competing command-based socio-economic structure represented by opposing ideology of the Communist Soviet Bloc of the 'Second World'. Thus, as Wolfgang Sachs asserts, "it was within the corridors of the (American) State Department that 'cultural progress' was absorbed by economic mobilization".[24] Sachs wrote that, for the first time, "…the degree of civilization in a country could be measured by the level of its production.".[25]

During the post-World War 2 era, the 'developing world' or the 'Third World' was in large part viewed as a battleground between the above two forces. International and national developers, as well as United States' geo-political strategists, rested their defence of capitalism in large part on the promotion of rapid economic growth in Brazil as well as the rest of the countries of the developing world. One of many assumptions inherent in the development ethos as a geo-political competitive strategy was the supposition that the developing world was a neutral field to be technically normalized and directed to meet the "scientifically ascertained characteristics of a developed society".[26] Poverty and backwardness were cited and arbitrarily defined by global institutions such as the International Monetary Fund (IMF) and the United Nations, which were set up by the 'First World' to aspire in large part to convert the poor of the rest of the world into modern developed peoples.[27] The mandate of international and national development agencies was effectively to eradicate 'inefficient' traditions and perceived irrationalities to rationally restructure backward societies to create conditions for capitalist production and reproduction in an urban-based society.[28] Technocrats in the post-war Brazilian government and international organizations throughout the world pursued economic development with missionary-like zeal. Educated elites and the institutions required not piecemeal change, but a total restructuring of 'backward societies'. [29]

Urbanization was conceived with a national development strategy as a necessary factor in the generation of a Modern industrialized society.[30] Since Brazilian society was being shaped by

the principles of rational economics, the formation and the function of São Paulo was seen as an essential economic tool in the 'evolution' of Brazilian society towards the promises of Western Modernity. Rather than differentiating space and location on moral, social or religious grounds as in a traditional city, the Modern city like São Paulo differentiated geographic places based on the real-estate market and organizational demands of industrial and transportation processes.[31]

Urban and spatial economic theory, especially growth pole theory developed by economist François Perroux (1903-1987), was instrumental in shaping the urban character of São Paulo.[32] According to geographers Bertha K. Becker and Claudio A. G. Egler, (1992), "the ideology of development poles showed itself to be the most adequate model for territorial organization proposed by the Brazilian authoritarian state, since it involved the creation of privileged locations, from the perspective of capitalist accumulation, capable of linking the national and international circuits of financial and mercantile flow".[33]

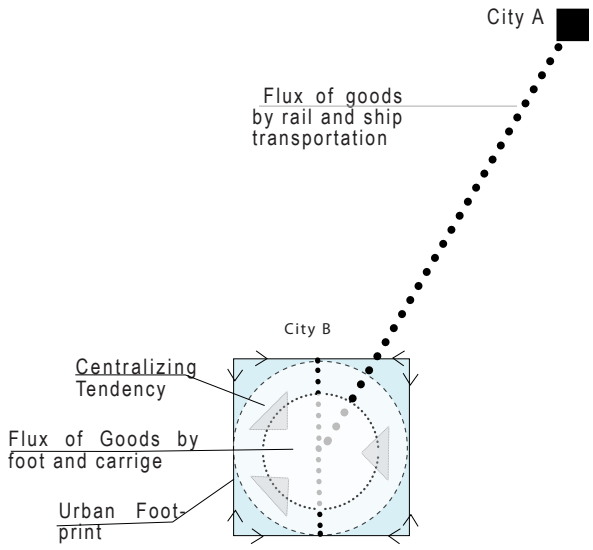
Development planners invested capital into the industries in São Paulo that they believed would generate offshoot industries to maximize the potential for rapid accumulation of capital. That is why international and national capital poured primarily into São Paulo to establish the petrochemical industry in 1938[34], the national iron and steel production industry in1942,[35] the automotive industry in1955,[36] the aerospace 1969,[37] and the military industrial complexes in 1969 and 1975 respectively. [38] São Paulo moved to the forefront of Brazil and the developing nations because it had inherited from its original coffee industry the essential preconditions for the development of an industrial society. São Paulo's original developers had decided to invest primarily in the city's region and its infrastructure. The post war national developers of the country saw that the modernization of Brazilian society would rest on the further development of São Paulo as an industrial theatre in which its labour markets and consumer society would operate.[39] In their view, the function of the city was best regarded as a theatre for the accumulation of capital, for production, and for consumption, and was an integral part of the overall economic development plans of Brazil.

1.1.3. SÃO PAULO: AN ECONOMIC ENGINE

Changing communication and transportation technology systems also continue to affect the urban evolution of São Paulo. It is important to describe this process briefly because, together with the mass migration into the city, it underpins any explanation of the historical development of the city. This set of technological changes has generally accompanied the spatial and social development of Modernist global industrial society in advanced cities.[40] The specific pattern of the Modernist development of the city of São Paulo is essentially a product of an "autocatalytic processes",[41] of a growth and increasing sophistication of transportation and communication systems, combined with the expansion and increase complexity of the industrial and market system. As part of the different stages of development of communication and transportation technology there has either been a centralizing or decentralizing tendency in urban agglomerations like São Paulo.[42]

Although a generalization and oversimplification, the first phase of São Paulo's modern development during the 19th century was marked by the steamship and the railway, which carried hugely expanded masses of people and goods, while the telegraph carried messages around the world in seconds (see Figure 1.2).[43] Both communication and transportation in this historical phase were essentially centralizing.[44] At this point in the historical evolution of communication and transportation technology, the steamship, railroads, and telegraph had succeeded in overcoming the obstacle of vast distances between cities at the regional and intercontinental scale. The first electric needle telegraph was invented in Germany by Baron Schilling in 1832 and the first commercially successful steamship was invented in 1807 in Great Britain by Robert Fulton.[45] Despite this expanded evolution of national and global transportation and communication technology, messages and communication were still distributed by foot or horse and buggy in São Paulo from central receiving areas in the city.[46] Factories, offices, markets, and residences remained close to the urban centre where major connecting railway and communication junctions were located. This concentration of infrastructure crowded the city population into a limited space, centralizing the activities of the city around a core area.[47]

Centralizing effect caused by the use of transportation technology, such as rail and ship. Goods are taken to a central point by rail or ship, then there is a distribution by foot or carriage transportation through out the city.



De-centralizing effect caused by the use of transportation technology, such as the automobile and the truck. Goods are taken to a central point by rail or ship, then there is a distribution of goods by truck transportation through out the city.

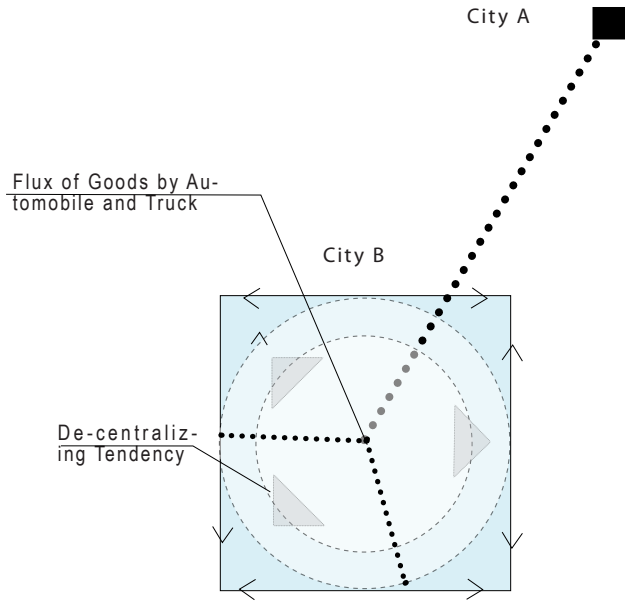


Figure 1.2 **The Centralizing And Decentralizing Effect Of The Evolution Of The Transportation And Communication Technology** (image by the author)

The situation changed quickly with subsequent advances in communication and transportation technology; their impact on Modern urban form further changed the interior infrastructure networks of the city. This new evolution began with the development of intraurban railroads, streetcars, subways, and finally with the development of the automobile.[48] Unlike the interurban technological evolution of the 19th century, the intraurban technological evolution of the 20th century, especially the automobile and the telephone, encouraged the decentralization of the city.[49]These changing relationships are diagrammed in Figure 1.2.

As in any typical Modernist city, the location of manufacturing plants and labour and financial centres, and the complexity and extensiveness of the range of the transportation and communication systems, has had profound prominence in organizing São Paulo's urban geography. Like the urban frameworks of other global mega-cities, which have grown and been structured by the co-evolution between the global market place and industrial system and the advances in communication and transportation technology, São Paulo displays similar basic functional relationships between its constitutive elements. São Paulo's contemporary urban configuration expresses the necessary spatial, formal and structural characteristics for sustaining a society increasingly organized by the modern economics of the developed society like the one envisioned by Harry Truman in 1949.

Within such capitalist urban societies, the global market mechanisms works by determining the organization and allocation of work (i.e. services and wage labour) in relation to the provision of natural resources through supply and demand.[50] More profoundly, the market system also organizes social roles along with the allocation of natural resources.[51] The belief by economists is that market mechanism organizes itself, much like an ecosystem, through the cumulative affects of responses by the suppliers of goods and services to the demands for human and natural resources by society. The market sets the prices (price is the main device that translates the interaction of demand and supply to allocate resources through the market) of goods and services based on this relationship.[52] Brazil and São Paulo's current spatial organization are largely a manifestation of such an economy, one that is an intimate part of a much larger

continuous global evolution of international networks of trade, consumption, and production.[53] Unlike tradition-based paradigms for structuring human societies, the current socio-economic system in Brazil is relatively recent in its Modernity and unprecedented when considering the length of human history.[54]

São Paulo is an example of a type of a contemporary city, one that is not only global in its connection, but also serves a society that is overwhelmingly urban-centred and, more importantly, "a type of society whose goals are linked to future-oriented, scientific objectives and rationality that were brought into existence through the mastering of certain techniques".[55] Since Brazil's original inception five hundred years ago as a colony of Portugal, the country, and consequently São Paulo, has had a particular role that changed in parallel with the expansion and projection of Western civilization. The steady measure of success, however, of São Paulo has been the city's historical ability to generate wealth. São Paulo has evolved a spatial, formal, transportation, and communications complex first to sustain the evolution of a trans-Atlantic colonial market and then an expanded global industrial market society. The city has quickly evolved into a 'child' of the Modern Age and 'Desenhvolvimentalismo' (the Brazilian term for the development ethos).

Despite four decades of expanding environmental and social awareness by scientists, and alternative economic and social thinkers of the finite nature of the biosphere, the development ideas embodied in Truman's 1947 speech have not altered significantly across the globe in general, and in Brazil in particular. 'Desenhvolvimentalismo' continues to drive the political debate in the country, reflecting the steady and comprehensive absorption of the development ethic in Brazilian society during the last century. The quest to modernize embodied in the gamble on development is the propellant force of change and order in São Paulo.

The progression of change in Brazilian society from an agrarian base towards a market and industrialized society are played out in and through São Paulo. All the major factors and developments required and shared by any modern market and industrial society, both institutional

and technological developments, can be witnessed in the socio-economic history of São Paulo. The necessity for a modern labour market, for technical, legal and clerical professions, and the restructuring of major productive process are vital developments throughout the slow progression through the key cultural epochs of the region and the country towards Modernity's fruits.

1.2. THE HISTORICAL EVOLUTION OF SÃO PAULO'S URBAN PHENONMENON

Although seemingly artificial and subjective, it is useful, in order to understand theri evolution, for this analysis to organize the major socio-economic phases in the region of São Paulo and the country by considering them as separate epochs. These epochs highlight the description of the factors underlying transition from an agrarian society toward a market and industrial society and have been given a graphic form in a time line developed in Figure 1.3. For São Paulo, the two main epochs, the coffee epoch and the modern development epoch, represent specific socio-economic phases with their distinct relationships between the institutions and economies that organize Brazilian society and Paulista society specifically, technology and the nature of production and labour.

As has already been briefly noted, the coffee epoch in Brazil and São Paulo created the conditions necessary for the creation of the Modernist development epoch of the country. Both epochs are nestled in a much broader global movement towards a global integration of the resources and societies in a market, led and organized by different European powers, by the expansion of Western societies through out the world. The thesis narrative for this research only sets the colonial period as a prelude for the coffee epoch because the coffee socio-economic period itself sets the stage for industrialization and modernization, which is the most dramatic epoch in São Paulo's history.

1.2.1. THE COFFEE COMPLEX: LAYING THE FOUNDATIONS FOR REGIONAL AND GLOBAL NETWORK

Any historical accounting of the current urban condition of São Paulo must begin with the coffee epoch (1840-1930). Although the gold rush in the hinterlands during the eighteenth century did expand the position of Brazil in the global market, the first real sustainable economic interconnection with the global marketplace developed around the growth of the coffee sector. As the geographers Becker and Egler wrote, the "commercial and financial apparatus for the coffee economy, which constituted itself as an agro-exporting complex, generated a coffee-growing bourgeoisie. The internal market expanded with the emergence of an urban middle class and with the substitution of slaves by free labourers who solved the labour-shortage problem and liberated capital for the other investments. In sum, conditions were created for the emergence of modern industry".[56] São Paulo's coffee epoch laid down the important foundations for modern communications, transportation, and the financial interconnections of the São Paulo Region with the expanding global economic network, and seeding great changes in Paulista society. During the coffee epoch São Paulo began to establish itself as the most important engine of economic growth in Brazil. São Paulo's region evolved over the epoch as a nexus for all of the urban factors eventually required for the creation of a modern 19th and 20th century industrial society.[57]

1.2.2. THE PRECEDING PERIOD OF BRITISH HEGEMONY

Throughout the middle of the 19th century, Britain consolidated its hegemonic power over most of the world. Britain's power rested largely on the economic dependency of markets that it helped create and control via its control over maritime trade.[58] London became the locus of a growing network of trade of goods and, as the 'world's workshop', provided the financing and technological centre for the expansion of Britain's global mercantile ambitions.

Since the affective exhaustion of the Brazilian gold mines in Minas Gerais between 1690-

1780, and the loss of market share by Brazilian sugar in the global sugar market, the economic focus for British financiers in Brazil moved toward the area immediate north east of São Paulo, known as the Paraiba Valley (see Figures i.iii & 1.3). This valley was not only the nascent centre of coffee growing activities but it is also formed the transportation connection between São Paulo and Rio de Janeiro, the capital city at the time.[59] As the coffee market in Europe and the United States began to grow, the Paraiba Valley began to be very attractive area for the British investment houses. The coffee explosion, however, only really took place after the first kilometres of the newly invented railway were laid down and the reorganized socio-economic factors were in place.

1.2.3. THE COFFEE EPOCH'S FINANCIAL MODEL

Before Brazilian coffee could become a global product, a financial model was established between the coffee farmers, the Brazilian Imperial Government, and the British financial institutions. The business model rested on assurance by the Emperor to the British bankers and venture capitalists for any losses due to market fluctuations. [60] By controlling the amount of coffee in the market, the Emperor assured a minimum level of profits for the British financiers by controlling the supply of export coffee into the market.[61] Brazilian farmers in the hinterland of São Paulo State in turn received the necessary financing to develop the land and have excess to the growing global coffee market controlled by the British financial houses. The Emperor assured that, at least in São Paulo, there would be the beginning of a more 'developed' region of Brazil as well as deeper contact and interdependence with the British Empire and consequently with the rest of the expanding world market.[62] This basic relationship between international capital, national capital, and government direction is the basic model used latter in the Modernist period during the development phase in the socio-economic history of Brazil.

1.2.4. TECHNOLOGICAL ADVANCEMENT: CONQUERING TIME AND SPACE

British technological advancement in railway transportation along with their financing made

it possible for the interests described above to take advantage of the economic possibilities of further expanding the coffee sector into the hinterland of São Paulo State. The potential in the development of the vast fertile western region of the State of São Paulo only became a reality with the introduction of the steam locomotive and the railway lines. The first railway line in São Paulo Region was the Jundiaí Santos railway line in 1867.[63] The relationship between the growth of the coffee market, and foreign investments by British financial interests, and the new regional railway system fuelled the explosive expansion of transportation arteries into the hinterland. This rapid expansion, in turn, increased the economic usefulness of the hinterland of São Paulo in order to both provide more land for the industrialized monoculture of coffee market and to feed the growing population of the city of São Paulo (see Figure 1.3).

The implication of the railways was not just their ability to transport coffee cheaply through São Paulo to the port of Santos and out to the world coffee market, but they also tied isolated parts of the region and the capital more closely together. Whatever happened in the state capital had an immediate affect on the hinterlands of the state because the city of São Paulo's interconnection as a node for international communication and transportation. São Paulo funnelled goods to and from the rest of the world into and out of the region as well as producing many of the manufacturing goods consumed throughout the region and latter throughout the country.

1.2.5. WATERSHED ORIGINS OF THE URBAN ECOSYSTEM NARRATIVE OF SÃO PAULO

Along with its historical reference, Figure 1.3 also intended to outline an ecosystem development narrative for São Paulo State. The historical inheritance of the railway infrastructure required to sustain an industrial coffee complex at a global scale had a significant effect on both the spatial organization of the urban fabric and the urban ecology of São Paulo. The railway system founded during the coffee epoch has continued to affect São Paulo's urban fabric and urban ecology right up to the present. Until the expansion of the highway system that developed to support a burgeoning automotive industry, the railway system remained the most extensive and effective transportation system in the country. The rail system not only linked the coffee

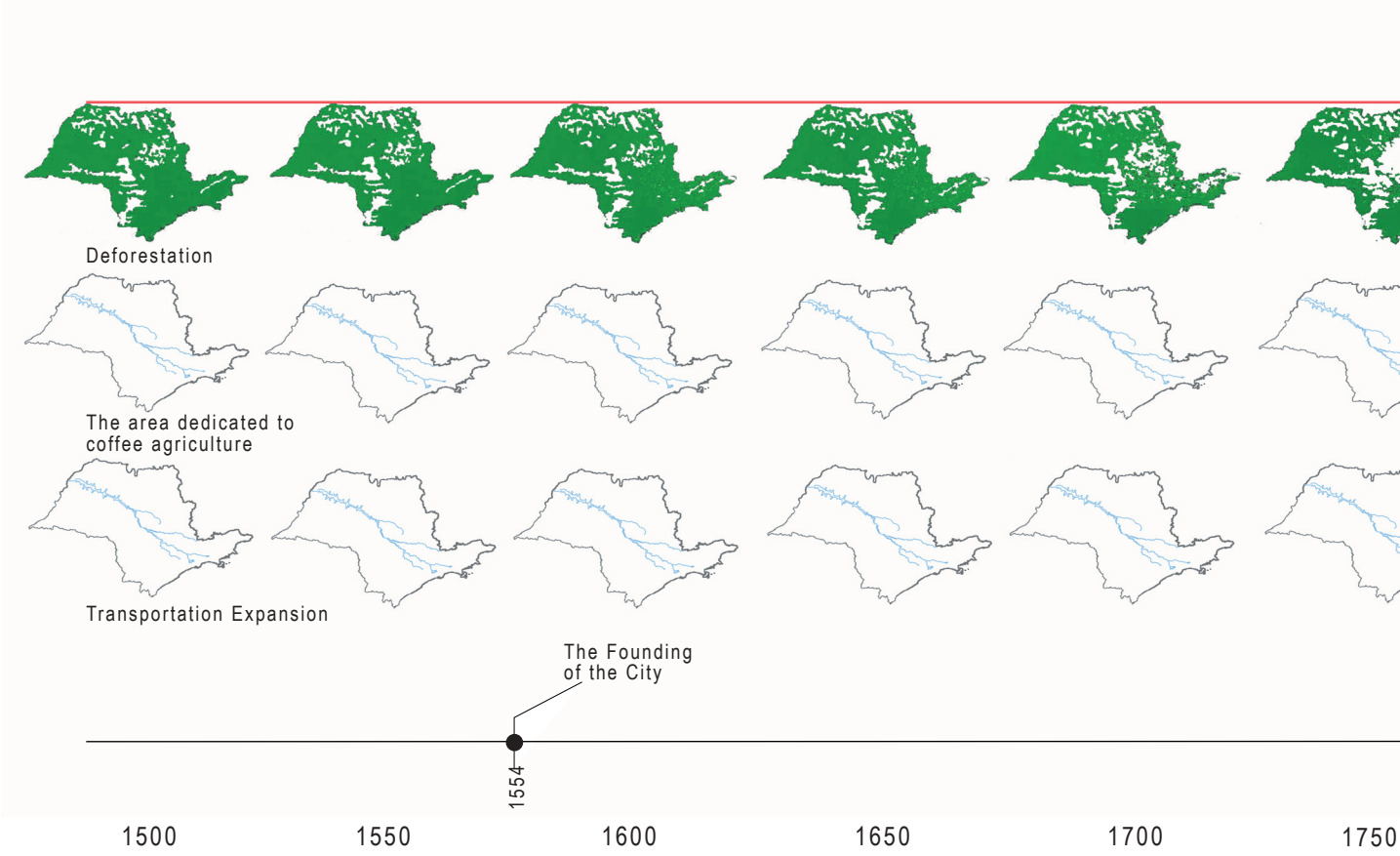
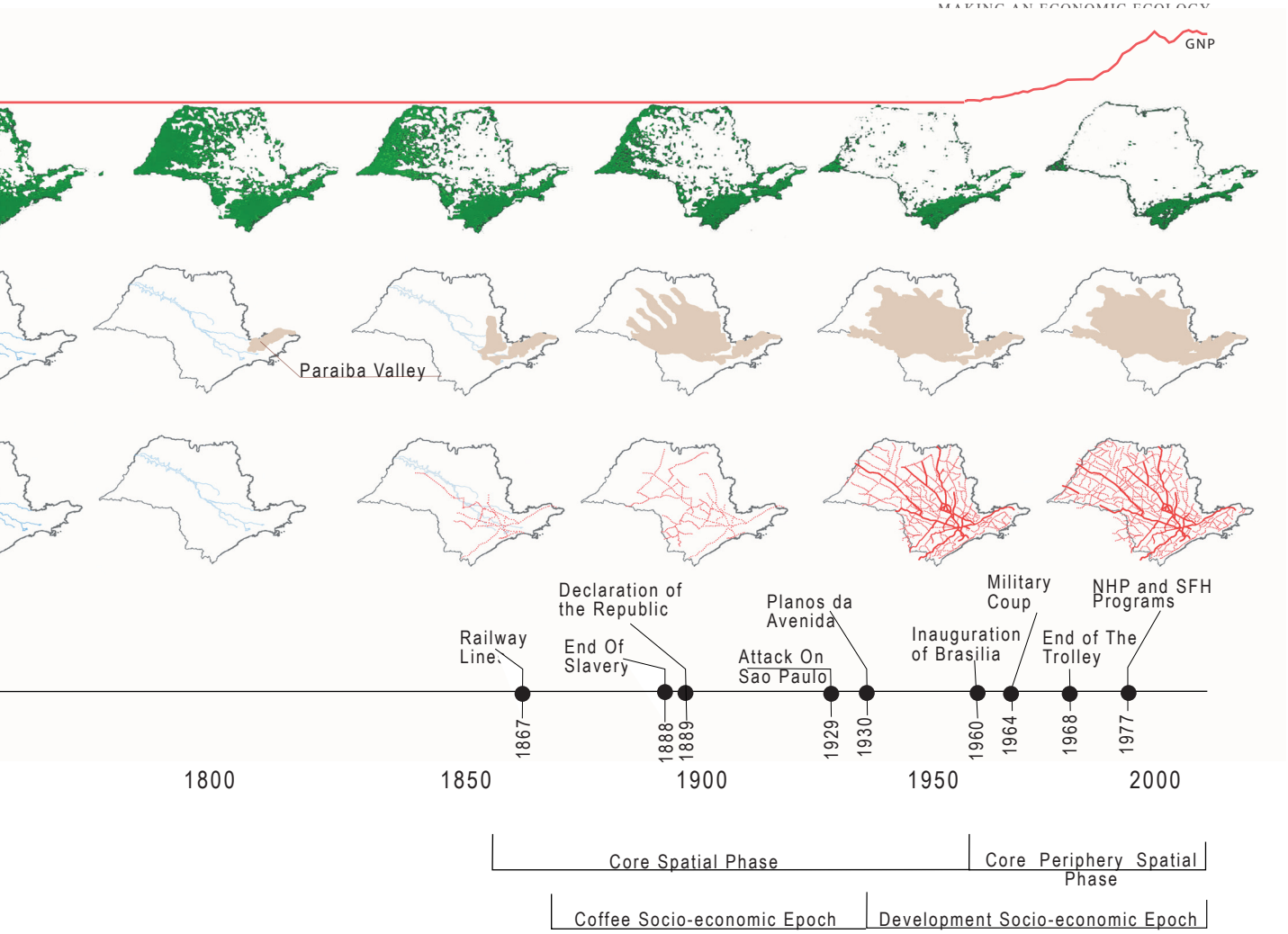


Figure 1.3 **The Co-evolutionary Narratives Of The Socio-economic Development Of São Paulo State** (image by the author)

The intention of this graphic narrative is as an illustration of the effects of economic development represented by the symbiotic growth in the GNP of the country, the expansion of the infrastructure and coffee complex throughout the state. It is important to note here that since the 1920s coffee has dominated less and less of the agricultural sector of the state, however the final area in 2000 serves as an approximation of the extent of the current use of arable land. The diagram also references important dates that affected the socio-economic and spatial evolution of São Paulo described latter in Figure 1.8.

producing regions of São Paulo's hinterland with the global coffee market, but the Paulista railway system evolved to provide transportation for the manufactured goods during the early stages of the national development period.

Even more fundamental to the railways, however, was their role in integrating the natural ecosystems of São Paulo Region into the global economy. Layering of the early (and present) transportation systems over natural waterways, as shown in Figure 1.3, deeply affected the



evolution of the urban fabric and urban geography of São Paulo. The influence of the evolution of the transportation systems on the form of the present urban fabric of São Paulo is a result, in part, of the practice of layering the initial transportation infrastructure of the coffee industry onto the river system of the Tieté River. The Tieté, because of its size, reached into the hinterlands of São Paulo, and its connection with the Parana River system was used for transportation deep into the hinterland of São Paulo State and Brazil since São Paulo's foundation by the Jesuits in1504. Due to the relative flatness of the margins of the many rivers that make up the Tieté Watershed, the footpaths, horse pathways, railways, and later the highway arteries, were

constructed to follow the sinuous paths of the Tieté River system (see Figure 1.4 through 1.6). This evolution of the relationship between the natural pattern of the topography and hydrology of the land with the placement of the transportation network, which served the coffee market, naturally lead to the emergence of the later manufacturing complexes of the city along Tieté River watershed.

Although the layerd relationship between transportation in the case of the railway system and the watersheds was determined by the economic demands of the coffee industry, it is worth adding that this practice can be traced back further in time to the Portuguese approach to subdividing land before the coffee epoch, the traditional practice being to divide land along river edges and the watersheds.[64] The current 'sinuous clusters' that comprise the current street matrix of São Paulo are the result of the delineation of old farm lots by roads built along or on top of many small rivers that comprised the many tributaries of the Tieté River system (see Figure 1.6). São Paulo's spatial organization further evolved and changed along these watersheds to respond to the period of modern economic development. Each historic period has shaped and reinterpreted the urban geography and ecology of São Paulo. That city's shape, however, has also been determined by the shifting socio-economic class structure of Paulista Society.

1.2.5. THE CHANGING STRUCTURE OF LABOUR: THE CREATION OF A MODERN LABOUR MARKET AND SOCIAL CONDITIONS

Not only were the types of interconnection provided by rail transportation and infrastructure important, but also the question of labour became increasingly important in determining the actual potential growth of the coffee industry. [65] For over four hundred and fifty years, Brazil was an agrarian society dependent on African slave labour to produce mainly sugar, cotton, and eventually coffee. The agrarian society that developed in Brazil used farming to sustain an agrarian social structure for Brazil.[66] There was no real concept of a modern wage labour market or farming to increase productivity in order to maximize profit and then reinvest this back into more efficient and consequently more profitable production process. [67]

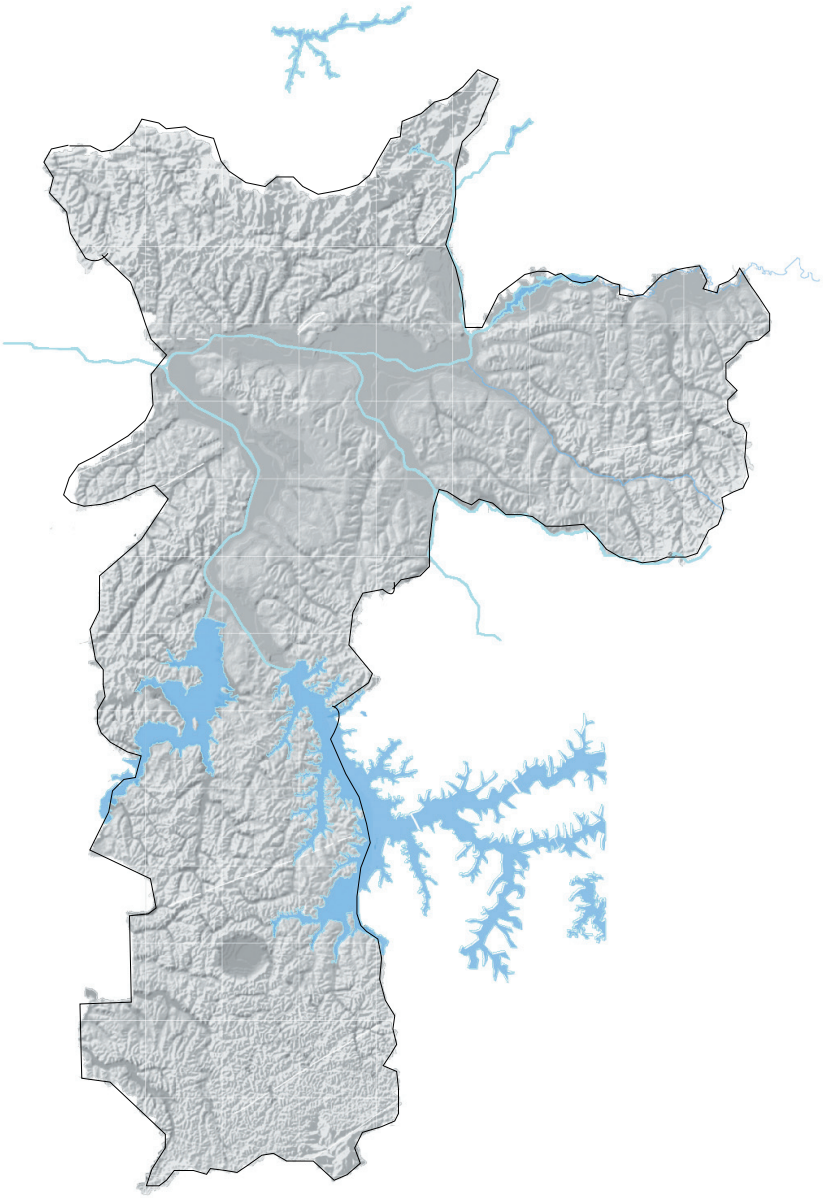


Figure 1.4 **Topography** (image by the author *Source*: www.prefeitura.sp.gov.br)

This along with the following maps illustrates the relationship between the arrangement of the transportation system of the city and its underlying watersheds and the major rivers, the Tiéte and Pinheiros Rivers, which are important elements in São Paulo's geography.

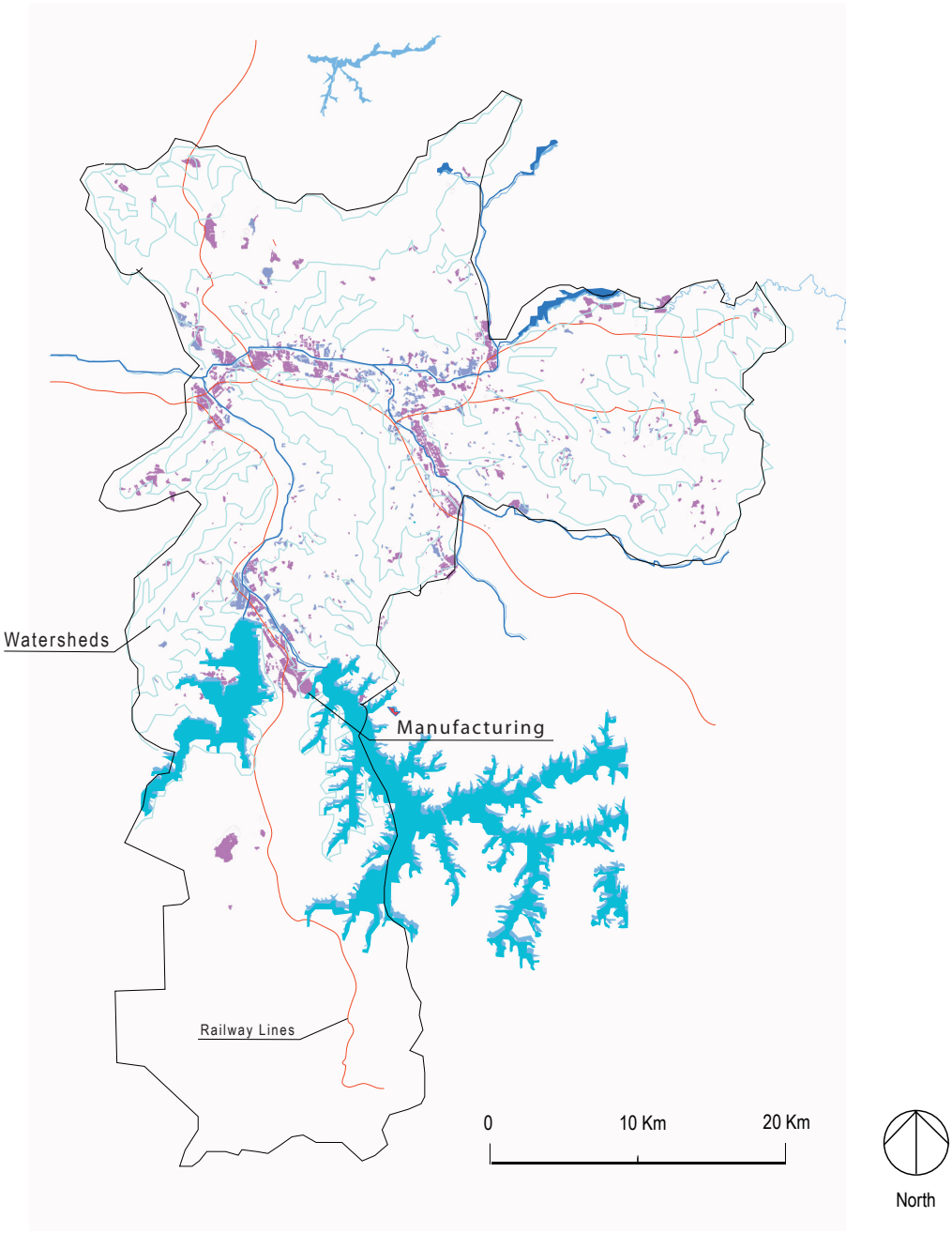


Figure 1.5 **The Relationship Between Transportation Watershed And Industrial Complex** (image by the author *Source:* www.prefeitura.sp.gov.br)

The map shows the symbiotic evolution of the city's major transportation arteries, the manufacturing complex (shown as the purple hatching) and the rivers of São Paulo.

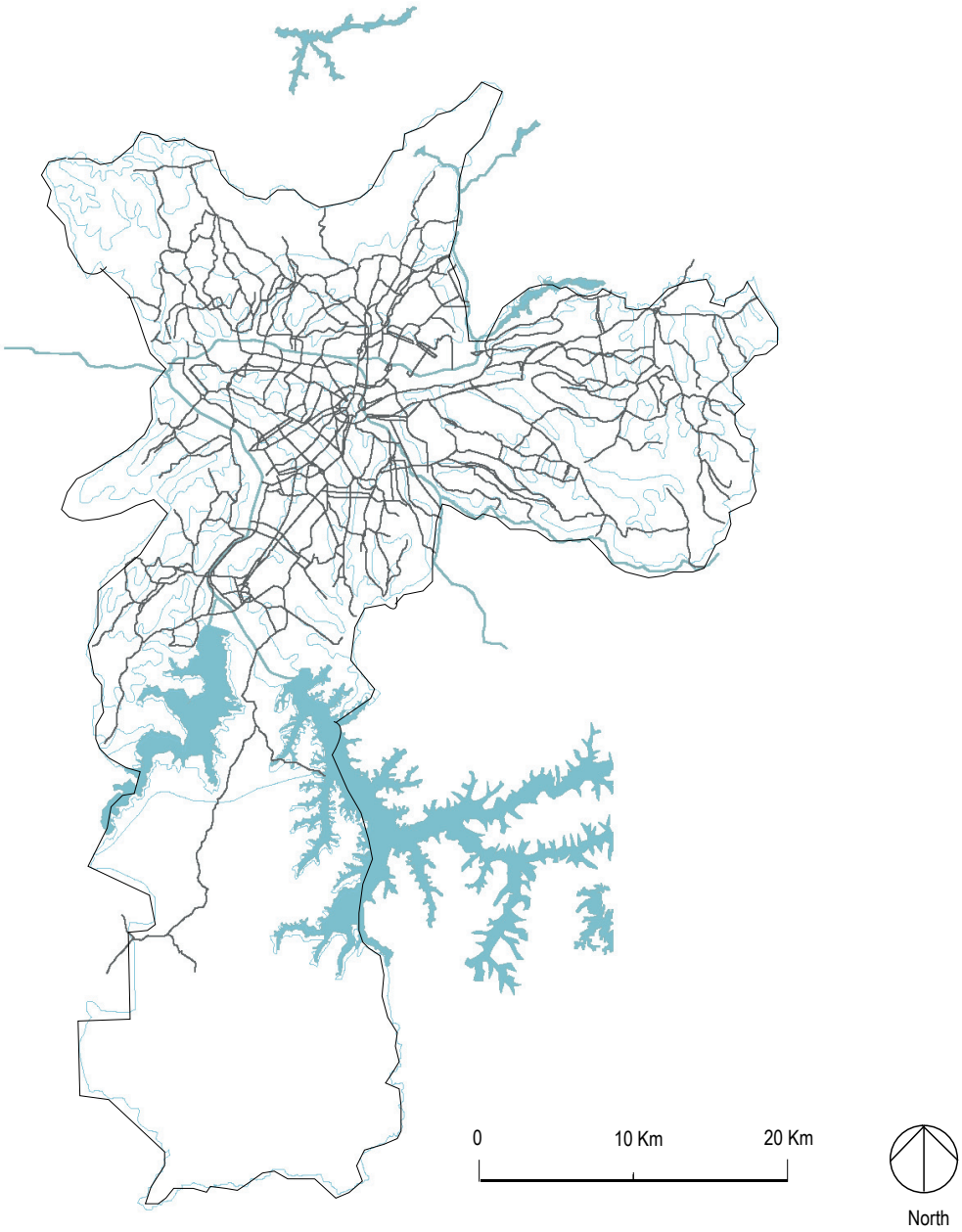


Figure 1.6 **The Relationship Between The Watershed And Street Matrix** (image by the author *Source:* www.prefeitura.sp.gov.br)

Another effect of the city's geographic features is on the nature of how both its street matrix developed around the watershed form and consequently the layout of the urban blocks.

The motivations of international financial interests, the Paulista industrial farmers, and the government were not, however, solely to support agrarian social structure. A capitalist motivation was to create a cycle of increasing profits. In contrast to Brazil's traditional agrarian society, the industrial-like organizational pattern used in the coffee sector optimizes factors, like labour, involved in the production of coffee, to reduce the cost of production and subsequently increase the amount of profits.[68]

Viewing the production of coffee through such abstract factors, a society that was dependent on slave labour to organize human resources, as Brazil was before the abolition of slavery, was inherently inefficient.[69] The slave owner, for example, had to provide all the logistics and resources to feed and to clothe slaves, as well as motivate people whose only motivation for doing the work was avoiding physical punishment or death. In other words, slavery was resource and labour intensive. In addition, a slave society never created potential consumers in the market in the city of São Paulo and region's coffee producing hinterland.[70] Slavery as an institution, beyond the moral outrage of owning other human beings, was neither the most efficient form to organize nor the most desirable type of labour for a modern industrialized coffee sector. An economic boom could only happen with the genesis of some kind of 'modern' labour market.[71]

With the inevitable abolition of slavery in 1888, the demand for labour primarily to work the coffee plantations in the hinterland, and labour for the growing city of São Paulo, was quickly filled by an influx of primarily Italian, but also Syrian, Spanish, and German immigrants looking for land to work.[72] Since some immigrants were literate, they filled lower ranking managerial and clerical jobs as well as working in the coffee and food storage depots and a slowly growing textile manufacturing sector in the city of São Paulo itself.[73] The nascent manufacturing sector provided the growing middle class some of the consumer goods that it needed. The ex-slaves on the other hand, either stayed in the nearby towns close to their old farms, or joined the growing flood of migrants to cities such as Rio de Janeiro and São Paulo, to find work along side European immigrants. In addition, the clerical, administrative, and legal

professions developed alongside the coffee industry as the necessary social factors to sustain the growth of the coffee industry, the fledgling manufacturing sector, and the consumer society. These professions created a necessary set of social conditions for the coffee sector to bloom and propel the subsequent industrialization of Brazilian society.[74]

1.2.6. MODERNIZATION OF BRAZIL: THE EVOLUTION TO MODERN DEVELOPMENT AFTER 1949

The coffee ephoch could not have happened if it was not for a combination of new factors: the abolition of the socio-economic constraints of slave society, the creation of modern social institutions, the financial mechanisms, and the regional and global interconnectedness established by the transportation network such as the railway systems. Examining in the terms of the narrative for São Paulo's urban ecosystem described in previous sections, the expanding global network, developed from the coffee epoch resulted in São Paulo becoming a central point from which Britain could extend the exploitation and consumption of an increasingly interconnected global biosphere for the growth of its world market. One consequence needs to be added to the list of factors above, namely the deforestation of São Paulo's previously underdeveloped hinterland. This deforestation and agricultural exploitation had the ultimate effect of extending the ecological limits of England, mainland Europe, and the United States in order to satisfy the global thirst for coffee (see Figure 1.3). Such an expansion of a developed society's ecological footprint by annexation of another region's biosphere for the provisions of new foreign markets for more developed nation signalled a new scale of ecological exploitation and was the first substantial loss of habitat and biospheric wealth that was to be experienced in Brazil.

Despite wholesale deforestation and the 'civilization' of its natural ecological region for coffee plantations, São Paulo became the flagship of change in the country because it now possessed the regional infrastructure required to provide sufficient foodstuff to feed a growing population and proximity to a deep-water port in Santos to connect the city with the wider global market. São Paulo also had, by the 1930s, a labour force that had for the most part been exposed to an

expanding global markets and organized into a wage labour market. Finally, São Paulo also had the required financial and legal institutions to support business enterprises as wells as the professionals required to fill managerial, clerical, and administrative positions.

The coffee era seeded São Paulo's urban elite with the promises of a modern industrial society, that was urban and progress centred. The coffee complex not only linked São Paulo to the global market system, but also to the expanding Western cultural world. It marked a progression in Brazil's relationship with the rest of the world. Although subjugated to the periphery of the evolving global market and industrial system, and constrained to the whims of Britain's financial houses, Brazil started to entertain its own aspirations.[75] Brazil, during the coffee epoch, went from a purely a colonial territory, exporting raw natural resources to a Portuguese metropolis into a country which, though ambiguous in its national goals, wanted to embark on the road to Modernization.

1.2.7. STATE-GUIDED MODERNIZATION

The 1930s proved to be a decisive time in Brazilian history. Between the two World Wars, Brazil was already a rapidly industrializing territory, but it remained a fractured collection of regions with local competing agrarian oligarchies controlling most of the political power in the country. With the ascension of Getulio Vargas, born in 1883 and in power from1930 to1954, the country embarked on a nationalist fascist agenda, which coincided with the collapse of the coffee sector after the world market collapse in 1929.[76] Vargas effectively ended the hold of the coffee oligarchies on the fate of the country and pointed Brazil definitively toward modern industrialization. He centralized political power and balanced the interests of differing sectors of the Brazilian political establishment, creating a corporatist fascist nationalist state.[77] Vargas's state was controlled by a coalition of the major economic sectors of Brazilian society, especially the industrial sectors.[78] He developed a protectionist economy founded on import substitution and set about controlling and centralizing labour disputes in order to assure a set of social conditions conducive for state guided modernization and national economic development.[79]

The new Brazilian state would be actively involved in directing the country's economic evolution and coordinating investments and social evolution as part of a national plan towards modernizing Brazilian society through what Vargas called 'The New State'.[80] This new state government under Vargas, although striving to assert Brazilian autonomy, continued to align itself with the hegemonic power at the time, aligning Brazil with the early cold war interests of the United States. Brazil during this period, like other subsequent periods, took advantage of the American willingness to fund the aspirations of the 'developing world'. Economic growth was seen by the United States' global geopolitical plans not only serving the desire for the economic development of Brazil and the region, but it was also part of a crucial plan for the national security of Brazil and of the hemisphere.[81]

After Vargas, another significant leader who championed economic development was the democratically elected President Juscelino Kubtischek in power from 1956 to 1960. Kubtischek advanced the same line of accelerated economic development and furthered the modern state institutions that had been established by Vargas. Kubtischek administration's was enthusiastically elected into power by the promises of Modernity expressed by his campaign motto: "fifty years in five".,[82] fifty years of development in five years. President Kubtischek's most famous accomplishment was the building and transferring of the capital city of the country from Rio de Janeiro to Brasilia in less then four years between 1956 through 1960. The building of Brasilia at the geographic centre of the county was not only a symbolic political centralization, but it also propelled geographic focus of the country away from the coast and the dilution of the political regionalism that had coloured Brazilian politics for most of the country's history. It became a great historical moment for Brazil. The construction of Brasilia also consolidated the government's decision to point Brazilian society along the vague ideals of Western Modernity. The new capital was designed by urban designer and architect Lucio Costa and the government buildings by Brazilian architect Oscar Niemeyer. Its heroic modern architecture galvanized the Modern promise of economic and social progress that the future of Brazil was surely to bring.

Beyond Brasilia's grand aspirations, President Kubtischek actively promoted modernization and the economic development of the country. Following a growth pole economic theory, one of President Kubtischek's many contributions was the introduction of the automotive industry in the ABC (the cities of Santo André, São Caetano and São Bernardo) in the greater São Paulo Region (see Figure i.iii).[83] Because of the inherent dynamics of the automotive industry's economy, other industries developed to compliment the automotive sector, such as the petrochemical industry and other transportation-related industries. More importantly, the automotive industry in the region of São Paulo unleashed what the Brazilian historian Boris Fausto called an "automotive civilization".[84] The abandonment of the rail for the promotion of the automobile affected the country and São Paulo very deeply.

1.2.8. FORCED MODERNIZATION

Beside the four hundred years of slavery, the most profoundly difficult period for the general population in Brazilian history is arguably the twenty years of military rule from1964 to 1985. Many of the historical social problems afflicting Brazilian society today, such as the gross socio-economic inequalities, are attributable to the authoritarian policies of the military.[85] It was a twenty-year period characterized by Boris Fausto as "a savage capitalism".[86]

Like Vargas, the military's economic plans were based on cheap foreign loans, violent suppression of labour movements, the systematic and deliberate reduction of real working wages of labour, and the concentration of wealth. This coercive approach pointed Brazil towards a fast track to industrialization and modernization. The government's goal was to accelerate the industrialization of Brazilian society by promoting a complementary consumer society further. Growth was to be accelerated to assure, according to the military thinking, the absorption of Brazilian society by the global market system in order to curb the global and local communist and socialist threat from 'winning over' and destabilizing the population. Thanks to the combination of coercive policies the country's gross national product exploded from 1970-75. The growth was in industrial production one, largely fuelled by the manufacturing complex

found in São Paulo and its region. This was the recipe for the creation of the 'Brazilian miracle' during the late 1960s through the early part of the 1970s.

Although life in Modern Brazil was qualitatively different from earlier periods, it clearly did not make much of a difference whether military or later civilian rule prevailed to advance the modernization project of the country. Irrespective of this, Brazil was on the fast track towards industrialization, modernization, and the development of a middle class and consumer society. The social consequences, especially the mass migration into the São Paulo Region caused by the expanding industrial complex, unleashed the unbounded horizontal and vertical physical expansion that has characterized the city throughout the latter decades of the twentieth century.

1.2.9. THE RESULTING SPATIAL NARRATIVE OF THE TRANSITION TO A MARKET AND INDUSTRIALIZED SOCIETY

One of the requisites of 'desenhvolvimentalismo' was the creation of the modern nation state. Command over the national territory was seen as fundamental in the creation of a modern industrialized society and the extension of the political and administrative presence of the Brazilian State.[87] The spatial reorganization caused by the internal migrations during the modernization of the country was not the only influence in the evolution of Brazil's geography. After the consolidation of Vargas's power in 1954, the plans of national development required that Brazil's geography be consolidated under the organizational demands of industrialization.[88]

Once begun, there was marked continuity between modern civilian and military rule. For four hundred years Brazil had been a predominantly fragmented society with competing economic and political regional interests. This had left the county not only disjointed politically and economically but also spatially fragmented. Northeastern regions of the country were isolated from the southeastern region of São Paulo and capital of the country in Rio de Janeiro. In addition to the regional fragmentation, by the 1930s the population of Brazil was primarily

concentrated in the coastal regions of the country. The coastal concentration left a huge uninhabited and unexploited Amazonian watershed to the west. For the rest of the 20th century either through civilian or military rule, the plan was always for the political centralization, the increased presence of the state throughout Brazilian geography, and the increasing absorption of the country's land into the industrial system.

1.3. EXPLOITED MULTITUDES / UNBOUNDED AVARICE: SÃO PAULO'S SPATIAL EXPANSION

For São Paulo itself, the most significant historical shift unleashed by the socio-economic evolution of Brazil during most of the 20th century was the flood of people migrating from the Brazilian northeastern region and from outside the country into São Paulo. The city went from a sleepy provincial city to a mega-city of 22,000,000, whose unprecedented size today houses desperate masses.

This wave of people swelling the city all had to be housed and transported from their São Paulo homes to their workplace and back. The evolution of the city was predominantly shaped by unrestrained capitalist energy and 'sacred' avarice championed by the government's support of the growing market society described above. In keeping with concentration of power, the shape of the urban form and the geography of the city today is largely a result of the use of the city by the very wealthy and powerful few who could influence its future to create their theatre of unrestrained avarice. The city became a stage for savage exploitation of the working multitudes to satisfy the hunger for the personal profit of the few. São Paulo's form expanded through a series of phases, the first horizontal, and the later vertical.

1.3.1. THE TRANSITION FORM : THE CORE SPATIAL PHASE TO THE CORE PERIPHERY SPATIAL PHASE

The most pronounced effect of the force of capitalistic profit was the spatial expansion of São Paulo's urban footprint out of traditional core areas of the city. The first spatial phase, the core

spatial phase of the city of São Paulo was characterized by the concentration of a full range of socio-economic classes, along with industry, and financial areas, in the original centre of the city (see Figure 1.7 & 1.8)[89] reflected the conditions of the coffee period. This was the prevalent spatial condition for most of São Paulo's post-colonial existence and up to World War II.[90] Socio-economic heterogeneity and high-density population levels at the city core characterized the core spatial phase. The concentration of urban elements was held tight against the historical core of the city because of São Paulo's dependence on the limited range of travel by the trolley system of the early twentieth century.[91] Because of both the relative cheaper lodgings and relatively short distances covered by the urban trolley system, the workers in the manufacturing sector near the centre of the city would gravitate to housing near the core areas to minimize both the cost in time and wages in travel. Most of the workers, during this spatial phase lived in crowded tenement housing near low-lying areas between the Tamanduatei and Tieté Rivers. Meanwhile the wealthy lived on higher areas overlooking the poor areas of the city. The historical core spatial phase of traditional São Paulo was generally characterized by a compact city core where a range of socio-economic classes, ethnic communities, and the growing manufacturing, financial and residential sectors of the city where held tight by the rail trolley transportation system around the old city centre.

With the eventual provision of buses to the periphery of the city combined with the ability of working residents to buy and build on available land their own homes on the city's periphery, the masses flooding the city of São Paulo could then be housed under better economic terms for the economic developers of the country.[92] The feasibility of this situation was only hampered where there was no more easily accessible land available, or the lack of services and travel distances were too extreme to be viable. This transition from the core spatial phase to the centre periphery spatial phase resulted in a drastic reduction in urban density of São Paulo. During the expansion of the city into its periphery, the population density dropped from 110 inhabitants per hectare in 1914 to 53 in 1963, all while the city was still growing.[93] This 'de-densification' of the population attests to the radical transformation of the city's urban ecology created by Brazil's automotive driven economic modernization.

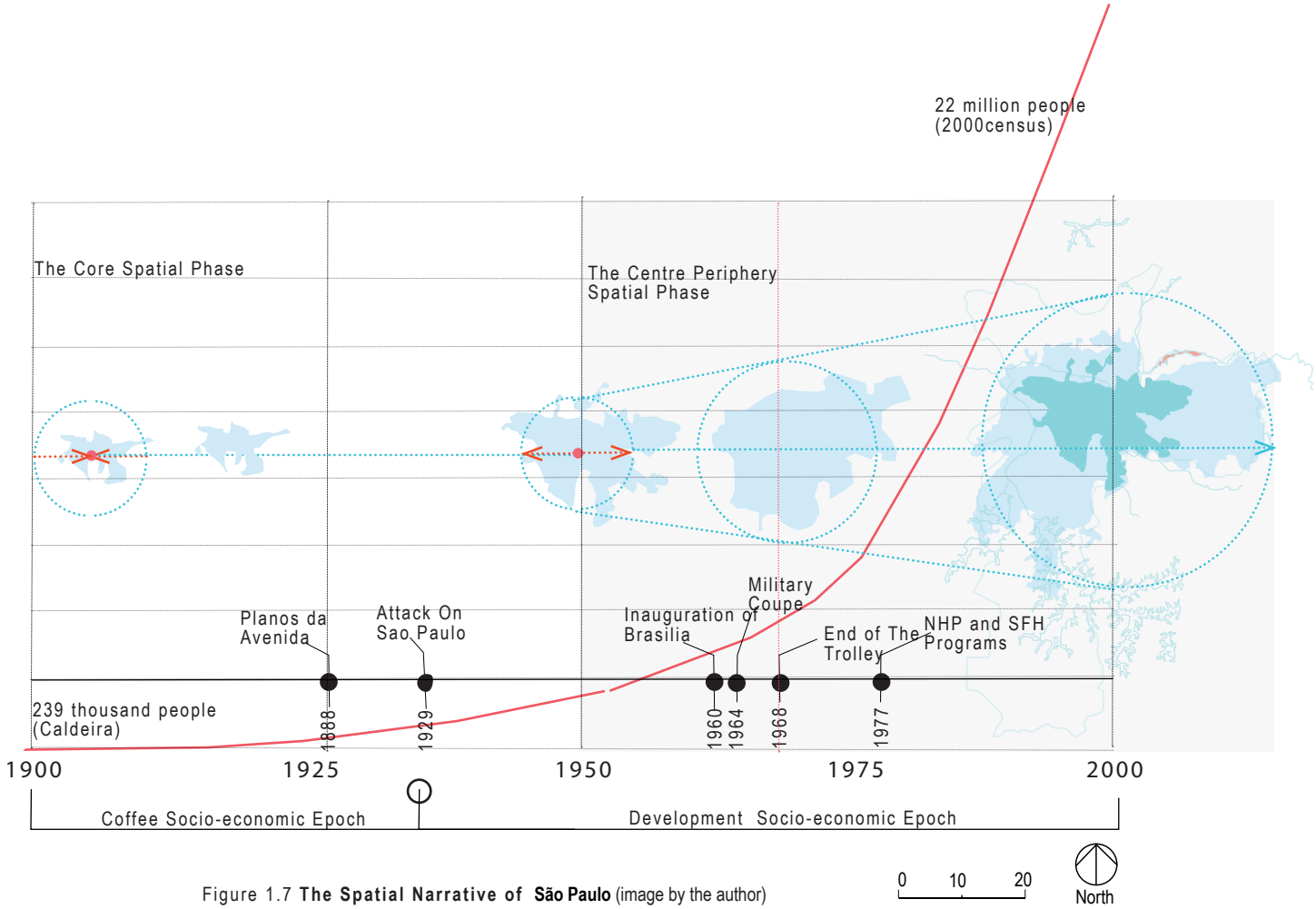


Figure 1.7 **The Spatial Narrative of São Paulo** (image by the author)

This illustration shows the general spatial evolution of São Paulo's territory from the core spatial phase to the centre periphery phase. It relates the increase in population of the city with the spatial evolution, major events in the city, and highlights especially significant events in the history of the city.

As in North America, the beginning of the transition from the *core spatial phase* to the *core-periphery spatial phase* was given impetus when private bus companies schemed to replace the public trolley system.[94] The replacement of the trolley system was the catalyst for a cycle of unbounded urban land speculation on São Paulo's periphery that resulted in an outward urban expansion. Private bus companies had started since 1924 to compete directly with the trolley system. Busses needed less infrastructure and were more flexible in their routing so they could reach the unpaved neighbourhoods that were spring up in the periphery of the city.[95] Since the original owners of these private bus companies were also the owners of available land on the outskirts of the city, they arranged through political connections to break the municipal

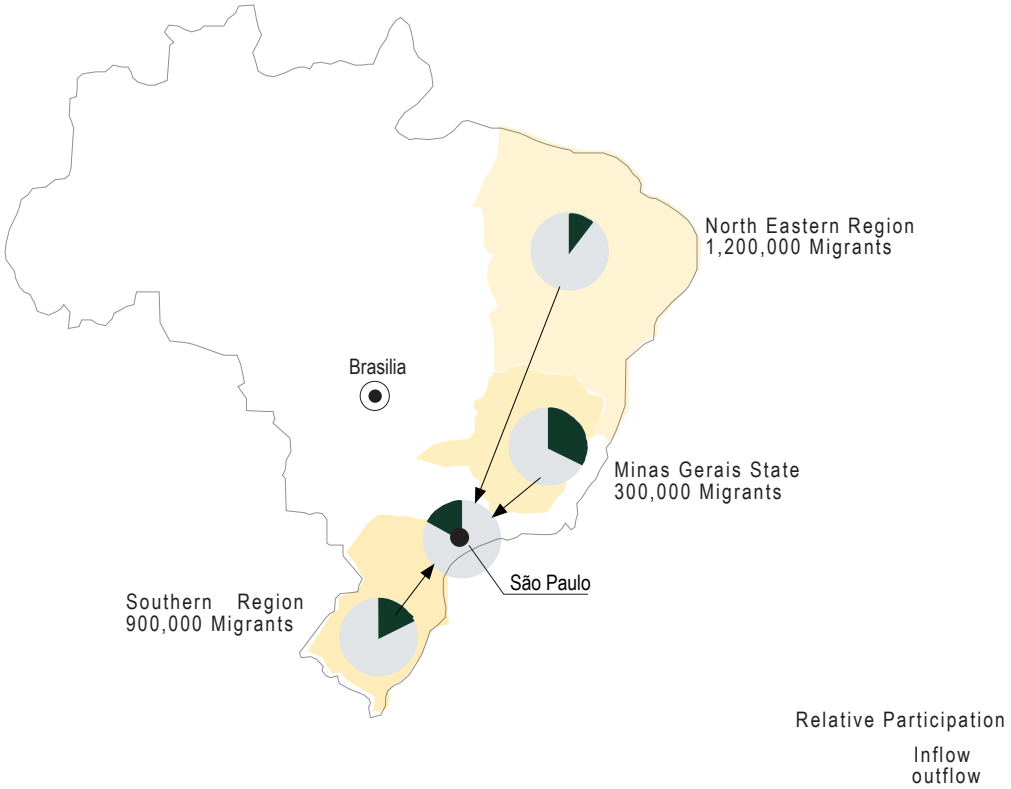


Figure 1.8 **Migratory Flows In Brazil 1970-1980** (image by the author)

The map illustrates the general migrations of population from other regions of the country into **São Paulo**

monopoly of the public trolley system and fill the need for transportation by their own private bus companies.[96] These developers would not only generate profits from their control over transportation but also from the leverage it gave them over the growing demand for land. The core periphery expansion was thus based not on the most 'efficient' use of urban land but on the most profitable pattern of land development for the private real-estate developers. It was expansion based, speculative at heart, and directed by uncontrolled and unplanned greed. São Paulo's development pattern followed a basic formula. The strategy was to leave one set of lots underdeveloped in order to drive up their value as the surrounding lots were developed.[97] Since this growth was taking place beyond the legal jurisdiction of the municipality of the

city of São Paulo, the regulatory agencies charged with construction and housing standards, could not impose legal restrictions on construction.[98] Laws and regulations only applied to the limits of the São Paulo's jurisdiction and not the periphery lands. The major expansions of the jurisdictional responsibility by public powers by São Paulo only happened later in the years 1936,1950,1962 and 1968, and after the cycles of land development. São Paulo's building code and other regulatory controls over construction were gradually extended to include the peripheral areas.[99] Although controls did not guarantee any minimum construction or health and safety standard or consequently any social equipment, such as libraries, health clinics, and police stations, residents could at least buy land and slowly build their home, over many years, in a process called 'auto-construction'.[100] Without the rapid expansion, however, São Paulo workers would have to contend with the deplorable conditions and rising real-estate values of the urban centre in crowed and dangerous 'cortiços' (tenement housing) in the downtown areas. With the reconfiguration of the downtown area under "the plano da avenidas" by Mayor Francisco Prestes Maia administration, land values continued to go up.[101]

Superficially, the notion of taking economic advantage of the increasing population by directing urban growth of the city to the periphery does seem morally questionable today. During the expansion, however, by facilitating home ownership, the real estate development of the periphery of São Paulo also corresponded with the growing social concerns of the São Paulo's elite and wider social and public health interests of both the industrialist and the government agencies involved in the national development plans of the country.[102] Because of the close proximity between the wealthy and the growing numbers of working poor during the core-periphery spatial phase, living conditions, such as hygiene and high crime rate, became reasons for the elites to push for social reform. Subsequently, the wealthy put much pressure in the city administrators in order to find a solution to the ailments found in the poor areas of the city. Therefore, there was no significant resistance from any sectors of local elites to the idea of developing the periphery of São Paulo both because of their vested economic and traditional social-class interests in land speculation and transportation, and also in the improvement of public health and sanitation.

With 'auto-construction', the opportunity to transfer the responsibility for housing the masses of workers from the companies onto the workers themselves would prove a great savings of financial resources for companies setting up manufacturing plants in the São Paulo.[103] In addition, private ownership of housing for workers in São Paulo seemed politically quite desirable, because by making it possible for workers to provide housing for themselves there would be one less demand by growing labour unions on the government and on the industrialists.[104] The provision of housing to a growing manufacturing labour force was thought to alleviate the political tensions usually associated with an industrializing society.[105] Brazilian society saw private ownership of housing in addition to the creation of an automotive society as a necessary social precondition for smooth and peaceful industrialization and as a necessary factor in creating a consumer society.[106]

The transition from the core spatial phase to the core-periphery spatial phase deeply affected the current urban geography of São Paulo. The combination of the aggressive real estate speculation brought about by the rising population of labourers, the new transportation system, and the need for as smooth a process of capital accumulation as possible generated the horizontal expansiveness of the urban fabric that is one of the characteristics of contemporary São Paulo. The expansion of the urban footprint, however, resulted in a sharp socio-economic separation between the wealthy, core area, inhabitants and the poorer workers living in the periphery.[107] The transition also highlighted the importance of the relationship between transportation and the transformation of the socio-economic geography of São Paulo discussed later in this thesis.

1.3.2. THE 'VERTIFICATION' OF SÃO PAULO

The expansion outwards from the centre of the city was quickly followed by an extrusion upwards of the city, one that was propelled by the same unrestrained pursuit of speculative land profit (see figure 1.9 for the extent of the current urban footprint). The resulting overwhelming density of buildings in São Paulo is the most striking characteristic of today's city. The beginning of the trend to build up began earlier, in the first decade of the 20th century, with

high-rise development. Until the 1950s, however, living in apartments was stigmatized for their association with cortiços or tenement housing.[108] Living in apartments was seen as a failure by the members of a growing middle-class to buy the traditional detached house in or close to the centre of the city. [109]

By 1957 the indisposition to live in apartments began to change as they started to be a very good option for the growing middle-class in the city given the lack of supply of low rise houses for the expanding population desiring to live in the city centre.[110] From that date on, not only would the city expand horizontally for the working population, but vertical growth would also be continuously extruded upwards for the growing middle classes. A combination of regulatory laws and financial mechanisms encouraged, because of the vested real estate interests in the city, the creation of large land development companies to the detriment to the existing traditional small family construction companies. In addition, these large development companies, which emerged from the same development groups who exploited the periphery land, found it more profitable to design their apartment buildings to cater to the middle-class rather than to provide affordable housing for the working-class which were still expanding on the periphery. Apartments because of the greater floor area over many stories could generate more profit for a given valuable piece of land.

Ironically, the profit that these companies earned in the vertical development was also an effect of the exploitation of the federal subsidized real-estate development program dedicated to providing housing for the working-class. Through the National Bank of Habitation (BNH), developers managed to acquire very low interest rates to finance their projects.[111] At the same time as the builders were getting low interest financing, the middle-class was also getting their own low interest rate loans to buy the apartments built by these large real-estate companies. The middle-class took advantage of the Financial System of Habitation (SFH), which provided financing intended for the poor to finance the purchase of apartments.[112] The reality was that the working poor very rarely met the financial requirements of the program.

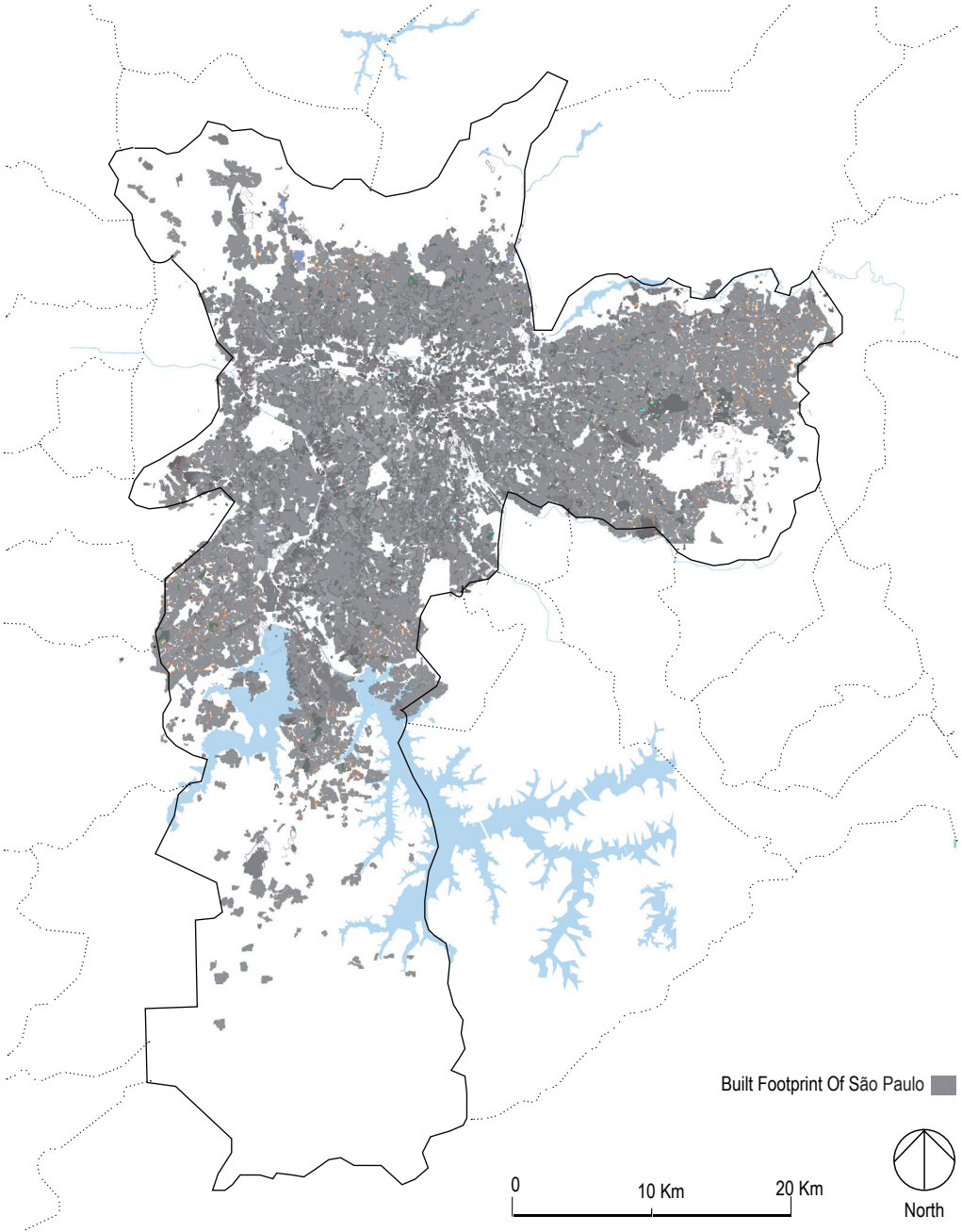


Figure 1.9 **The Built Footprint Of São Paulo Proper** (image by the author Source: www.prefeitura.sp.gov.br)

The map shows the extent of the built footprint of São Paulo proper excluding the surrounding region which are not show due to the absence of equivalent information.

In addition to the financial incentives for those involved in development and the accessibility of low interest loans, urban regulations meant to control the urban growth of the city further encouraged the extrusion of the city. The regulations allowed for buildings to be built to a maximum amount of floor area based on a factor of the total area of the lot. The Municipality did not set height restrictions directly. The combination of the regulatory structure of the legal control over real-estate development, the ease of accessing finance for construction, and the increasing valuation of real-estate in the centre of the city all contributed to promoting the general trend of urban expansion in the periphery and vertification.

The continuing outward and then upward expansion of São Paulo has resulted in an increasingly homogeneous urban condition. High-rise apartment buildings are the predominant building type to dominate São Paulo's expanding central cityscape. These edifices are replacing the traditional self-constructed houses on the former periphery as it is swallowed up by new high-rise developments of the expanding centre. Today on the outskirts of the city the high-rise apartment building share the edges of the city with the informal settlements, known as favelas that have formed beyond the urban area over the years. This homogenization of the urban fabric is a mature evolved form, and despite São Paulo's more unique verticality, is not expected to be just a characteristic of São Paulo, but is will also be increasingly characteristic of the global mega-cities. The more evolved urban form of São Paulo is similar to that found, in a less mature form in the other cities of the developing world. It is an urban form that still continues to be shaped and generated by the promises of global Modernity combined with a raw and an insatiable hunger for the personal wealth that has propelled the horizontal and vertical expansion of the city. Beyond the endemic morphology of São Paulo's urban fabric and its socio-economic and environmental condition, the very nature of the relationship between the society it serves and the wider natural ecology speaks of a more essential condition of the city. It is a relationship that threatens directly the sustainability of the proposition of São Paulo as a place to live.

Figure 2.1Typical São Paulo Cityscape(Source: Shaffee)

In the previous chapter the discussion focused on identifying the cultural values championed by the Modernizing project undertaken by Brazil, during most of the last century, as the propellant force organizing and generating the city of São Paulo. This chapter extends the discussion by answering the second fundamental question to describe São Paulo as an ecological phenomenon: What is the resulting nature of the relationship between the host ecology-the biosphere- with the human society and the physical city? This chapter sets the stage for the next chapter in the thesis, which will present the general direction that should form an appropriate response by the picture created over these last two chapters.

This chapter begins by arguing that there is precedence and a shared underlying pattern in the ecological collapse of past civilizations with the state of the current society's parasitic relationship with the natural world. The chapter develops the notion that the underlying nature of Modern São Paulo is a result of the continuation of the historical pattern of omission by human civilization of the ecological limits to human ambition. The chapter then turns, to both express and explain the different aspects that make the city's parasitic relationship with the biosphere. Not only does this chapter assert that it is the economic systems generating São Paulo's parasitic relationship with the biosphere, but the actual urban fabric also contributes to this condition. Finally, the chapter concludes with a question that must be dealt with in the next chapter.

2.1. HISTORICAL PRECEDENCE FOR ECOLOGICAL COLLAPSE

There have been many theories on the mysterious disappearance of the Anasazi civilization of the American South West. For over 200 years between 900 and 1120 AD the Anasazi were a vibrant and sophisticated civilization that thrived in the harsh conditions of the Chaco Valley.[1] The urban settlements were found in the intersection of the present States of New Mexico, Colorado, Utah, and Arizona. Within a short span of time, around the 12th century, this accomplished civilization disappeared.[2] The Anasazi are known today to archeologists for building great settlements in caves and extensive terraced plantation complexes with sophisticated irrigation systems for growing a variety of crops such as corn, beans, and squash to sustain their society.[3] Unfortunately there are only traces of this civilization throughout the existing Chaco Valley.[4]

Research indicates that the emergence of the Anasazi civilization was a result of a confluence of many underlying trends. First, there was an ecological evolution of the area of the Chaco valley into dry climate forests and rivers ecology before the genesis of the Anasazi civilization. (Anasazi camps have been dated as early as 1200 B.C.) . From that date on, the Anasazi developed, over centuries, a reliable farming system organized by the increasingly sophisticated political and socio-economic structure of the population. With these factors in place, the Anasazi were in a position to figure prominently in the rich collection of pre-Columbian Native American civilizations. Equally true, however, is that they eventually disappeared when the erosion of the original ecological underpinnings of the civilization began to compromise the overall viability of the Anasazi society.[5] Experts agree that one of the most influential factors in the collapse of this society was the deterioration of the regional ecosystem, especially brought on by Anassazi deforestation of the dry climate forests that had supported the initial growth of their culture.[6]

This ultimate dependence of any civilization on natural resources for food, energy and products has not changed. Human society's most essential underlying reality is its total reliance on natural systems for its survival and prosperity. The collapse of the Anasazi civilizations seems

to be today attributed in part to a lack of conscious thinking by that society about the long-term limits of the sustainability of their society. [7] For whatever the reason, there was no institutional system in place for that could convey to the Anasazi the seriousness of the ecological deterioration and collapse of their constructed reality until it actually began to happen around them. There appeared to be no concept of any type indicating to them that the ultimate viability of their civilization rested on the state of their relationship with the larger host ecosystems. Our contemporary society, very much inclusive of Brazil and São Paulo, also displays the same tendency as the Anasazi of not recognizing our ecological predicament before it is too late to save our civilization.

Historian and novelist Ronald Wright (2004) writing in "A Short History of Progress" argues that, seen in terms of geological time, the modern ecological predicament is as old as civilization, and comprises a novel evolutionary situation, one which Wright characterizes as a recent ten thousand year experiment, the latest step in the relatively brief five million year old evolution from primates to present day humans. Wright argues that the main difference between our primate descendents and us is that "we have been shaped less and less by nature, and more and more by culture"[8] and that "we have become experimental creatures of our making".[9] Furthermore, there are overarching historical patterns underlying the agricultural civilizations of Mesopotamia, Egypt, India, China Mexico, and Peru, which indicate something important, namely "…that given certain broad conditions, human societies everywhere will move towards greater size, complexity and environmental demands."[10] That recent tendency in the last ten millennia is the growing dependence of our ever-larger civilizations and their cities on an expanding process of annexing of wilderness into new arable land itself a productive network needed in order to satisfy the growing population. Past civilizational limits have been set free by increasing food supplies and more effective resource exploitation. Another way to look at this process is that there is a perpetual need for a continuous extension of local ecological limits further and further from the immediate possibilities of the local region, and that this expansion of control and exploitation is a phenomenon characteristic throughout the history of civilization, and consequently of the city at the heart of that civilization.[11] This process, Wright

asserts, is as applicable today as it has been throughout history. Moreover, because the scale of today's global societies is much larger than in the past, the scale and the range of impacts, and collapse, will correspond to the increased size.

Wright's most precisely defined example of this pattern of development and collapse of a civilization besides that of the Anassazi is the Easter Island civilization known as the Rapanui.[12] This Polynesian civilization built impressive stone images still standing today to honour their ancestors. After their arrival in Easter Island they developed an increasingly sophisticated society based on a rich bounty of fish, seals, porpoises, turtles, and nesting birds.[13] For Wright, this Polynesian civilization lived on an island that was small enough for its members to be able to survey the whole of what they probably conceived as their world at a glance.[14] A powerful lesson for today regarding this "glance"is that the Rapanui people could easily see and predict the result(s) of felling the last few trees on their island to satisfy their need for erecting stone statues of their ancestors, but they went ahead and felled the tree anyway.

2.1.1. THE LACK OF CORRESPONDENCE BETWEEN THE ASSUMPTIONS UNDERLYING HUMAN ECONOMY AMD THE ECOLOGICAL REALITY

Our current global civilization is far more sophisticated than the Anasazi or the Rapanui civilizations. There is, however, no guarantee that the same fate will not repeat itself for contemporary civilization. Increased demands on the natural world, this time at the scale of the global biosphere, will result in the same sort of ecosystem deterioration and consequent resource scarcity, which Wright (2004) suggests, will lead inevitably to social disintegration, strife and at worst, collapse.[15] The difference between contemporary society and ancient societies is the extent of interconnection and dependence of contemporary society on the global network of trade and ultimately on that networks ability to employ an increasing amount of the biosphere to serve human global civilization. Unlike the ancient world, the current socio-economic system uses and processes natural resources at a global scale. Therefore, experts fear possible ecological collapse will be global in scale rather than isolated to a region as in the

earlier examples. Archaeologist Joseph Tainter (1990) asserts that the "collapse, if and when it comes again, will this time be global…world civilization will disintegrate as a whole".[16]
The reasons why current global society is not immune to an ecological collapse described by Tainter, are that the human economic system is driven and organized by the complex interplay between abstract human values and principles. Unlike natural ecological systems, which react quickly and directly with unforgiving reality to changes in underlying conditions, cultural values and principles are human constructs. They inherently contain assumptions and conceptual models of the realities of human society. Some of these conceptual models are, unfortunately for our fate, incomplete, completely wrong, or constructed from motivations other than the need to understand accurately a particular subject, in this case, the accurate condition of the relationship of humanity in the natural world (see Figure 2.2).

One such faulty conceptual model is that of the Truman style development discussed in Chapter I, a model to which, as we have seen, the development of São Paulo has continuously adhered. At its core, the Truman development model and its predecessor operates under an obviously problematic and false assumption that the natural biosphere has an infinite capacity; it's an assumption unfortunately shared with the Anasazi and Rapanui .[17] Underpinning the socio-economic system are the beliefs that the biosphere can provide unlimited raw resources to support human society, and, at the same time, act as a sink for the waste produced by global production and consumption processes. [18] These assumptions and beliefs are coupled with the further belief that the human economy can expand infinitely, increasing the amount of material goods produced, and consequently increasing their consumption.[19] Much of this logic, after half century of experience after Truman, is now accepted as false and potentially fatal for the long-run human ecological sustainability of a mega-city like São Paulo and global civilization. This is a situation that Wright likens to creating, "a suicide machine".[20]

A new view of the relationship between the global biosphere and globall civilization is emerging. The global biosphere processes the sun's energy into useful resources for all of the different agents in its natural system through the fundamental productive process, of photosynthesis.

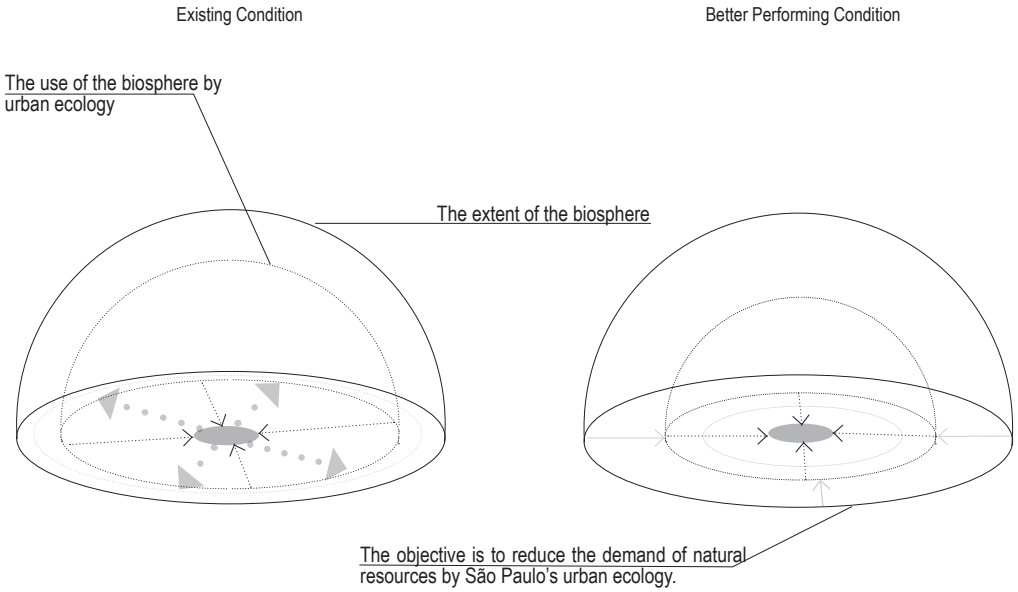


Figure 2.2 **The Relationship Between The Biosphere, Society, And The City** (image by the author)

The diagram shows the difference between the current and desired tendency of the condition of the relationship between the biosphere and human civilization.

According to economist William Rees ecosystems "do not grow indefinitely". [21] Unlike the way natural ecosystems allocate the earth's resources, however, human economies are not driven by the external source of the sun's free energy. Human economies, such as that described earlier for São Paulo, when successful, expand through resource conversion and positive feedback. This is in contrast with natural ecosystems, which are held in a "steady state" [22] or "dynamic equilibrium by limiting factors and negative feedbacks".[23] This conflict between the two types of system behaviours is relatively well understood today. Obsolete and plainly wrong assumptions at the root of modern development ideologies, especially those like the Truman model in its ignorance of ecological limits have historically shaped the present development paradigm. They have come to threaten the sustainability of the relationship between the urban ecology of developing cities like São Paulo and the biosphere it exploits and of which it is an

inextricably part.

Wright, seeking an explanation for the obsessive destruction of their environment by societies like the Anasazi and the natives of Rapanui, asserts that, " Marx was surely right when he called capitalism almost admiringly, a machine for demolishing limits".[24] Scientists have already presented frightening evidence of the consequences of the rapid and enormous expansion of the human global economy over the last two hundred years. Some scientists believe that global biosphere is already showing signs that nature will impose limits on our future regardless of humanities defiance in face of this reality. Problems like the changes in global temperature, the loss of habitat and species, the demise of Canada's east coast fisheries, the shrinking of coral reefs around the world, and the excess of damaging solar energy passing through ozone holes, just to mention a few, are linked to destructive human behaviour that is an intrinsic part of the need of modern economies to expand continually. Although there are continuing disagreements over when and how the ecosystems of the natural world will react to the exploitive abuse of the global biosphere, there is a consensus that the type of global society that São Paulo serves exists on weak epistemological footings[25]. In other words, São Paulo and its rapid expansion seems to have been generated by a tacit assumption underlying all of present global society that the limited provisions of the biosphere can satisfy the unlimited ambitions of human civilization.

2.2. PARASITIC SÃO PAULO

The extremely extended urban fabric of São Paulo, as well as the scope of its urban economy, embodies an ethos that has in principle plagued human society throughout the course of human civilization. According to Brazilian historian, Boris Fausto, "the word ecology almost never entered into the dictionary (of the developers of the Brazil) and industrial and automotive pollution looked as like a blessing".[26] Wright (2004) characterizes this ethos as "… a kind of progress that becomes a mania, an "ideological pathology".[27] The crucial question for the future of global human society and consequently of São Paulo is posed by the archaeologists Paul Bahn and John Fenley (1992) when speaking of the end of the society of Rapanui, namely " Is

the human personality always the same as that of the person who felled the last tree?" [28]

São Paulo is an enthusiastically complicit participant, even a nexus point, in an interconnected global network of trade in natural and human resources for global production and consumption. While still pursuing the Truman vision, most countries in the southern hemisphere of the globe, like Brazil, still pay with their resources and ecological degradation for the 'ecological deficit' incurred largely by the countries in the northern hemisphere.[29]

With a surface outlook, it appears that the worldwide network of resource exchange and consumption has conquered the ecological limitations of São Paulo's bioregion by satisfying the ever-increasing demands of the city's population through a wider regional and global trade network. However, since Brazil is an intimate part of this global network, and is not merely a separate isolated consumer of the global biosphere, the ecological balance of the use of resources cannot be accounted for within regional or national constraints but should be understood as a global total that includes São Paulo as a contributor. [30] There is no real correspondence here with the actual limits of the city's biosphere leading to a false, and possibly fatal, understanding of the possibilities of infinite economic growth inherent in Brazil's development doctrine.

The predominant characteristic of the city's ecological condition today is parasitic. With São Paulo's industrialization, there was an enormous expansion in the city's ecological footprint caused by the growth of per-capita consumption of natural resources coupled with an overall explosion of the city's population. Although there are no available studies to compare the increase in the use of natural resources in Brazil over time, the pattern of deforestation of some major biomes, such as the Atlantic coastal rain forest, in the country overall and the well-documented micro-climatic degeneration of São Paulo over the last century serve as powerful indicator of the exploitative extraction of resources throughout the expansion and evolution of São Paulo (see Figure 2.3). The sequential maps in Figure 2.3 show the linked expansion of the city and its economy in relation to the severe deforestation of its hinterland

The assessment of the city's current urban ecological condition points to two findings. First, ecological footprint and analysis, (developed by William Rees and Michael Wackernagel), asserts that São Paulo demands more of the biosphere than not only its immediate urban region but also the much larger State of São Paulo itself can possibly provide (see Figure 2.3). Second, the ecological footprint of São Paulo also suggests that the demand for the biosphere's resources by the resident population is not evenly distributed. This uneven use of resource by São Paulo's population is one of the results of the particular urban historical evolution of Brazilian society outlined earlier in Chapter 1. While, the size of Brazilian middle and upper classes are numerically small relative to the overall population, their per-capita ecological footprints, are comparable to North American levels and incorporate global inputs that reflect the different, wealthier, consumption patterns (see Figure 2.4 and table 2.1).[31] Contrary to what might be intuitively expected, however, because of their much larger numbers, the lower socio-economic classes are still the overall predominant contributors to the demands made on the local biospheres. Despite the low individual demand by the working poor of São Paulo, the large proportional size, 44% of the whole population, give the group a large aggregate impact nonetheless one that can only grow given the dream of increasing material wealth.

The fear of the collapse of global civilization outlined by Wright and others is not just based on the type of economy that supports São Paulo in particular, but by the nature of any mega-city's physical presence in general in its surrounding ecosystems and the slow but very steady erosion of the natural world in favour of the urban area. The difference between the natural and human-made morphology of São Paulo is shown in Figure 2.6, which contrasts São Paulo's urban fabric with the surrounding areas of natural green land and the water reservoirs south of the downtown core of São Paulo at Guarapiranga and the Billings Reservoirs. The clear contrast between the natural ecology and the human-made ecology is revealed. The two natural ecological areas of forest and reservoir lake-land, unlike São Paulo's current urban fabric, demonstrate the superior capability of the natural ecological fabric to process solar energy for the use of living systems. Seen in connection with the wider demands on the biosphere, caused by the increasing growth of the ecological footprint of São Paulo, the erosive loss of this 'biomass footprint'

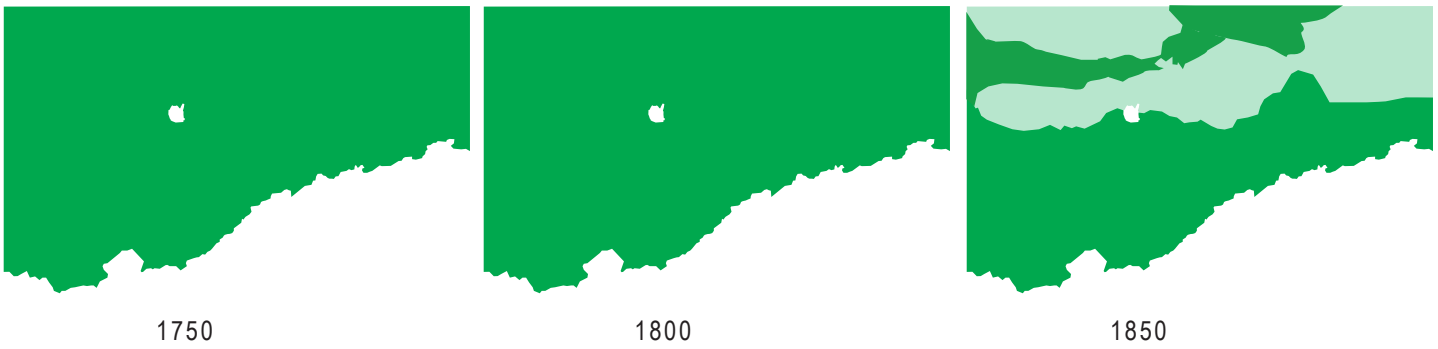
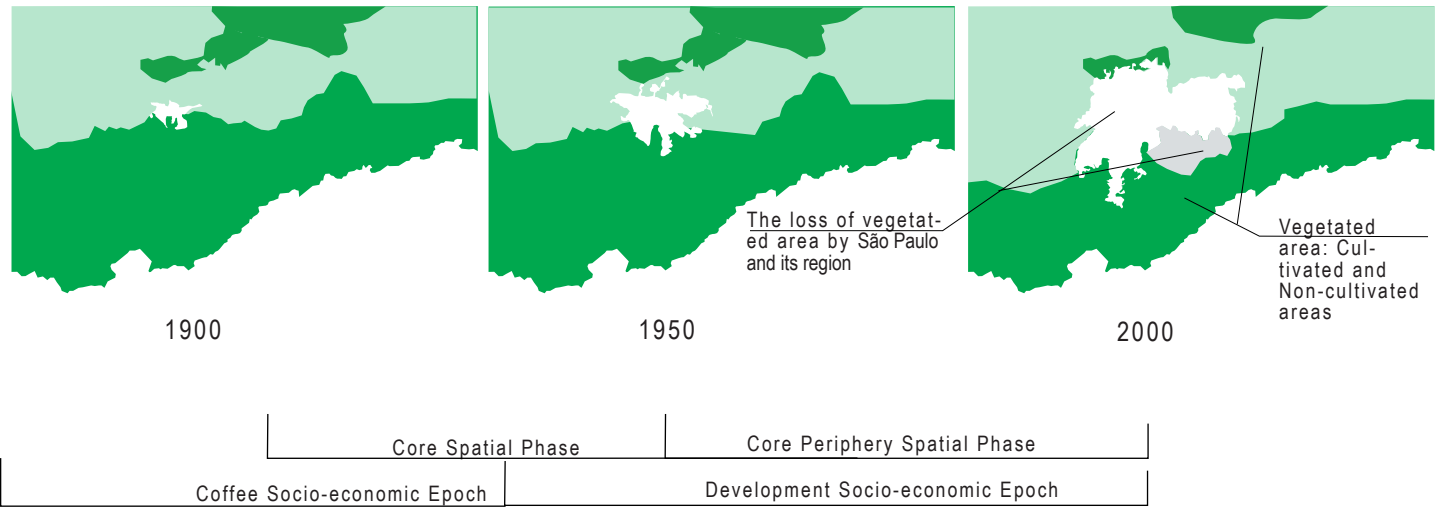


Figure2.3 **The Narrative Of The Deforestation Of The Region Of São Paulo** (image by the author)

The series of maps shows the deforestation of the current area of the city since the middle of the 18th century as the city's urban footprint grows. This narrative also references both the main spatial phase described by figure 2.8 and the socio-economic evolution of the country explained in Chapter II.

further impoverishes the urban biosphere's potential to provide natural resources for economic consumption and, more significantly for the city's future, diminishes its ability to dispose of the wastes produced by human society. In other words, São Paulo's expanding urban ecological footprint, a result of historical and contemporary development paradigms, clearly adds no natural wealth but instead continually subtracts from the biosphere's reservoirs of natural wealth. The result is that the physical growth of the city is increasing the quantitative size of the 'ecosystemic' net loss of the region's biological potential and subsequently, by extrapolation, that of the global biosphere.

Through its historical development and into today, the Modernist morphology for the urban fabric of São Paulo has not functioned in the same way as the morphology of the natural biosphere, which it has almost supplanted. Unlike the natural morphology of the physical environment, the design purpose of the form of buildings is primarily to house human occupation and activities. In current urban ecosystems, buildings are developed and designed to house people and operate as instruments primary for rental income or by increasing valuation through ownership in a speculative real-estate market. This is in contrast with the vital property of a typical morphology of a natural ecosystem, which converts solar energy into the actual living



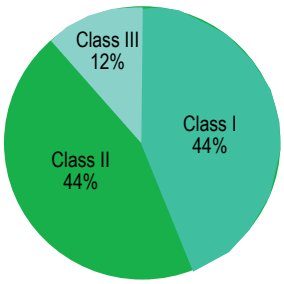
form of the overall ecosystem. São Paulo's urban fabric is obviously less viable in the long term because component elements, such as architecture, in the urban ecology do not process energy like natural components, such as trees and other plant life, which are symbiotically tied to a larger seamless global ecology with the daily solar energy input. Most of the energy of urban areas, is both reflected from the urban ambient or is absorbed during the day and then slowly released back into the urban ambient at night. The morphology of the urban fabric of São Paulo wastes the energy of the sun that falls on it, a waste of a free resource that, by contrast, was well utilized by the natural biosphere it has replaced (see Figures 2.6 & 2.7).

2.3. MODERNISM IS NOT ENOUGH

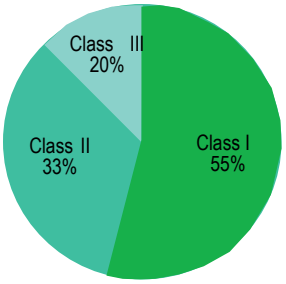
By abstracting society into simplified models in its theory and practices, the Modern Western development ethos has also abstracted and consequently homogenized the conception of architectural and urban space throughout the world as the world's economy has itself also globalized. One urban place relative to another is often valued based on its location in relation to exploitable resources and in a subsquent real-estate market rather than in other possible non-economic valuation frameworks. For today's urban fabrics, the choice of one site over another

	Average Monthly wages	Ecological Footprint per Class	Total Ecological Footprint per class	Total Ecological Footprint per class
Socio-economic Class Structure I (9,700,000 people)	Cnd $109.8	2.8 Hectares per person	27,160,000 Hectares	271,600 sqm
Socio-economic Class Structure II (9,800,000 people)	Cnd $1098.80	3.11 Hectares per person	30,478,000 Hectares	304,786 sqm
Socio-economic Class Structure III (550,000 people)	Cnd $10,988.00	10 Hectares per person	5,550,000 Hectares	55,500 sqm
			Total Ecological Footprint	631,886 sqm

Table 2.1 **The Ecological And Wage Profile Of The Major Constituent Socio-Economic Classes Of São Paul**o (*Source:* Economic Commission For Latin America And Caribbean)



The Populational Proportion Per Socio-economic Class



The Ecological Footprint Proportion Per Socio-economic Class

Figure 2.4 **The Ecological Footprint Profile Of The Population Of São Paulo** (images by the author)

The ecological footprint of the city of São Paulo (631,886 square kilometres) takes up more than 2.8 times the area of São Paulo State (240,209 square kilometres). In addition, the city requires 414 times more area in comparison with the area of the city(1,523 square kilometres) itself. The footprint would increase dramatically should São Paulo's population move significantly to a developing world's socio-economic status.

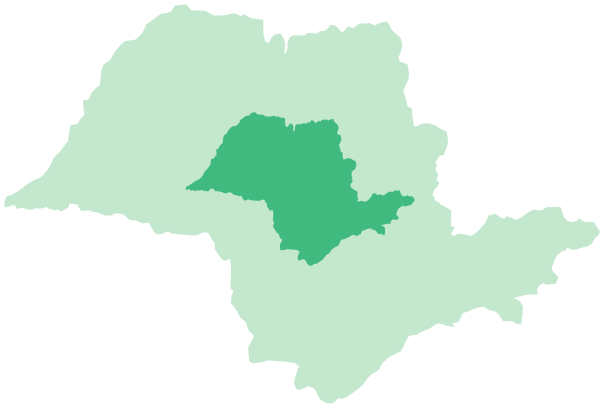


Figure 2.5 **The Comparison Of Footprint Areas** The image is a comparison between actual state territory with the total ecological area required to sustain the City of São Paulo.

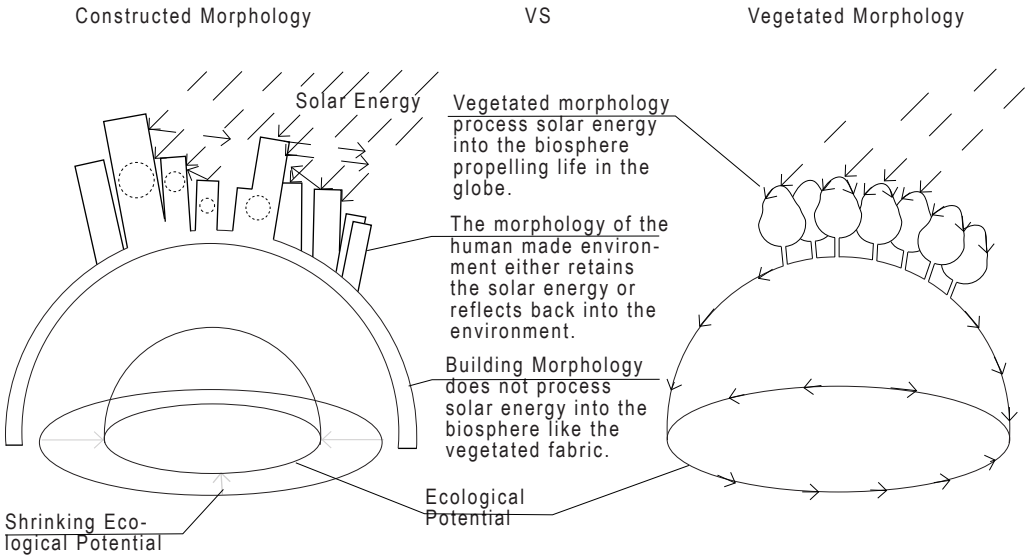


Figure 2.6 **Constructed vs Vegetated Morphology** (image by the author)

The two images describes the conceptual difference between the urban and vegetated fabric. Unlike the vegetated morphology, the urban morphology does not process solar energy as part of biospheric energy process that sustains and organizes living systems described by Figure i.iii.

for a building and the configuration of building projects themselves are ultimately motivated to extract the maximum amount of profit with the least amount of cost. Even where other 'softer' factors, like culture, are taken into account they are experientially modelled to provide attractive places for external investment in a visibly vibrant urban economy. Modernity in Brazil, carried through the development ethos, is a particular way of treating urban and architectural space that satisfies the economic prerogatives underlying Modernist Western ethos and lead to a kind of "the Taylorization[32] of architecture" and urban fabric.[33]

The second consequence in adopting Modernist, Western, design principles is that Modernist urban and architectural design abstracts, and then reifies, the purpose and meaning of space and form in the modern city.[34] The Modern Movement in Brazil, epitomized by the construction of Brasilia in the 1960s, reduced the significance of local and regional context, and the conception of architectural work as one of formal and spatial composition reflecting emphasized instead

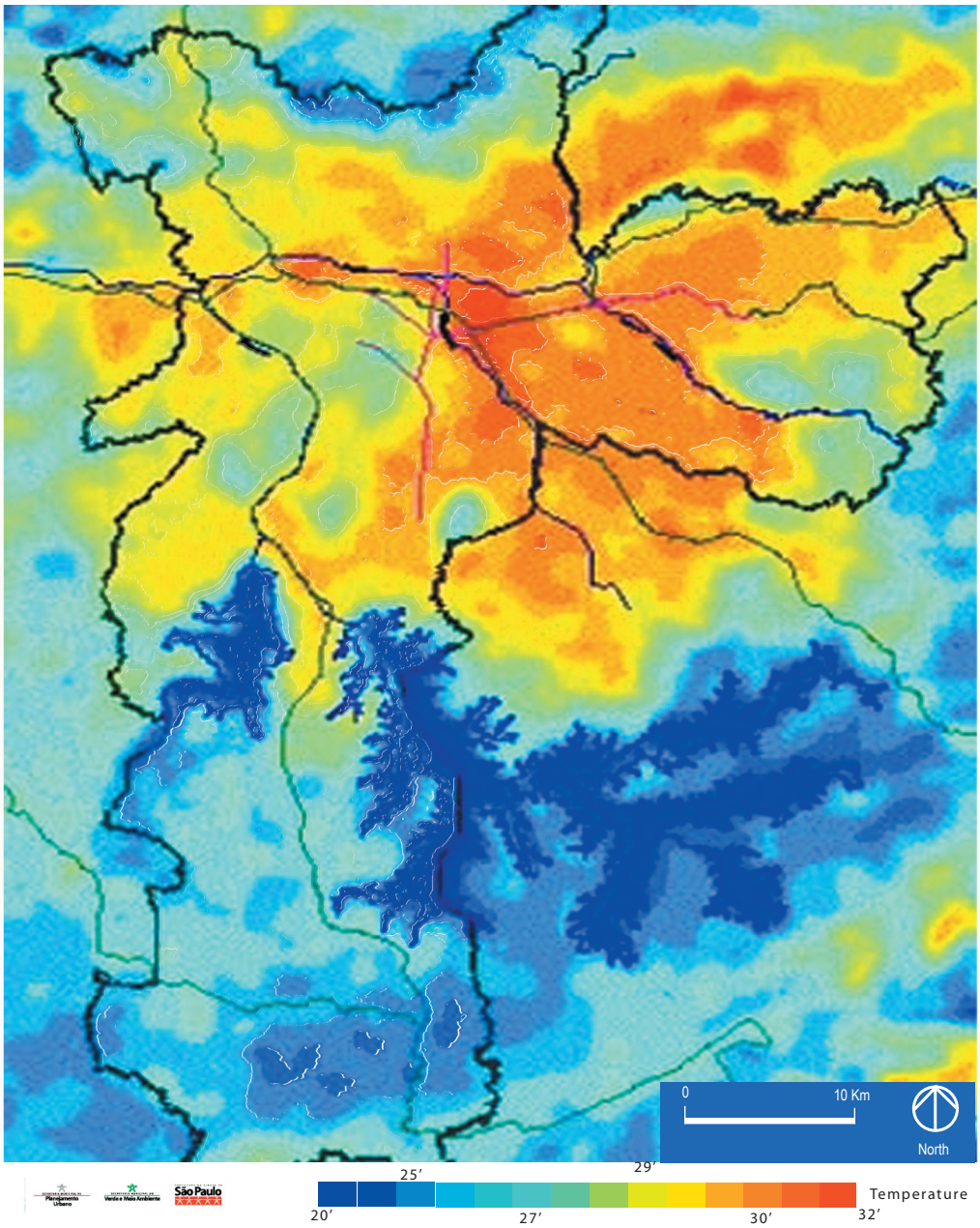


Figure 2.7 **Reflected Solar Energy** (*Source:* www.prefeitura.sp.gov.br)

The reflected solar energy satellite scan is used here to highlight both the surface temperature difference between the vegetated fabric surrounding the city (see Figure 1.1) with the human made fabric and the relative temperature throughout the range of urban density found in São Paulo.

ultimate underlying economic functions and valuations. This reified systemization was made possible by new rationalized efficient construction technologies, especially in reinforced concrete, and also by the centralized electrical and water services provided to citizens by various levels of government, which were also themselves rationalized and purged of traditional values in favour of technocratic efficiency.

As is illustrated in the mapped layers of urban qualities and statistics in Figures 2.8 to 2.14, São Paulo's socio-economic class structure is clearly manifested on the spatial configuration of the urban morphology of the city. The population earning higher incomes tends to live in the core areas in apartment blocks, while those in the lower income bracket live in self-constructed houses or in informal self-constructed "illegal" settlements such as 'favelas' or shantytowns both in the inner city and at the periphery (see Figures 3.15 through 3.17 on page 126 and 127). The 'metabolic system' of São Paulo's urban society (the socio-economic system), sustains the artificial urban ecology of the city, and the physical configuration or of the morphology of São Paulo's urban fabric. Both contribute to a clearly parasitic ecological condition. As noted earlier, this condition is largely caused by the continuing aspiration of Brazilian society for unstoppable economic development, and for the trappings of a Modernist society and for the ability to overlook the ecological costs of satisfying those ambitions. If the city as a whole is parasitic in relation to its natural ecosystems, then ironically, within its built fabric, those same structures of urban parasitism organize themselves similarly on smaller, more human scales as city districts, blocks, and buildings.

2.4. THE NECESSARY BUT INCOMPLETE RESPONSE

In light of the ruthless transformations that were made in achieving the creation of modern São Paulo, the response by political and social reformists to the social and environmental conditions created by industrialization of the city has been primarily remedial. Progressive movements in São Paulo have historically focused primarily on much needed political and social reform. Social and political critics attribute contemporary São Paulo's social condition to the failure of

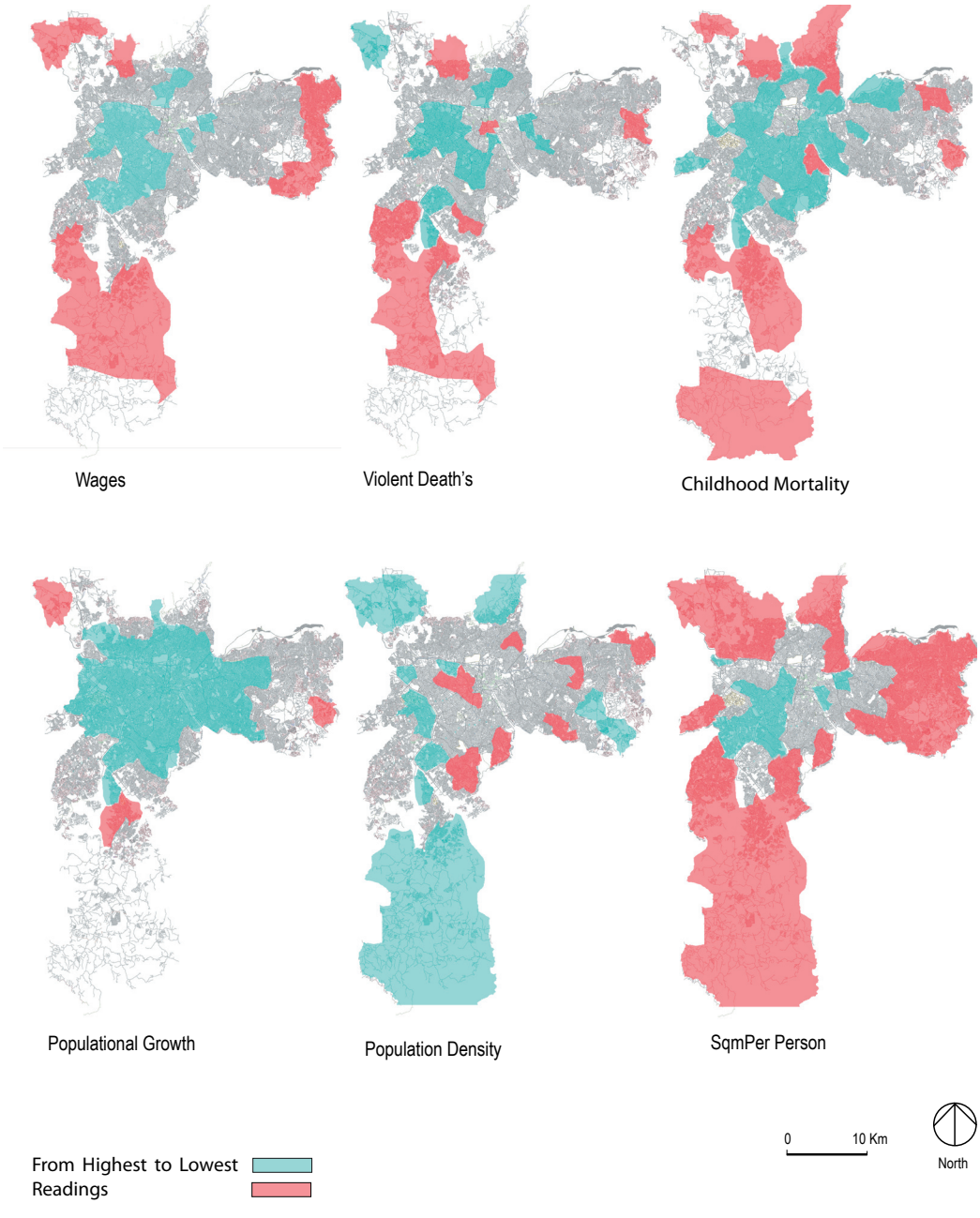


Figure 2.8,2.9,2.10, 2.11,2.12& 2.13 The Break down of the Social Conditions from worst to best readings of individual socio-economic indicators of the city. *Source:* (image by author *Source:*www.prefeitura.sp.gov.br)

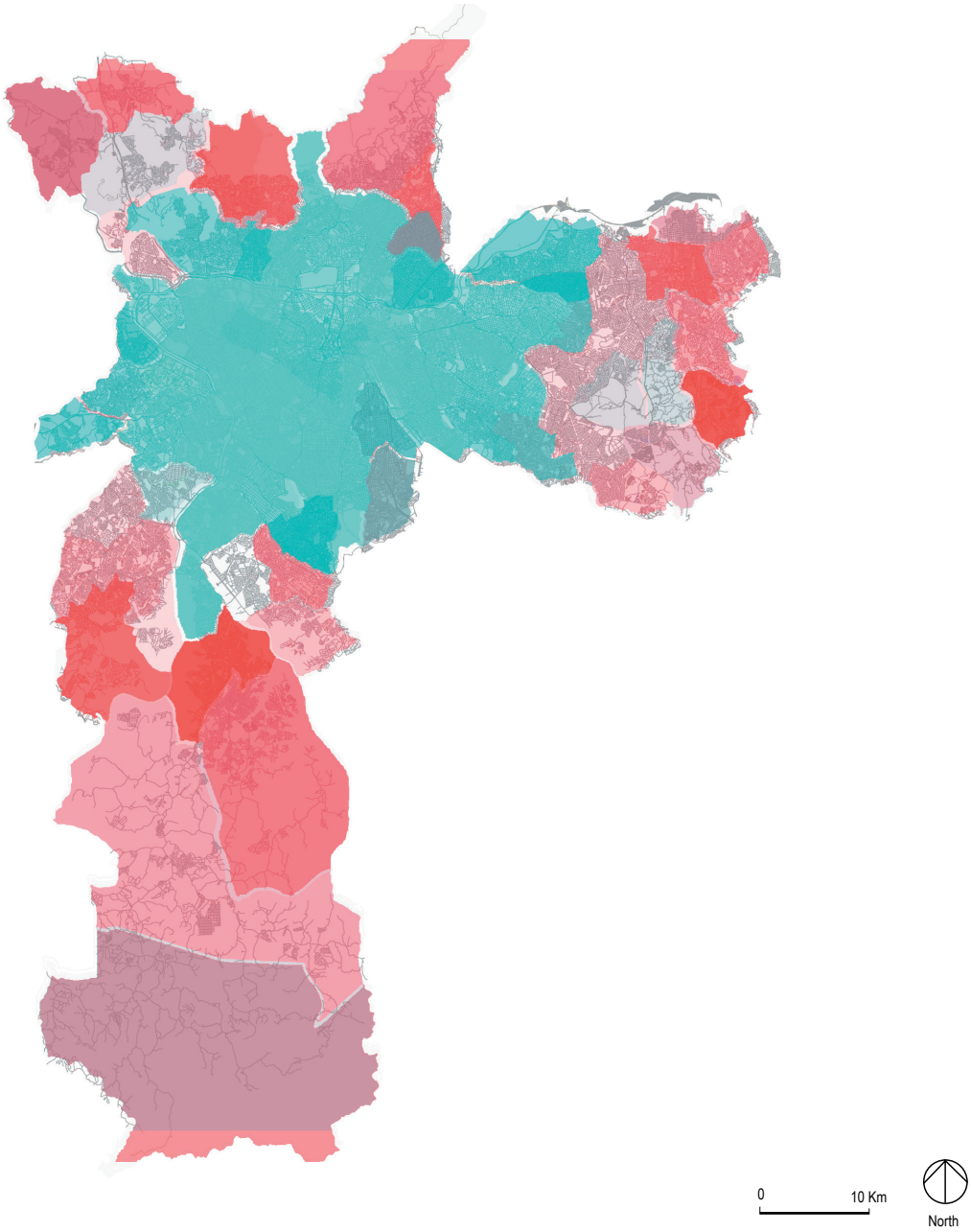


Figure 2.14 **Relative Social Condition Map** (Image by the author *Source:* www.prefeitura.sp.gov.br .Please refer to preceding page for constituent maps)

The map is a culmination of various social conditions listed in the preceding page to illustrate graphically the total socio-economic condition of the geography of São Paulo by sub-municipalities. The method used to create this map is to layer the worst and the best demographic readings and exclude the intermediate readings.

large parts of the population to profit from the aggressive and coercive track taken by Brazilian elites toward development. Instead the political and social minimums required for the economic and political viability of the city as a reforming counter reaction to the single-minded Modernism of development are emphasized.

The emphasis of urban reformers, especially during the reinstatement of democracy in1985 after twenty years of military administration, has been primarily in guaranteeing a viable economic, political and social environment. This narrow emphasis on political and social frameworks is problematic. Constant attempts to reclaim the two main rivers of the city, namely the Pinhieros and the Tiete Rivers, for example, from historical accumulation of industrial and domestic waste, and the attempts to control air pollution by ameliorating the local micro-climatic conditions of the city, demonstrate that environmental costs of development have not been totally overlooked. Reformists of the city, however, have only been able to minimize the damages caused by the economic and productive system being played out through the city on its natural ecosystem. In the final analysis, the environmental viability of the city is gauged solely for its ability to provide a tolerable environmental condition and the measures and efforts of the reformers have essentially not challenged that fatal assumption.

After the military dictatorship, reformers and cultural critics demanded the necessary social and political rights associated with the political promises of modernization. In the case of São Paulo, the desire underlying the reforms in the city was to correct the social-economic inequalities that had developed over the previous decades during the economic development of the country. The hope was to be able to complete the 'incomplete development' of Brazilian society.[35] In this sense, the belief of the reformers was that in order to complete the modernization of the country there was a need to create a democracy based on the minimum provisions of social services and amenities to match the political gains of Brazilian citizens.[36] It also should be a democratic system where there is an ecological accounting to guide the progress of the society. Although such reforms may not at all affect the parasitic relationship between the Brazilian society and the biosphere, only with the equal treatment entitled to all citizens of São Paulo could the city

become responsive to the needs and the rights of a modern democratic society.[37]

Political and other social and economic issues aside, however, the citizens of São Paulo still need a critical re-evaluation of the condition of the relationship between the city and the natural biosphere. The implications of the tenuous underpinnings of São Paulo's socio-economic system, especially in the natural ecosystems that still continue to generate wealth and sustain São Paulo, suggest that this vital evaluation is much needed. There is also a need to complement the critique of the condition of the social, political and economic relationships discussed above, in the social ecology of São Paulo with a more sophisticated evaluation of its relationship with the wider natural ecological system, which underpins its existence. São Paulo has been and remains a creation based on a 'huge gamble' of the type described by Ronald Wright (2004) and there is a need for Brazilian society to evaluate the quality and cost of the complete 'payoff'. After all, focusing solely on alleviating or correcting society's injustices is of little consequence if the biosphere is unable to sustain that society's often-conflicting ambitions.

If the ancient precedents described by Wright are any indication, ignoring the ecological reality underpinning the contemporary city may ultimately prove to be a strategy that undermines the overall economic, the social, and the political viability of the urban theatre of São Paulo itself. In fact ignoring the much broader and complex ecological reality of global urban society will affect the viability of global human society both at the global scale and at the local scale. São Paulo's future should be based, according to Czech writer Karel Capek (1930) on, "rule one of any prudent parasite: Don't kill off your host". [38]

Not only does São Paulo's reality serve as a refutation of many of the promises of Modernity, it also stands as a condemnation of the global acceptance that human ambition is limitless. Ignoring the complicity of the human-made environment in the creation of such a potentially insane urban theatre as São Paulo, disregards both the historical responsibility of design to the internal progress of any society, and to disregard an important factor in changing the course of human civilization itself. Questions emerge at this point, the first defensive, the second seeking

some social optimism. How can São Paulo generate an urban condition that is ecologically prudent? How must the conception of the urban condition of São Paulo change in order to produce a city that is consciously built on the reality of the limits of human ambition? The next chapter addresses these questions, while coalescing the major themes developed over the past two chapters and developing some broad principles for assessing, directing, and generating the urban form of the future, one based on the need to resolve the increasingly absurdity of the evident gamble that is at the heart of Brazilian development.

Figure 3.1 Downtown **São Paulo** (*Source:* Exploring Your World: The Adventure Of Geography, 92)

The last two chapters served to construct the image of São Paulo as an ecology intimately tied to the global biosphere. Because of the values propelling and organizing the city that relationship is in essence parasitic. Chapter III extends the discussion in the previous chapters by proposing general conceptual lines for answering the challenges that phenomenon of São Paulo poses.

The first part of this chapter outlines the three challenges that a new set of principles must address; (1) the limitation of the biosphere to quench the thirst of avarice. (2) The conceptual framework of urban thinking that has traditionally not accounted for these limits and (3) the complex organizational nature of the market and democratic society that still must be addressed. In response to these challenges, the chapter proposes first that São Paulo be considered as a physical construct in service of Brazilian society. The chapter argues that the city should be evaluated for its performance in providing the fundamental physical factors for human flourishing with an appropriate amount of input from the biosphere that will not compromise its long-term sustainability. This new underlying perspective of the city is considered the eco-political view of São Paulo. The aim is to calibrate human ambition to flourish against the ecological cost of sustaining that ambition. This is the common good of the city. From that point, the chapter proposes three case studies to demonstrate the use of two indicators for gauging the physical performance of the urban fabric of the city. The chapter concludes by arguing for an ecological approach to designing buildings and a way to affect the complex organization of the city by manipulating economic variables.

3.1. THE UNLIMITED CITY

Because of his affinity with São Paulo's powerful social and economic elite, Cendrars approached his friends, São Paulo State Governor Dr. Carlos de Campos and Brazil's President Washington Luis to seek their support for a movie project that would document the power of modernity that he saw being acted out through the city. The two politicians offered Cendrars their full support to create, "an epic celebration of São Paulo as a savage new power, congregating formidable energies to conquer the back lands, rainforests and the native peoples of Brazil up to the Andean mountains".[1] Cendrars wanted to assemble in the movie a large number of people in a camp somewhere in the back lands of São Paulo State. The idea was to supply these people with a highway, provisions, and the entire infrastructure required to recreate the modern enterprise. This city would have the latest technological paraphernalia, like airplanes, air propelled boats and, of course automobiles. However his ambition to document the power of Modernity out in the tropics came to an unexpected end due to the tragic power of Modernity itself.

According to Sevcenko (1993), "as a distorted compensation perhaps for the ruin of his plans, he (Cendrars) witnessed another prodigy".[2] In 1920 a group of rebellious soldiers from the National Army threatened the emerging Modern order in São Paulo with an attempted coup d'ètat. In response to this threat to 'the order' of the city and the nation, the Governor of São Paulo State was able to gather some troops who remained loyal to the national government at the outskirts of the city, as well as a contingent of heavily armed military units sent by the President. Since the Governor did not know where the rebels were located, Governor Campos ordered the systematic bombardment of the city for over a month devastating the city and killing countless people especially in the troublesome poorer areas of the city. During those thirty days Cendrars witnessed the Governor of São Paulo State personally coordinating the use of modern artillery, aircraft squadrons, weaponry, and the strategies imported from Europe after the First World War, to assure the quick repression of this threat and the restart of the gamble with Modernity. As an ex-combatant of World War I, Cendrars was "stupefied by the gratuitous

re-enactment of that technological massacre in the tropics which reminded him of the intensity of the battle of Verdun".[3]

In trying to assure his soldiers to keep up the bombardment of the city, Dr. Carlos de Campos justified his merciless ferocity by enthusiastically declaring, 'let it burn down, we can build up another one! ". [4] Beyond the obvious comment on the cruelty and indifference to other human beings there is an important comment on the 'insane faith' in the regenerative process of 'progress' and avarice. In São Paulo, unlike Brasilia, Brazil's Modernist capital city of the 1960s, the iconography of Modernity is not a formal manifestation of a better world to come. Rather, the iconography of São Paulo is actually to be found, in the concrete reality of dynamism of greed made sacrosanct by the market society.

Although extreme, the bombardment of the city is a comment on the historical role of the human decisions, however cruel, in creating modern Paulista society. The dimension of the human-made environment in São Paulo is determined by its inescapable complicity in serving this mania. São Paulo's built environment, both its generation and materialization, has provided the tools for satisfying avarice and is, subsequently, part of the gamble that modern civilization is built on. As seen in the last chapter, the urban environment and the design of the human-made environment in São Paulo, and frankly in any modern city, is propelled, by the tacit belief in the limitlessness of the natural world to sustain individual and collective human ambitions.

In the first chapter, the nature of public power in São Paulo during most of its history shaped the urban fabric by freeing and protecting the power of personal self-interest to explore the economic possibilities of the multitudes flooding into the city. Public power has had at best an ameliorative influence in guiding the evolution of the city, while the pursuit of personal wealth has usually been facilitated by the collusion of public power at the expense of a controlled and positive evolution of São Paulo's urban environment

3.1.2. THE MISSING CONCEPTUAL FOUNDATIONS

Even if the municipal governments had not served the interests of individual land developers, but had been truly interested in dealing with the negative effects of growing population during the modernization of the country, they were conceptually limited by traditional urban thinking. The main intellectual traditions of thinking about cities have rarely explicitly dealt with the constraints of natural systems nor have they evolved enough to consider the type of complex order that the city presents and how such an order can be created and administered.

Urban geographer Hans Blumenfeld writing in "Theory of City Form", outlines three traditional perspectives for thinking about the city: the political, the economic and the sociological. Applied to São Paulo they offer typical perspectives common today on a modern metropolis. The first perspective of the city as a political phenomenon focuses primarily on the institutional arrangements of the city. This perspective is interested in two broad questions, namely what is the political structure of the city,5 and how are the political controls through public policies made manifest throughout the evolution of the city?[6] For São Paulo, this perspective is best illustrated in the writings of Paulista geographer, Milton Santos (1926-2001), who commented extensively about the political and economic structure of São Paulo, which he considered to be a "disjointed city"[7] because of the sociological and political effects of development.

This first political view is usually closely complemented by the second view of the city as an economic theatre.[8] Three broad concerns stem from the economic perspective of urbanity.[9] First, there is an interest in understanding the city as the exclusive spatial condition that makes it possible for human populations to produce and export goods to the rest of the world.[10] From this outloook, urban economists and geographers try to understand how the urban theatre itself influences the rest of the regional and national economy. The second interest of the economic perspective relates to studying how economic forces are differentiated within the city.[11] Related to this second level, urban economic thinking focuses on understanding the micro-patterns of dominant economic activities, such as the locational relationships of shops, movie theatres, the

corner store, and downtown cores in absolute and relative terms.[12]

Finally, urban thinking has also focused heavily on analysing the urban theatre as a nexus of society.[13] This third, sociological, perspective for São Paulo, in the literature on the city, has focused on understanding the dynamism of urban poverty, violence and the range of social structures of the city. Sociological interest in São Paulo has sought to explain the above dynamics of the socio-economic and social structures during the modernization of city and the country.[15] As suggested in Chapter 2, the transition of Brazilian society to a modern urban society has also affected São Paulo culturally.[16] Anthropologists and cultural theorists have written extensively about the different and evolving meanings of the nature of urban life in modern São Paulo. The work of the anthropologist, Teresa P. R. Caldeira (2000) in "City of Walls: Crime, Segregation, and Citizenship in São Paulo", describes in detail the cultural meaning, general history, and anthropological history of the interaction between the social segregation, crime, and the political evolution of the country as is reflected in the city. The study of the urban culture of São Paulo has further expressed the layered contribution of the African Brazilian population, the European migrations, and the influence of popular American culture in the current cultural fabric of the city.

Finally, beyond Blumenfeld's categories, the historical perspective views the city, in a temporal perspective, as a central controller of an increasingly interdependent societal system.[17] Such a perspective of the evolution of the city has, in the case of São Paulo, limited itself to explanations of the city as it changed in scale, and the impact of transportation and communication media on the resulting urban form.[18] No parallel natural historical perspective, however, chronicles the evolution of the relationship between Paulista society, its economy and culture, and its host ecosystems, throughout the historical growth of São Paulo's urban fabric and this exclusion of an ecological accounting is not limited solely to the historical perspective. The other perspectives discussed above are also only marginally influenced by the metabolic and morphological relationship between the urban organism and the wider natural ecology. None of the traditional urban geographic concepts synthesize the conception of the city as a result of, and accounts for,

civilization's use of natural world and its interrelationship with that world.
Most of the traditional academic views, describe the interrelationships between human elements, variables, and factors. There is, however, no description of the city's urban fabric as a cultural artefact with an ultimate ecological cost, a tangible result of the gamble with the limits of the biosphere as discussed in the last chapter. Although anthropological and historical perspectives rarely touch on the morality underlying the evolution of São Paulo, the political, sociological and economic perspectives, in their discourses, largely divorce the moral underpinning required for the analysis of the ecological relationship between urban fabric of São Paulo with the natural world.

In light of the above absence of an ecological perspective, and in order to create a society where members have an equal political, legal and economic participation in its evolution, it seems reasonable that Brazilian society should have broader multiple gauges to evaluate the changing state of various aspects of contemporary Brazilian culture. One such gauge is needed for the evaluation of the built environment. More deeply, this perspective is a response to the pressing needs of Brazilian society, and the wider global market society as part of the accountability of the overall ecological sustainability of the 'civilizational gamble' implicit in Western society. Not only is traditional urban thinking rarely framed by the limits of natural world, but urban thinking has not understood the type of organization that the city present with any consistent degree of sophistication.

3.1.3 TOWARD A CONCEPT OF ORGANIZED COMPLEXITY: DIRECTING VS DICTATING

The ability of policy and design to affect designed long-range change directly, despite the optimization inherent in their rational conception, are to some degree illusory. City plans, in retrospect, can at best be a blurry marker in a particular time in history of what experts think the future should be like. This is largely because urban agglomerations that display an image of an organic configuration really correspond to the evolving organizational nature of their societies.

Most traditional planning systems have to face the inherently less predictable nature of the self-organization of complex systems like cities. Compared to Brazil's completely designed capital of Brasilia, Le Corbusier's Punjab capital of Chandigarh, or planned Soviet industrial cities, São Paulo is a city whose organizational structures emerged out of, and is nearer to a materialization of, the real estate market and the true complexity of modern society in contrast to the 'Olympian' view of city designer-manager (see Figure 3.2).

In order to intervene effectively in the evolution of the city, the type and nature of the city's organization needs to be clear. Jane Jacob describes the broad historical paradigm shifts behind the types of problems that natural science has been capable of understanding and their affect on the evolutionary concepts underlying urban thinking on the nature of the order of the city. In the last chapter of Jacob's most famous book, "The Death And Life Of Great American Cities", she outlines the broad intellectual roots of modern urban thinking and where its future lies.

Jacobs suggests that there have been many revolutionary changes in the methods developed in the natural sciences for "probing the world".[23] Intellectual history has had three phases and, according to Jacobs, the first two phases have come to dominate urban thinking while the third phases should start to have an effect on urban thinking. The first phase, for Jacobs, includes the ability to deal with problems of simplicity. During the eighteenth and nineteenth century the sciences were able to analyze two-variable problems.[24] The essential character of these problems rests in the fact that the "behaviour of the first quantity can be described with the useful degree of accuracy by taking into account only its dependence upon the second quantity and by neglecting the minor influence of other factors". [25]

Jacobs writes that nineteenth century urban thinkers approached the problem of city planning much like how nineteenth century physical scientists analyzed two variable problems. This approach was applied, according to Jacobs, in the example of Garden City planning theory, developed by urban theorist Ebenezer Howard (see Figure 3.3). The two major interrelated variables in the Garden City concept of planning were the quantity of housing and the number

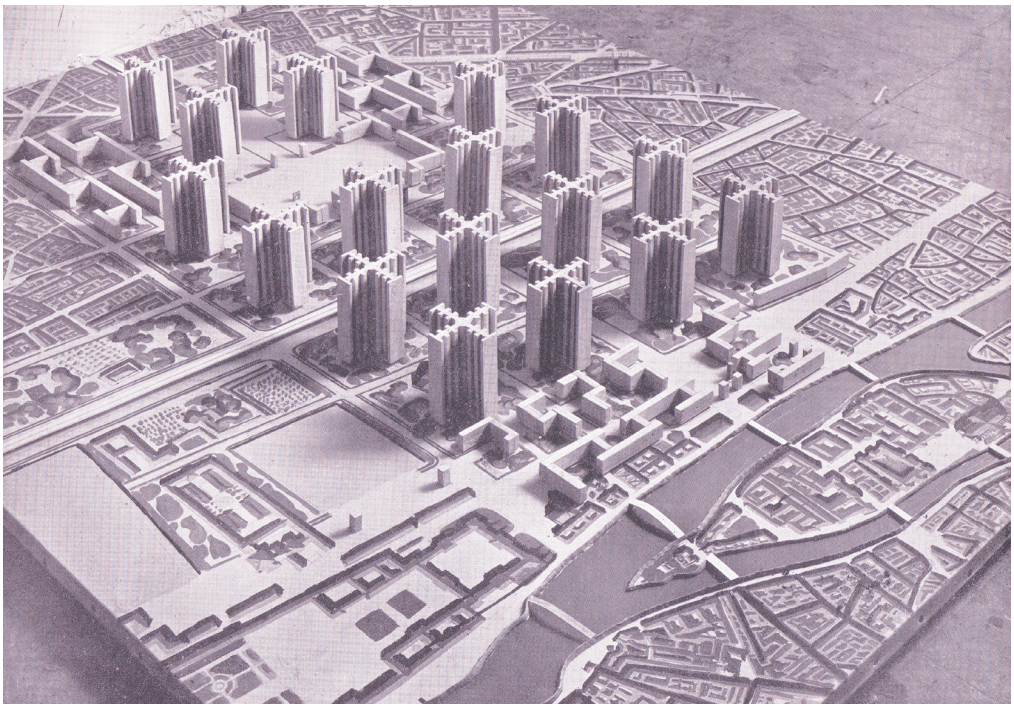
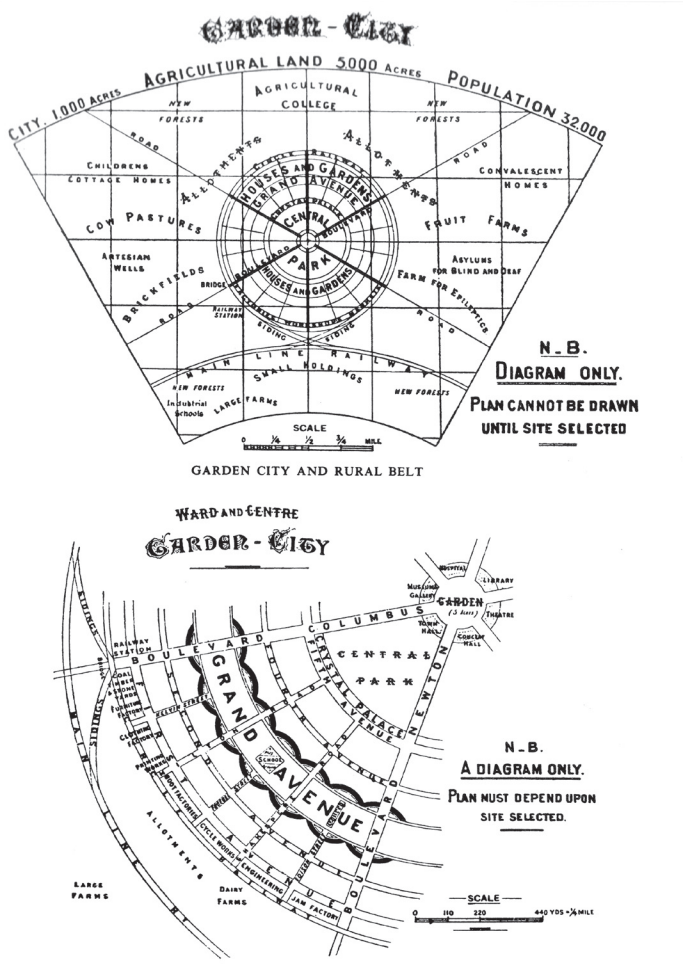


Figure 3.2 **Radiant City Proposal For Paris** (Source: Le Corbusier *The Radiant City*)

The image is Le Corbusier's Radiant City proposal for the restructuring of downtown Paris. This is the quintessential Olympian position taken by Modern designers, city planners and designers in the face of the challenges facing the Modern city of the 1920s. Le Corbusier proposed that downtown Paris be raised to ground and replaced by vertical towers connected to hierachy of transportation arteries.

of available jobs.[26] Furthermore, these variables, especially housing, had subsidiary variables attached to them such as the number of playgrounds, open spaces, schools, and community centres. The overall urban relationships were limited, organized and contained by a town's green belt. The town as a whole was conceived as two variable problem, totally contained and discrete. Jane Jacobs affirms that such simple two-variable relationship cannot possibly go far in understanding the complexity of great cities. She suggests that this way of thinking about the city has had a negative affect on urban thinking because it has, for example, reshaped big-city neighborhoods into reification of two-variable systems that have caused substantial social problems. In the case of São Paulo, this simplification of view of the city also extends to a larger scale of the country. At a much larger scale, the economic and social developers of Brazil



GARDEN CITY AND RURAL BELT

Figure 3.3 **The Graden City Plan by Ebenezer Howard** (*Source:* Choay, *The Modern City Planning In The 19Th Century"*,93.)

simplified the complexity of São Paulo to an economic variable to plan at a massive scale as part of the development programs of Brazil's Modernization.

The next, step in scientific problem solving for Jacobs was the ability to analyze problems of disorganized complexity. This method dealt with problems of many variables. After the turn of the 20th century, science developed powerful techniques of probability theory and

statistical mechanics. In this scientific phase, the system of variables posed, "a certain orderly and analyzable average properties". [27] Jacobs writes that by the 1920's and 1930's city planning theory began to analyze cities as if they were problems of disorganized complexity. Urban thinkers began to apply statistical analysis using probability-based mathematics by converting people into groups of averages. This way of considering the nature of the city did not supplant the simple base idea of two-variable "reformed city",[28] but rather it gave more, "accuracy, more scope, made possible a more Olympian view and treatment of the supposed problem of the city".[29]

Although Le Corbusier (1929) only superficially looked at the use of statistical analysis in the chapter of "The City of Tomorrow" called "Statistics", he is a supreme example of this 'Olympian view'. Le Corbusier's Radiant City, Jacobs asserts, "was a statistical reordering of a system of disorganized complexity, solvable mathematically". [30] Jacob writes "his towers in the park were a celebration, in art, of the potency of statistics and the triumph of the mathematical average".[31] The result of this logic was that it has become "intellectually easy" [32] to contemplate dislocation and re-assortment of large numbers of people in space based on the statistical variables, which still were based ultimately on the simple view of the two-variable city,[33]a mechanical city easily suited for the modern technocratic appreciation.

At the same time that cities were beginning to use and to draw conclusions from the analytical concepts derived form the disorganized complexity view of the problem of the city, scientists by the early 1930s were starting to realize that human issues were neither simple two-variable problems or problems of disorganized complexity.[34] Scientists were realizing that all variables were in fact interrelated and have essential features of organization. This new group of problems comprised problems of organized complexity, and formed Jacob's third phase in scientific problem solving. She noted that these were all problems, "which involve dealing simultaneously with a sizable number of factors which are interrelated to an organic whole". [35] Cities present a "situation in which a half-dozen or even several dozen quantities are all varying simultaneously and in subtle interconnected ways". Cities were regarded as multiple systems, "interrelated into

an organic whole" [36] and as such they are problems in organized complexity.

Jacobs asserts that, "As long as city planners, and businessmen, lenders, and legislators who have learned from planners, cling to the unexamined assumption that they are dealing with a problem in the physical sciences, city planners cannot possibly progress. Of course it stagnates. It lacks the first requisite for a body of practice and progressing thought: recognition of the kind of problem at issue. Lacking this, it has a short distance to a dead end".[37] It is important to note here, although science and its application in social science has provided some of the concepts and strategies for recognizing problems of organized complexity, and hints about analyzing and handling this kind of problem, Jacob warns, "because the life science (any of the branches of natural science dealing with the structure and behaviour of living organisms also known as the bioscience) and cities happen to pose the same kinds of problems does not mean they are the same problem". [38] Jacobs also notes that, "The organization of living protoplasm and the organization of living people and enterprises cannot go under the same microscope".[39] However, in it infancy, complex ecosystem thinking with its concepts and analytical tools should provide a more affective way to think about how to manage the dynamic and organic evolution of São Paulo by directing both order and change, a kind of third conceptual phase in the thinking about the city.

3.1.3. THE PROBLEM OF MANAGING THE MEGA-CITY IN THE BIOSPHERE

The challenge posed by São Paulo, and the focus of this thesis, is to develop a perspective based on human civilization's most fundamental and concrete reality (see Figure 3.4) and one which reflects Jacob's third conceptual phase. A mega-city with such unprecedented size as São Paulo, which is equal in size to many diverse ecosystems, and with a population comparable to many small nations, or even countries with large territories like Canada demands a new set of conceptual tools for urban thinking about its future. Urban policies must recognize the necessity to have both concepts and mechanism of control that correspond with the true complex and evolving nature of the built fabric of São Paulo. New instruments for planning and design are

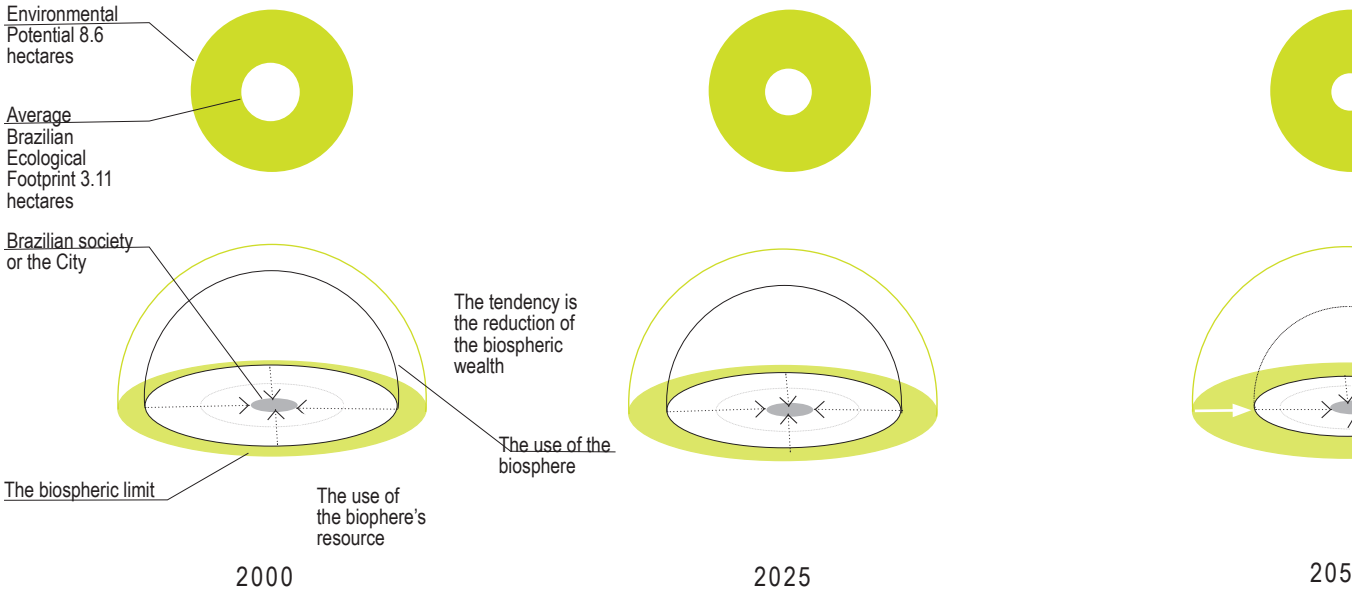


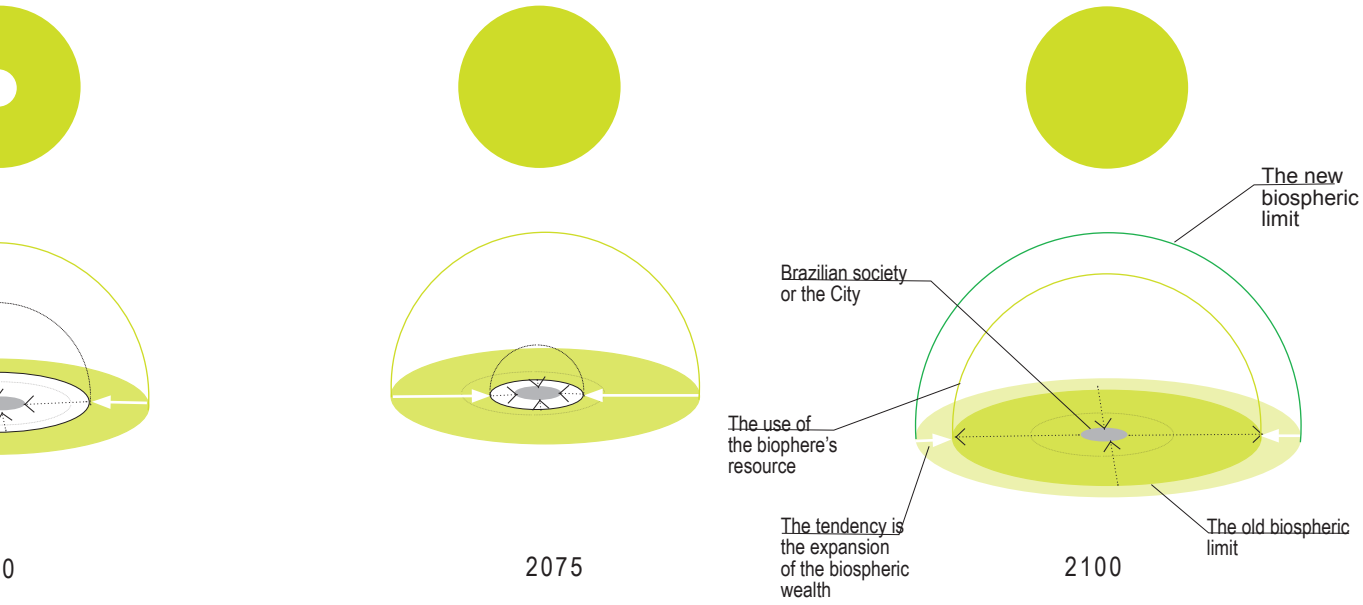
Figure 3.4 **The Objective For Human Society** (image by the author)

The speculative narrative diagram shows the ideal objective for the future of Brazilian society's relationship with the biosphere. It highlights the general direction that Brazilian society should aim to follow and in the implications on the individual ecological footprint of its members over the next 100 years.

needed to guide the urban evolution appropriate to São Paulo's complex evolved organization. Realizing that it is hard to design is a total vision of the city in the midst of the confusion of the freely associating people and groups in the democracy and the market is a beginning. Design must adjust its perspective on the nature of the city that the city is ultimately bounded by the limits of the natural world and the order, as Jacobs asserts is an organized complexity.

3.2. A NEW ECO-POLITICAL PERSPECTIVE

The first step in this thesis to develop a new and responsive path for urban and architectural thinking is the realization that the meaning of São Paulo for Brazilian society is found in its simultaneous role as a staging ground for the ambitions of human civilization, and as a mediation point from which to account for the present state of the relationship between that



This Stage Is An Ideal Sitution For Society's Relationship With the Biosphere

urban civilization and the natural world it needs to exploit to provide for 'civilization's gamble'. This new perspective is the recognition that the instrumental role of the built environment has in supporting the historical expansion of human ambition.

São Paulo is a kind of performing national investment it is an ongoing 'cost benefit' proposition for Brazilian society to evaluate. From such a perspective, São Paulo can be viewed as a form of 'output', a result of a natural metabolic input for the satisfaction and improvement of Brazilian society (see Figure 3.5 and 3.6). When gauged against the input of natural resources from the biosphere, the city's physical fabric might be considered as a kind of index of the performance of the city for the evaluation of its society it serves. The future evolution of São Paulo, in the new planning perspective, should be based on optimizing the input of the limited wealth of the regional, national and global biospheres to benefit Brazilian society. From this eco-political

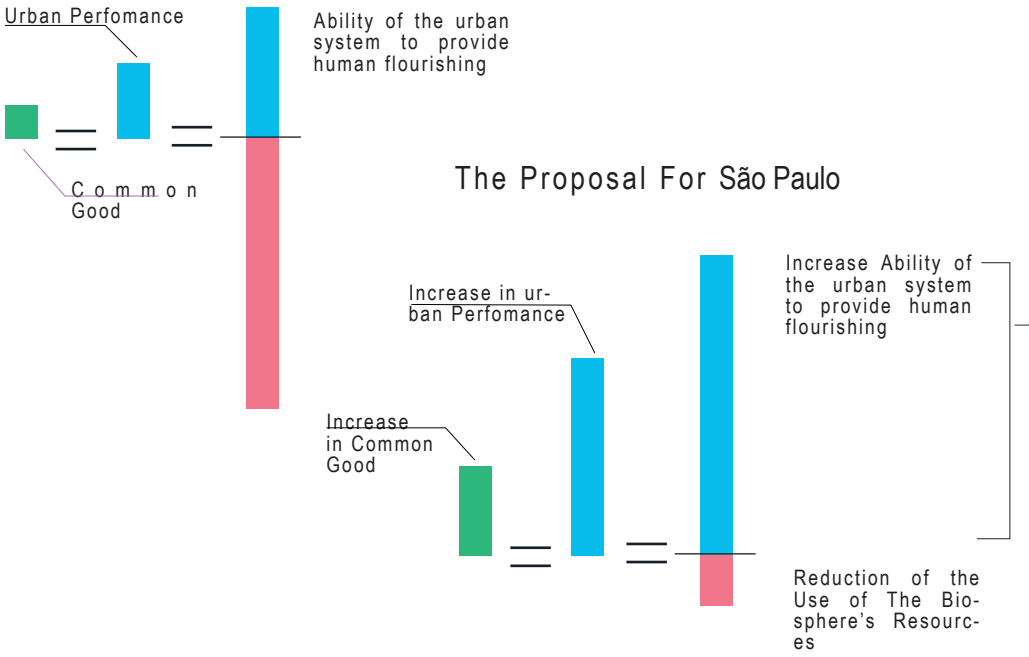


Figure 3.5 **The Proposed Perspective Conceptual Diagram** (image by the author)

The image along with Figure 3.6 illustrates the conceptual underpinnings of the eco-political perspective required for the city management and the design of the urban form. This figure clarifies the cost benefit proposition underlying the eco-political view proposed for São Paulo. The idea is to increase the ability of the urban form to provide for human flourishing and at the same time the reduction of the use of ecological resources by Brazilian society.

launching point, a concept of São Paulo's urban condition and a method for controlling, and directing future urban evolution, is underpinned epistemologically on the realization that there are natural limits on human ambitions.

This eco-political perspective demands answers to questions such as, what is Brazilian society getting out of São Paulo? Bearing in mind what has been and continues to be demanded of the region and country's natural resources to sustain the urban economy and the building of the mega-city over the years, the natural question is how is the city performing for Brazilian society? What is the ability of São Paulo's urban fabric to perform a minimum set of functions in service of Brazilian society to support its continuous 'civilizational proposition'?

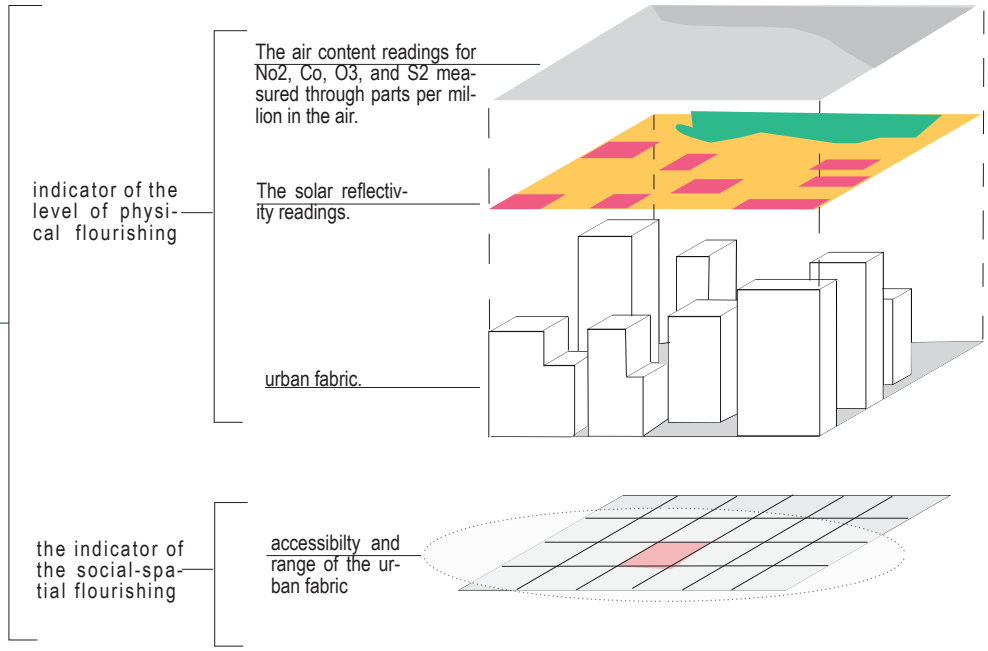


Figure 3.6 **The Indicators of Human Flourishing** (image by the author)

This diagram is the proposed indicators used to evaluate the ability of the urban fabric to provide its citizens environment for the flourishing of human society.

One such metric to measure the success of São Paulo's urban fabric is by its ability to provide a theatre for a 'flourishing' of human life, one balanced against the natural investments demanded to support it. It is also to assure the flourishing of the citizens provided by an urban fabric's evolution that is ecologically accountable. The notion of the "common good" is the optimization of this relationship and must be considered the basic goal for cities to reach for. This notion of 'flourishing' has been partially developed by work of urban thinker John Friedman (2000). Friedmann's notion is founded on the concept of a normative political right, which he calls, 'a right to human flourishing'. He states, "Every human being has the right, by nature, to the full development of their innate intellectual, physical, and spiritual potentialities in the context of wider communities".[19] Friedmann writes that to make this "right (to 'flourishing'), operational,

certain conditions of a political economic, social, physical, and environment character must exist".[20] A central of this thesis, un building an eco-political perspective, is to equate the city to a cultural product that can be judged for its ability to sustain human flourishing.

In the next section of this chapter a series of case study examples are explored as a potential measure, or indicator, of the condition of various aspects of the urban morphology of São Paulo that have a direct affect on the quality of human flourishing. Analytical concepts are developed through the case studies, together with the appreciation of the increase or decrease of the ecological footprint of the city, that are sketches of how such indicators could give a clearer, more comprehensive picture of the performance of the city in that eco-political perspective.

3.3. INDICATORS OF HUMAN FLOURISHING AND ECOLOGICAL COST

3.3.1. CASE STUDY I: THE URBAN MICRO CLIMATE

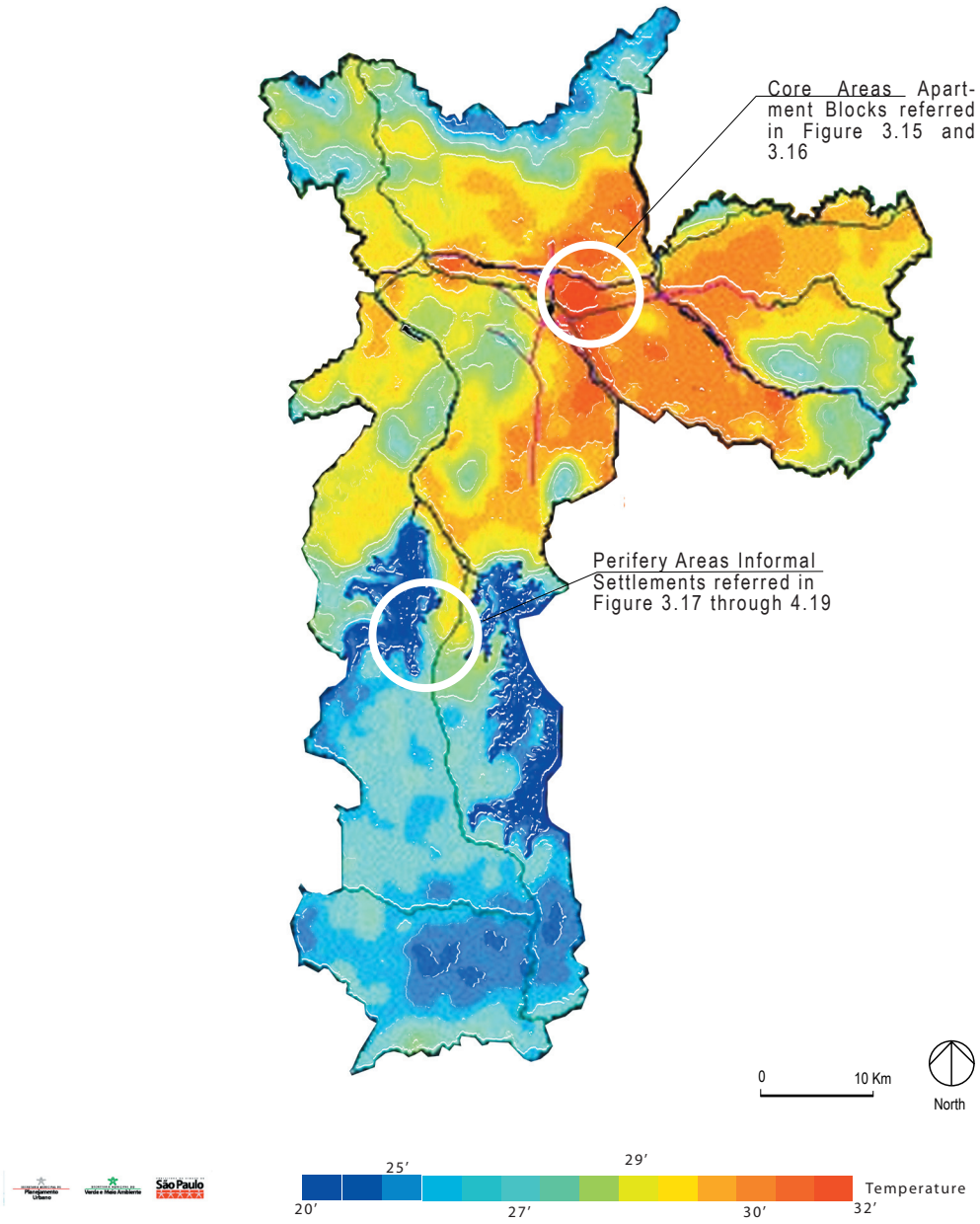
The relationship between urban form and incoming solar energy is one of the fundamental factors that constitutes and creates the urban microclimate. The urban fabric's physical configuration itself determines the large part of the sustainability of the resulting microclimate of the São Paulo mega-city. In an eco-political perspective, São Paulo's urban fabric can be viewed as an important underpinning for the abiotic condition underlying the built biotic urban ecosystem. The relationship between the constructed urban ecology and the mega-city's atmosphere can underlie the ability of the urban microclimate of São Paulo to sustain a healthy existence for human beings and consequently for the physical flourishing of its residents.

The relationship between solar energy and São Paulo's urban morphologies are illustrated by the Lansat-7Etm surface temperature scan of São Paulo's urban fabric (see Figure 3.7). As initially outlined in Chapter II, if the urban fabric of a city does not absorb the solar energy of the sun in a photosynthetic process, as in a natural ecosystem, then it negatively contributes to the overall relationship with the biosphere by absorbing and radiating into immediate atmosphere as heat. .

This absorption and radiation of incoming energy as heat by hard urban surfaces in the modern city creates a heat island effect. Other complimentary factors, which serve as indicators of the quality of urban life, and its relationship to the urban microclimate, are humidity, and the quality and quantity of a range of particulates readings (see Figure 3.8-3.11) suspended in the urban air. Taken together all these factors become one of the most fundamental metrics of the physical viability and resilience of a built urban fabric. They shape the underpinnings of the ability of the city to sustain a reasonable quality of urban life for its population and for providing a place for basic physical human flourishing.

Examining the heat island effect in more detail in figure 3.13, the accumulation of large amounts of dense built masses, such as concrete tower buildings, typically highly concentrated over a large area of São Paulo, increase the relative temperature because the masses both absorb solar radiation at night and reflect large amounts of energy during the day. Both processes heat the air. In addition to this process, trapped gases emitted from automobiles, trucks and surrounding factories, plus the tendency of cooler air to flow into the hotter denser downtown areas as the hotter air rises affectively trapping the heat in the city and further increase the ambient temperature and degenerating the air quality. To make matters worse, the lack of humidity caused by the exchange of heat by evaporation, also increases the heat and further degenerates the air quality even more[21] All these processes severely compromise the physical well being of the a city's inhabitants.

Statistics and readings from the of the São Paulo municipal sources taken throughout the urban fabric demonstrate that this area of the city is not only a poor performing agglomeration of form and mass, but it also coincides with both poor conditions of the air quality and consequently the pathology of the residents (see Figures 3.8 through 3.12), covering deaths caused by bronchitis, asthma, cardio vascular collapse, and heart attack. By mapping the different causes of cardiovascular and pulmonary deaths in each of the administrative districts of São Paulo with the physical context, it is clear that the highest rates of deaths coincide with the poor environmental areas of the central areas (see Figure 3.7).



Figures 3.7 **Morphological Performance** (images by the author *Source:*www.prefeitura.gov.br)

This map shows one of two components of the physical qualities of the urban fabric that affect directly the physical viability of São Paulo. The Landsat-7Etm image espresses the curent condition of thefundamental relationship between the morphology of the city with the level of reflectivity of solar energy,which is a crucial indicator of the physical vaibilty of the city .

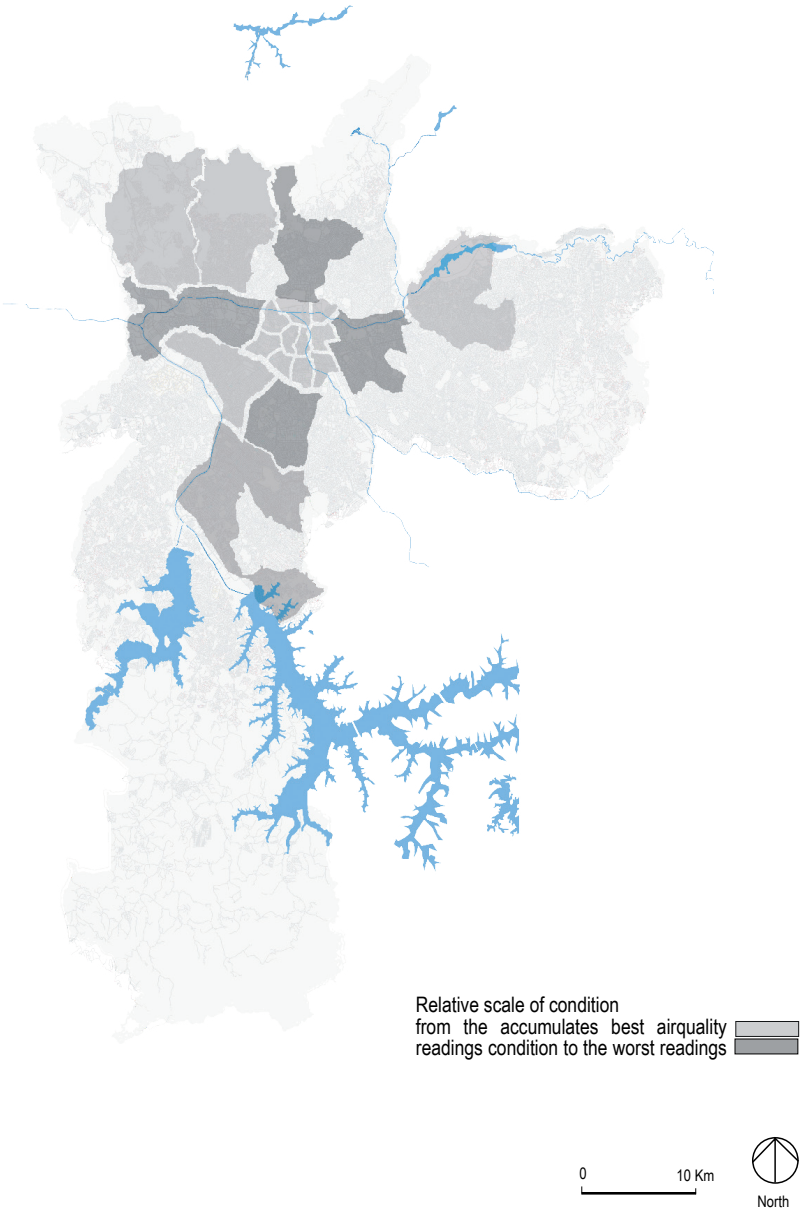


Figure 3.8 **Consolidated Airquality Readings** (images by the author *Source:*www.prefeitura.gov.br)

The map shows a compilation of the major readings of air quality, such as NO_2, Co, O_3, and S_2 measured through parts per million in the air by municipality. It includes only the highest and the lowest average daily readings.

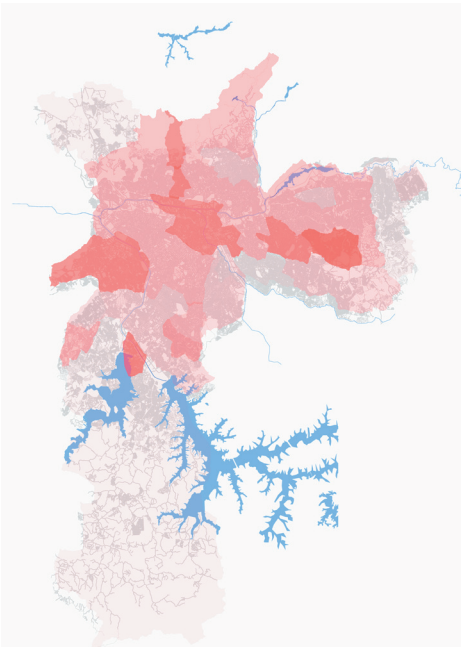


Figure 3.9 **Cardiovascular Failure**

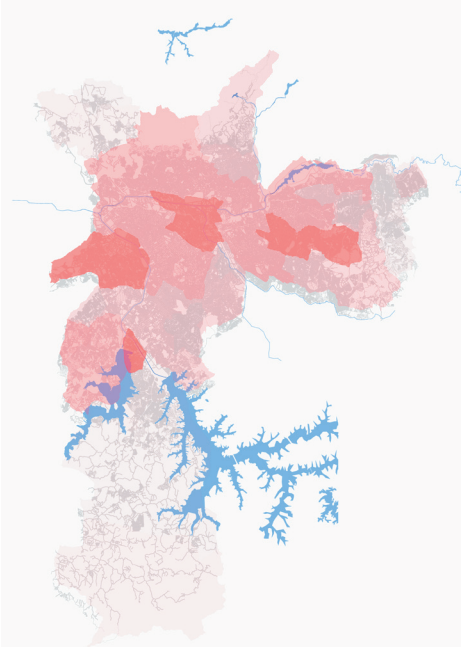


Figure 3.10 **Heart Dease**

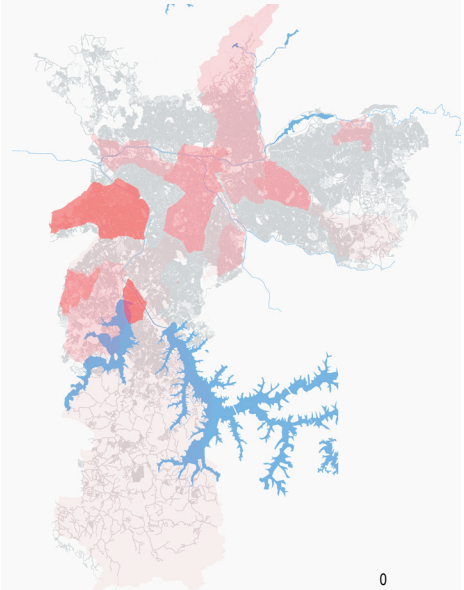
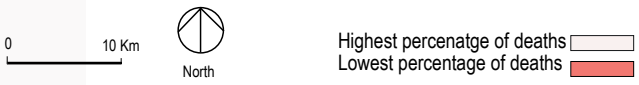


Figure 3.11 **Bronchitis and Asthma**



Figures 3.9- 3.11 **Relative Percent Of Deaths Caused By Cardiovascular Diseases** (images by the author *Source:*www.prefeitura.gov.br)

These three maps are component maps that are layered to make up Figure 3.12. They show percentage of death in the city's population per year caused directly by the quality of the air. These maps only includes the worst readings, darker tone of red, to the best, the lighter tone of red, in the municipalities of the City of São Paulo.

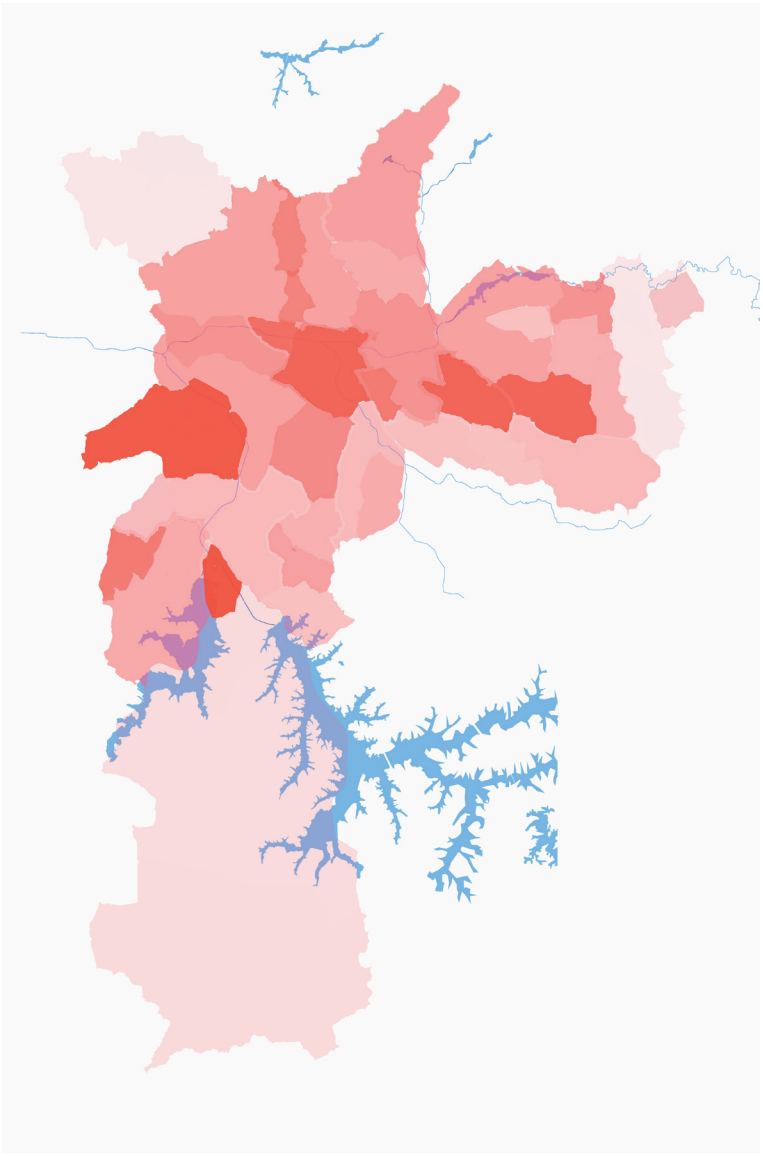


Figure 3.12. **Consolidated Deaths Caused By Poor Air Quality** (images by the author *Source:*www.prefeitura.gov.br)

This map is a compilation of the types of deaths associated with the air quality of the city in Figures 3.8 through 3.11. The relative intensities of red are a result of layering the maps on the previous page. This map is an illustration of the relative effect on the health of the population by the air quality throughout the city.

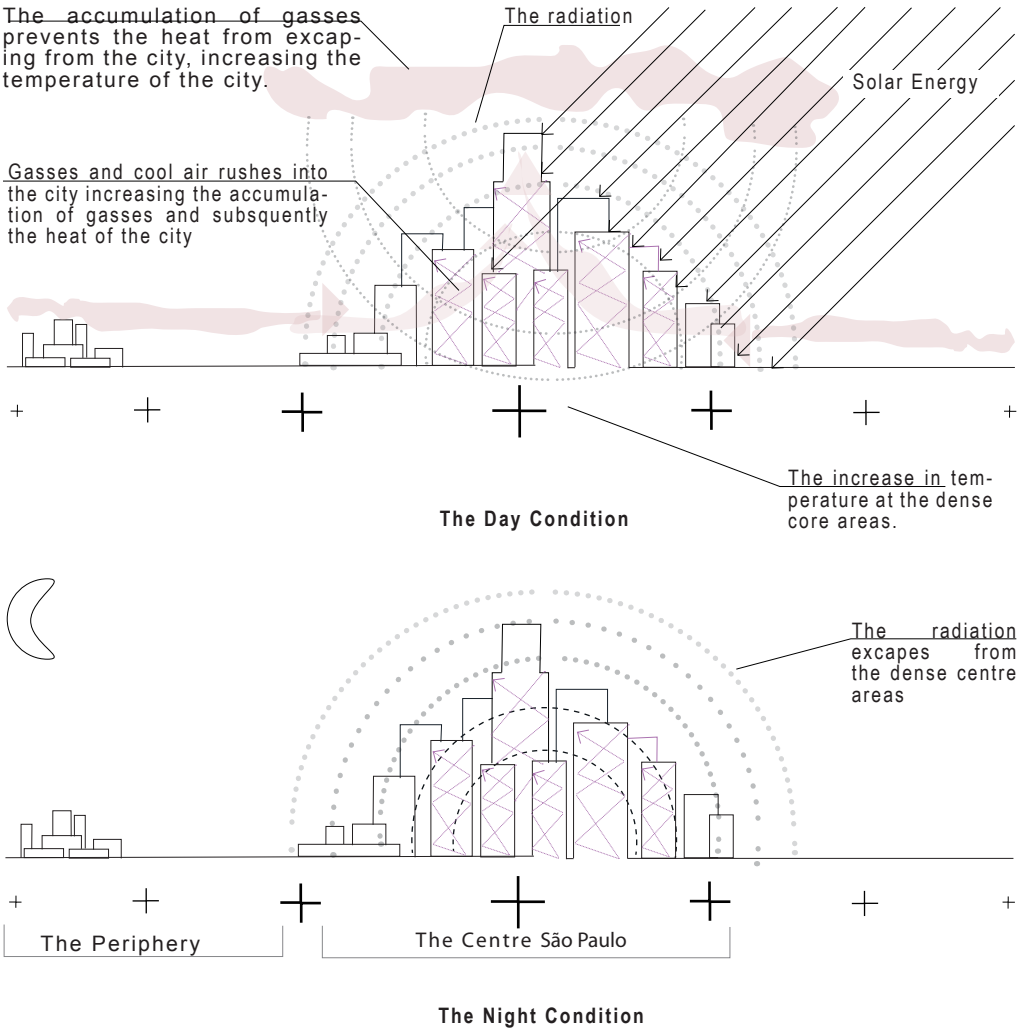


Figure 3.13 **The Heat Island Effect** This figure describes the urban heat island effect during the diurnal cycle.(images by the author)

There is a visible relationship between socio-economic class configuration of the geography of São Paulo, the type of buildings, and the urban blocks (illustrated in Figures 3.15 through 3.19) with the corresponding reflected radiant energy reading, as seen in Figure 3.7. The building density and therefore the radiation of the city are higher in the core area and become

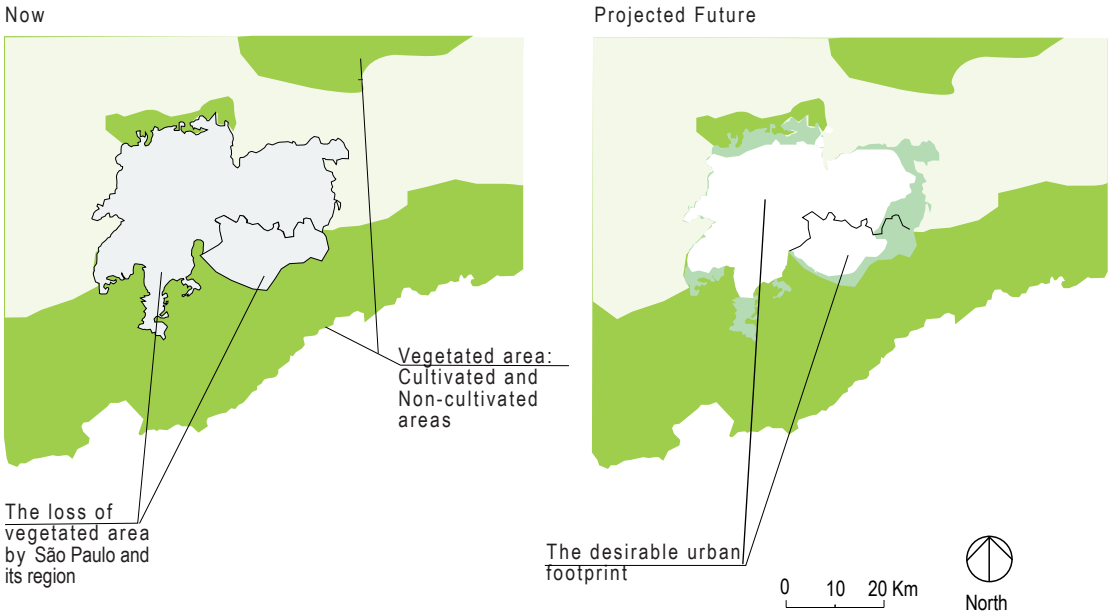


Figure 3.14 **The Reduction Of The Urban Morphology** (image by the author)

The two illustrations shows both the current extent of the urban fabric and suggest the desired general tendency to reduce growth of the periphery and hopefully the reclamation of part of the periphery by the vegetated fabric.

progressively less with distance to the peripheral areas. This coincides with the rate of deaths associated with the air quality (see Figures 3.8 through 3.12), pointing to a relationship between urban energy influxes from the sun and the physical quality of the urban fabric. It is already possible, however, preliminary, see develop a set of priorities by simply layering the satellite image, consolidate air quality readings, and urban health pathologies (see Figures 3.20 & 3.21).

Ironically, the higher socio-economic class are largely responsible both for the greatest per capital consumption of the biosphere and also for occupying the least viable urban morphologies for human flourishing in São Paulo. From the eco-political perspective, the areas expressing especially high reflectivity of solar and energy demand the most imported resources per capita, possess the least sustainable urban fabric. In other words the core areas of the São Paulo mega-

Figure 3.15

Figure 3.16

Figure 3.15 & 3.16 are examples of urban block types associated with the downtown centre areas referenced in Figure 3.7. These buildings and neighbourhoods usually house socio-economic class II & III.

Figure 3.17

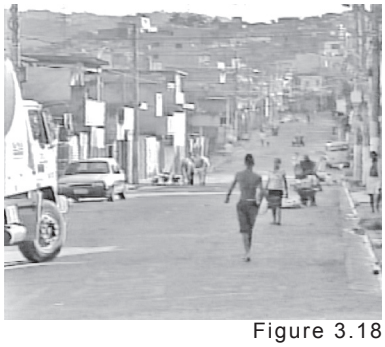


Figure 3.18

Figure 3.19

Figure 3.17, 3.18 & 3.19 are examples of the type of neighbourhood usually found in the periphery of city and associated with socio-economic class I. These settlements are threatening the forests and watersheds of the region highlighted in Figure 3.7.

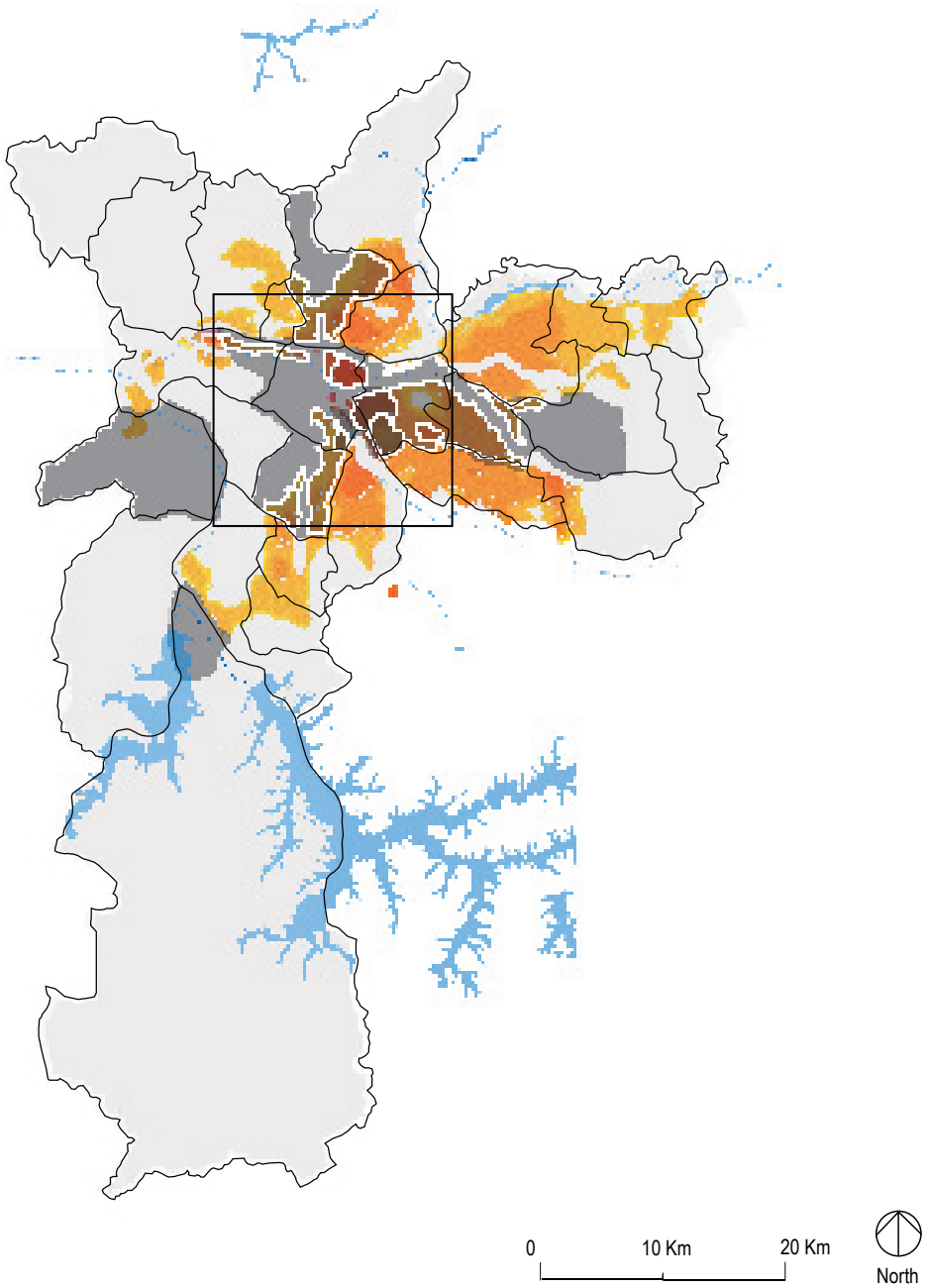


Figure 3.20 **Consolidated Indicator Map** (image by the author *Source:* www.prefeitura.sp.gov.br)

This map is the synthesis of the air quality readings developed in Figure 3.7through 3.12. A series of areas highlighted and scaled up in Figure 3.33 suggest a prioritization for a future strategy and a more accurate picture of the worst urban environments in São Paulo.

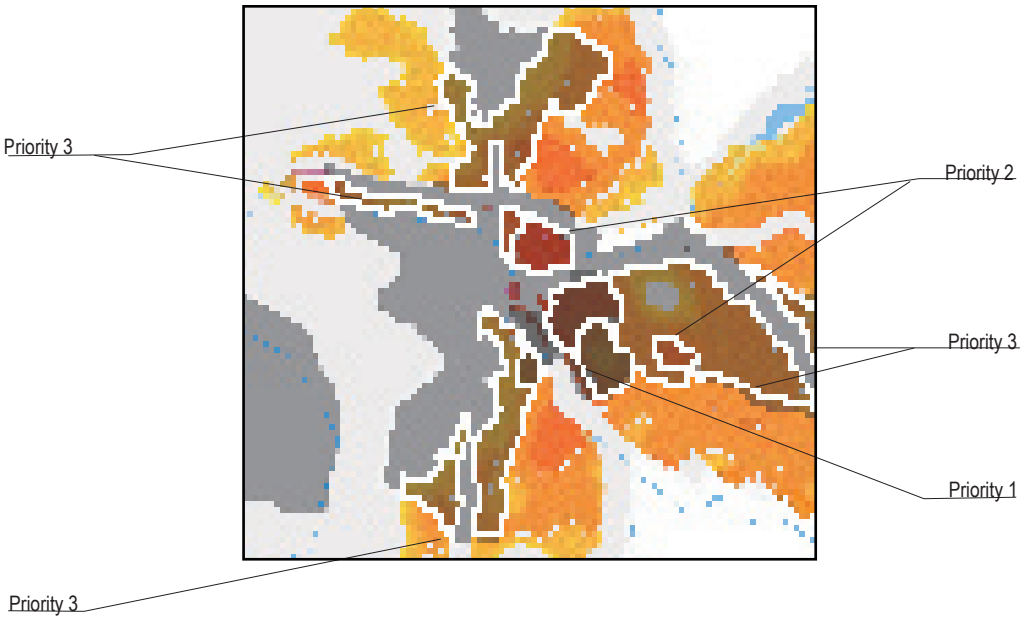


Figure 3.21 **Consolidated Indicator Map-Prioritization** (image by the author *Source:* www.prefeitura.sp.gov.br)

This a scaled up version of the more untenable centre area of São Paulo found in the preceding page. Along with Figure 3.32, this map suggests that there is a set of prioritization in a future a strategy for intervention in the city.

citydo not perform well, and they do not add to the common good of Brazilian society. The wealthier areas of the city demand a disproportionate amount of per capita natural resources to sustain a higher level of social class while the buildings and urban block types that they comprise are negative factors in the overall ability for São Paulo to provide an urban climate for the physical flourishing of the whole population.

3.3.2. CASE STUDY II: FAVELAS AND THE SÃO PAULO RESERVIORS

The satellite image such as those discussed in Case Study I also serve to differentiate the urban morphology of São Paulo from the natural morphology surrounding the city fabric. Although other middle-to-small cities, in Brazil, are outpacing the growth of São Paulo, as well as that of other large comparable metropolitan centres such as Rio de Janeiro and Belo Horizonte, the

Brazilian mega-cities still continue to grow. The growth of São Paulo still continues to threaten the integrity of the immediate regional natural ecosystems (Figure 3.14). Much of the new urban growth continues to be at the periphery of the cities. While there is significant progress in public control over the standards and quality of construction, growth throughout São Paulo Region is in many places still characterized as ad hoc or unsanctioned favela settlements. Some of that illegal construction, along with the general urban development pattern of São Paulo, is now threatening crucial urban ecological systems such as the Embu natural reservation to the south of the city proper and its two reservoirs that are important for the both quality of the water supply, and the integrity of the remnant natural ecosystems of the mega-city region.

The pattern of growth largely emerges from the make-up of the cities socio-economic class structure, which is a result of its historical evolution described earlier in Chapter I. The Embu area favela's ongoing uncontrolled expansion threatens the water quality of the reservoirs that satisfy the larger city's population's overall need for potable water supply. With the uncontrolled growth of the urban fabric near the reservoirs, untreated open sewer lines discharge refuse and human waste into the major sources of water supply for the city, ultimately affecting the quality and the health of São Paulo's overall population, as well as fish and other animals in the natural ecosystem. To make matters worse, the increase in the water temperature caused by the disruption of the natural rate of both absorption and discharge of water, and consequently the natural exchange of heat caused by the paved and other constructed surfaces also negatively influences the water quality of the reservoir as well as compromising the water table. In addition to the increase in temperature caused by the increase in discharge speed, with no passage through the water table, the flow of oils and domestic chemicals from streets in rainstorms straight into São Paulo's reservoirs is yet another aspect that threatens the water quality of the city.

Along with the threat to the quality of an important part of São Paulo's water, there is an increase in the exposure to mosquitoes carrying dengue and yellow fever to the residents of the informal settlements. There is also an increased danger to the settlements and the sustainability of the natural ecology caused by soil erosion due to the reduction of vegetation in place to

hold the riparian soils together. On a larger scale, the shrinking of the Embu reservation, which is part of the threatened Mata Atlantica forest, affects animal habitats and indigenous reservation of the Barragem and Krukuti people. Another problem is caused by the distance of the informal settlements in the Embu Region to the central area, making it harder for the municipal governments to provide the necessary public services, and especially health care, to every citizen.

3.3.3. CASE STUDY III: THE RELATIVE EFFORT TO TRAVEL IN SÃO PAULO

The issue of distance also reduces access to the socio-economic possibilities for these poorer residents in terms of service jobs located in the wealthier core areas and manufacturing jobs for those who are fortunate to have paid employment. The city's socio-economic class structure affects the spatial accessibility of São Paulo's population to the city at large. Analytical sketches shown in Figure 3.22 through 3.24 are based on a diagrammatic outline of typical days travel for each class and suggest the spatial segregation and socio-economic differences between different segments of the population are also manifested in the relationships between space, socio-economic possibilities, and daily time of travel. This indicator assesses the performance of São Paulo as an instrument in service of its residents.

The idea behind this measure of human flourishing is the ability of an population to access all parts of a city with relative ease. One of the requirements and basic characteristics exclusive to the spatiality of the mega-city urban condition and a major draw for rural populations is the increased accessibility to a much larger range of socio-economic spatial possibilities than in other human spatial conditions like compact smaller cities, towns, and the countryside. This aspect of the larger scale urban fabric demonstrates that the relationships between time, space, form, and location in service of human ambition and flourishing, forms the prerequisite condition for the complex social, economic and political interrelationships of an evolving society. By evaluating the accessibility of the socio-economic classes of Paulista society in São Paulo to the range of social and economic opportunities in the entire city, the ability of the urban

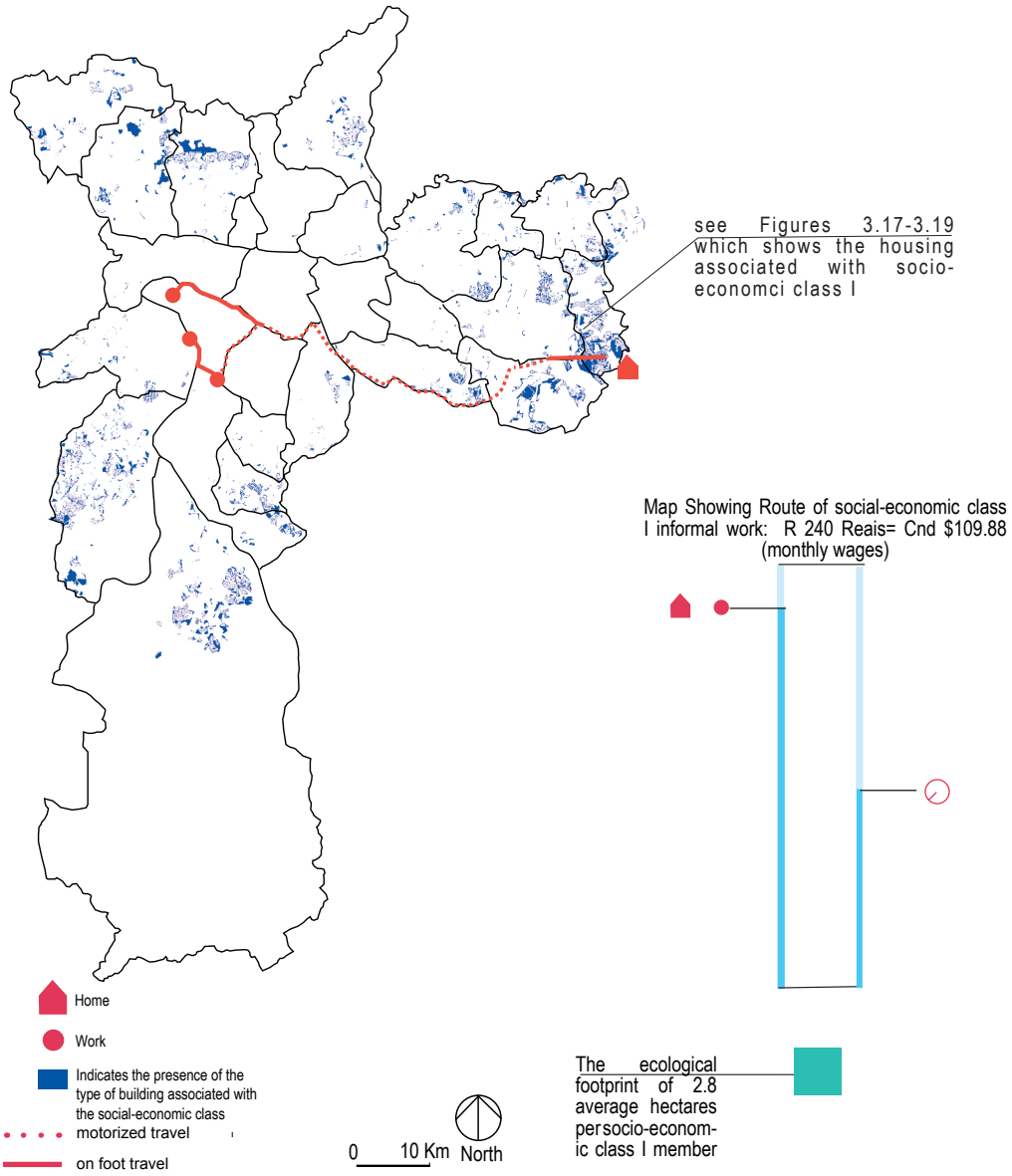


Figure 3.22 **Social Instrument Output** (images by the author *Source:* www.prefeitura.sp.gov.br)

Figures 3.22,3.23 & 3.24 are the readings of the indicator that gauges the affectability of the urban geography to satisfy the basic spatial reason for the existence of the city, the proximity to more inter-dependent socio-economic opportunities than any other spatial condition. It is a conceptual measure of the relative effort required by the three socio-economic classes to travel between work and home in São Paulo as the most common representative situation. The sketch of the effort is based on estimates of travel distances, travel times, cost of travel and average wage per socio-economic group referred to in

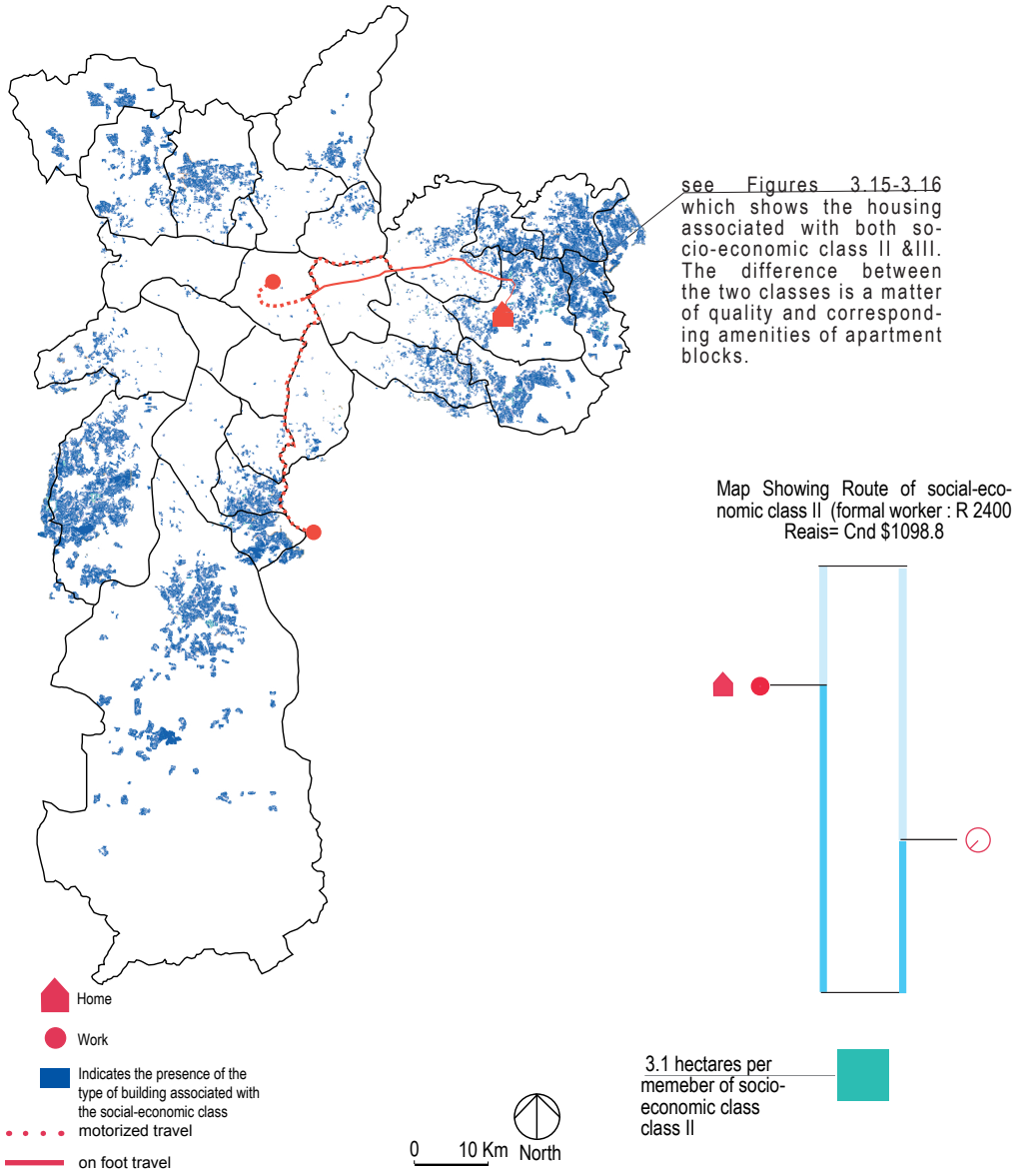


Figure 3.23

the latest national census issued in 2000 by the IBGE (Brazilian institute Of Geography And Statistics). It also references the ecological footprint per socio-economic class previously illustrated by Figure 1.3,1.4, & 1.5 to create a picture of average consumption versus the effort required by each socio-economic class.

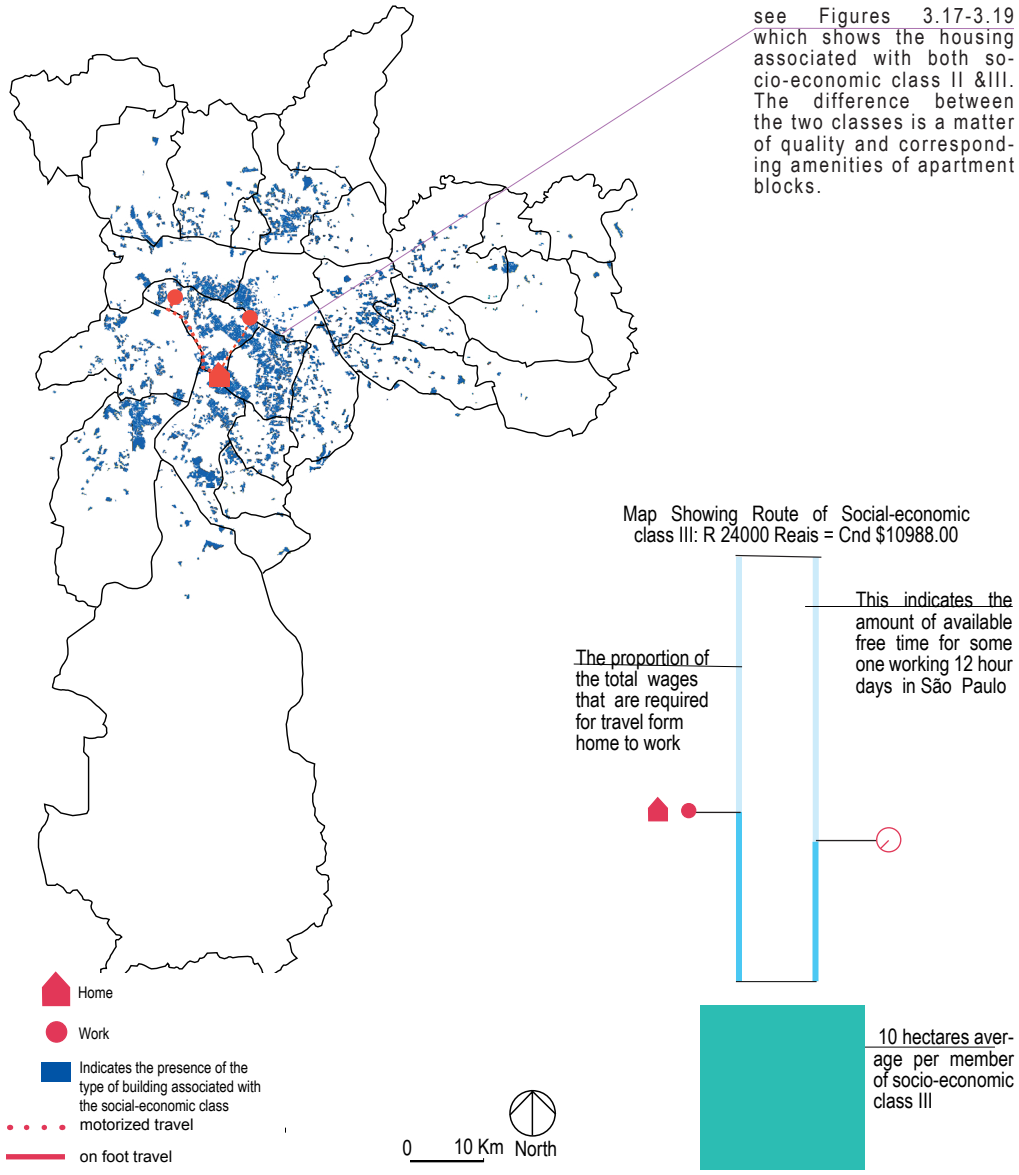


Figure 3.24 This indicates the amount of effort required, for this social-economic class, to travel from home to work as the expression of the relationship between hourly wages, labour and time dedicated to transportation.

fabric in accomplishing the minimum functions expected of a city by Brazilian society can be judged like the urban microclimate of the first case study, and measured against the biosphere 'investment.'

Urban theorist and critic Richard Register (2002) suggests that accessibility and proximity are important factors for diversity, which he argues is a crucial characteristic of both natural ecologies and urban ecologies. Register further argues that both an urban condition and a natural condition share diversity as a necessary factor in a healthy ecology. This kind of understanding of what makes a vibrant and resilient socio-economic, social and cultural environment has parallels with some of the principles developed by Jane Jacobs. She notes that the ideas of diverse economic and social activities are fundament factors for a vibrant and resilient urban economy and a resilient natural ecosystem. The idea of proximity and interdependence between social agents is necessary and related preconditions for diversity and subsequently the economic development, which Jacobs.[22]

In order to examine the implications of this spatial condition, typical representative routes for each of the social-economic classes were created. Because of its prominence in people lives, the travel between work and home is the most accurate form of travel behaviour with which to evaluate the larger levels of accessibility of the city and therefore, the evolution of the ability of the urban fabric to provide a fundamental requirement to achieve social and economic flourishing.

The socio-spatial indicators shown in Figures 3.22 to 3.24 measure and compare the level of effort that each of the different socio-economic classes must go through to accesses different locations in the city of São Paulo. The diagrams suggest that the spatial segregation and socio-economic differences between different segments of the population are also manifested in the relationship between space and time. This is another characteristic of the dense centre-periphery spatial configuration that characterizes the evolution of the city mentioned in Chapter I.

The graphs shown in Figures 3.22 through 3.24 indicate that the poorer the residents the farther they need to travel from home to work and the , perversely, bigger the proportion of their wages and time must be dedicated for transportation. Hence, the results indicate that the poor have less spatial accessibility to the city at large than the wealthier members of the population. In other words, they require more effort to travel than their wealthier fellow residents and that effort has a much higher relative price.

3.4. A NEW PLANNING INSTRUMENT FOR SÃO PAULO

So far the thesis has addressed in its case studies the first major conceptual Modernist planning problem of not connecting the growth of the city with its use of the natural resources of the biopshere. The city has a performance as a human construct and it should be assessed. The thesis has also suggests possible indicators that could evaluate this relationship. These indicators measure both the ability physical dimension of the city and its instrumental dimension to provide a place for human flourishing. The next speculative step addresses the complex organization of the city. The thesis proposes a new management tool to direct the growth of the São Paulo's urban fabric.

Recognizing the complex organization of São Paulo it is important to propose that growth must be directed for the sake of the viability of the city itself. There is no guarantee that the form of organic growth of the city will lead to the flourishing of the city to date on its own. If the favelas around the Embu reservoirs in Case Study II are an example of anything, it is that the uncontrolled organic growth of the city may at times threaten the whole of the system because this growth is not perceptive of the overall eco-system. It seems a bit ironic that in first parts of this chapter, the Olympian view of management was criticized. The thesis, however, criticizes traditional urban thinking because such thinking believes that the city could be completely designed and that the paradigm of the nature of the order of the city that it operates under does not correspond with the city's true self-organized complexity, not the idea that city system should not be managed. Since the thesis proposed what and how to gauge the city there is need

to directed at least the urban fabric towards creating a preconditions for human flourishing and subsequently the common good.

An entry point to influence the complex organization of São Paulo is to understand and employ the complex interaction of variables of the market place. Historically, as has been noted, these forces and mechanisms have structured the change and organization of the city itself. In the same way that the power of the market system was trusted by Governor Campos to direct the regeneration of São Paulo after he purged the city of its 'cancers', self-interest can still today be corralled and directed to shape São Paulo. The control over the economic variables that affect the real-estate market is a valuable instrument to guide São Paulo towards the common good and a maximum of social flourishing that is consistent with its history. Modern government institutions like central banks and other regulatory institutions have had the responsibility for guiding the progress of the modern economic system throughout the world. For example, when certain economic indicators suggest that there might be an increase in inflation then central bank intervenewith an increase in interest rates or decrease in the amount of money circulating in the economy. The same kind of manipulation of the variables in São Paulo's real-estate market may prove to be an effective instrument to help guide when, where and what should be constructed or deconstructed under an eco-political approach. The idea is to influence the process of urban evolution, its growth and regeneration towards an eco-political working model.

This thesis proposes a type of new planning institution that can monitor the critical indicators of biospheric wealth and the common urban good, described by Figure 3.25, and create a form of adaptive management of the city. Such a new institution should set incremental objectives for the municipal, state, and federal governments to guide evolution of São Paulo's urban fabric towards a goal of increasing the performance of the city. This regulatory institution or authority should be non-political, much like a central bank analogy and should straddle the national, state and municipal levels of public governance to correspond to the actual social, economic, and spatial interactions that delineate the extent of the urban ecology of São Paulo. The institution would be in charge of coordinating economic variables that affect the positive

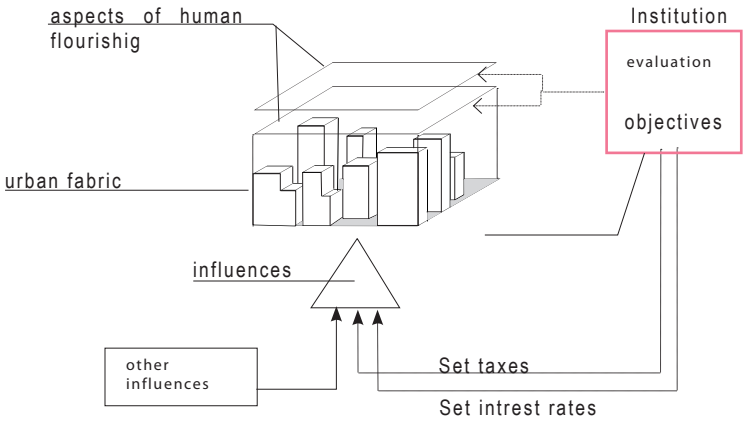


Figure 3.25 **The Relationship Between An Ideal Proposed Regulatory Agency And Its Influence On The Urban Fabric** (image by the author)

The image illustrates an institution proposed to serve as the regulatory institution charged with monitoring and influencing the evolution of the urban fabric of the city. It is an institution that recognizes that it can only be another factor to influence the development of the urban fabric of São Paulo

and negative incentives, like regional real-estate market interest and tax rates, to guide the potential of creating the desired type of buildings, and the location of construction, and timing of construction and ultimate the urban fabric.

A helpful way to think about this approach is to consider that what underlies the structure and organization of the built urban fabric is in large part affected by an abstract economic field. This economic field is made up of a range of positive and negative fiscal and economic incentives outlined by Figures 3.26 through 3.30 that would determine the overall direction of growth of the city. The idea described by the diagrams is to manipulate the abstract economic field of São Paulo to influence urban development at the desired parts of the urban field, and to discourage undesirable development. It would affect the relationship between positive and negative incentives for construction of buildings, and the taxes and interest rates to influence the abstract economic context for each particular municipal district of São Paulo rather then set a national rate.

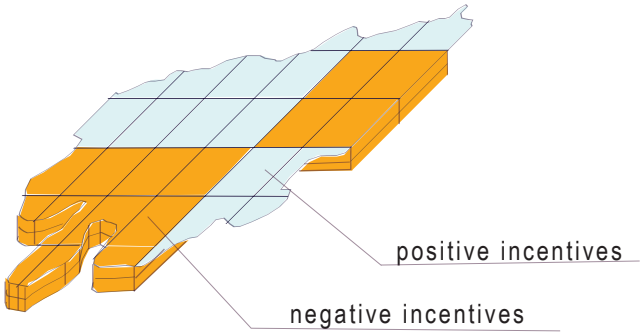


Figure 3.26 **The Abstract Urban Field Of São Paulo** (image by the author)

This figure and the following figures are abstraction of the underlying economic dimension of São Paulo's urban geography. The following four diagrams are meant to explain the idea of manipulating economic and fiscal variables to affect the evolution of the city .

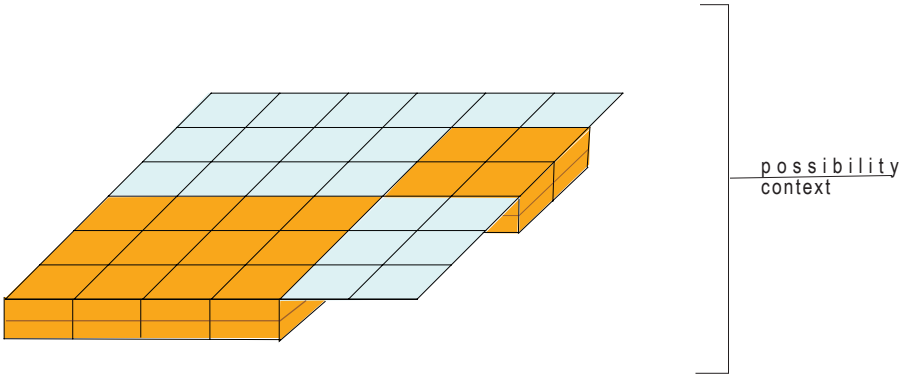


Figure 3.27 **The Abstract Urban Field** (image by the author)

This diagram is a further abstraction of the geography of the city illustrated by figure 3.25.

Part of the concept is that an independent regulatory institution can direct economic and fiscal variables, like taxes and interest rates, to help positively influence the evolution São Paulo. By periodically intervening in the positive and negative incentives that make up the urban economy, this institution will affect the choices people make about where and how people live and subsequently affect the urban geography of the city.

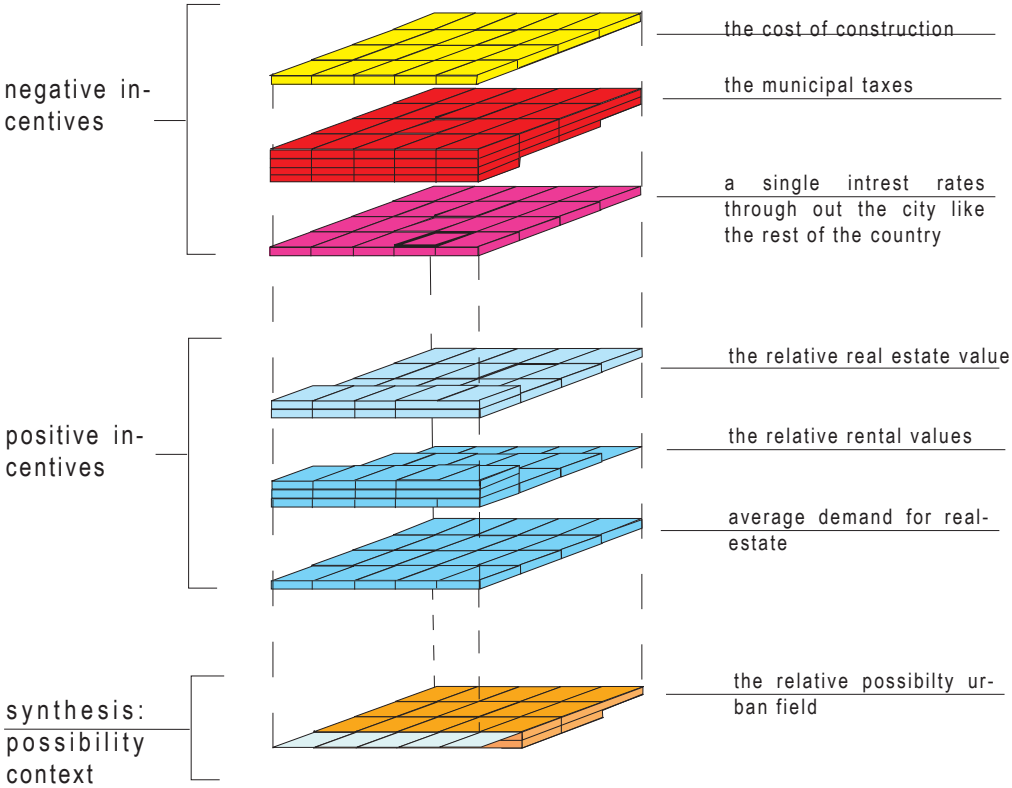


Figure 3.28 **The Creation Of Context of Possibilities Of The City** (image by the author)

This is a descriptive diagram of the range of positive and negative incentives that make up the context where people decide to act and consequently shape the urban geography of São Paulo. The idea illustrated below by figure 3.28, shows that the urban field is a context built by the relative difference between economic conditions of the geography of the city and that their difference can influence direction of evolution of the urban fabric.

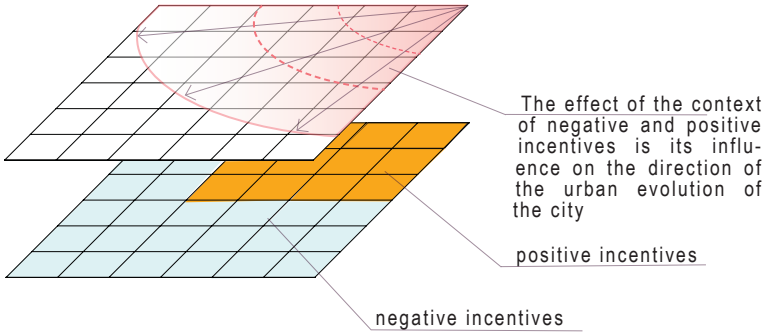


Figure 3.29 **The Affect The Urban Field** (image by the author)

This concept complements the current range of managemant tools available to adminstrators by recognizing the influencing the organic complexity of human economy, which underlies the urban fabric. In the following figures, Figure, 3.26 is the conception of the current negative and positive incentives that affect the choices where and what to build in São Paulo. In Figure 3.27 is a proposal of how to manipulate those very same variables as another instrument to affect the evolution of the city.

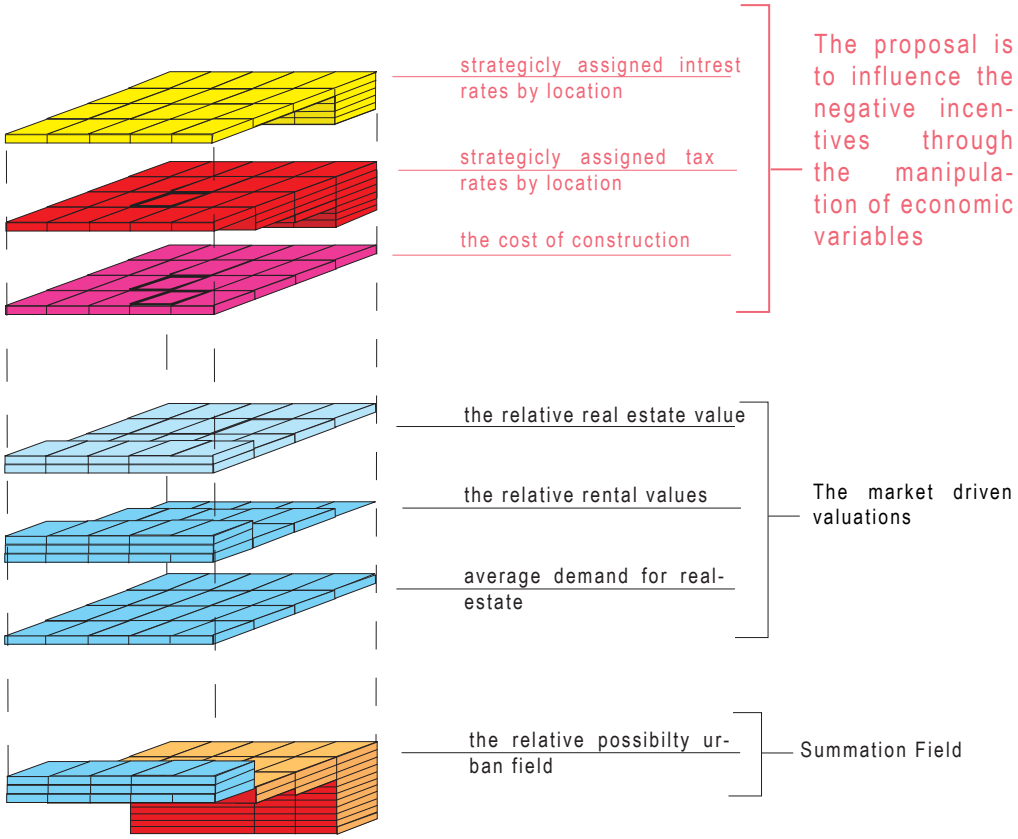


Figure 3.30 **The Proposal Of How to Influence The Possibilities** (image by the author)

This figure is the description of the mechanism proposed to supplement the existing urban management tools. The concept is to influence strategically with the manipulation of primarily economic variables (referred to in red in the above diagram), like taxes and interests rates, the positive and negative incentives that ultimately shape the city.

3.5. DESIGNING ECOLOGIES FOR SÃO PAULO

While based on economic incentives and disincentives, a new eco-political perspective should also be based on Jane Jacob's third paradigm of complexity. Public powers in a city should have the conceptual ability to direct the evolution and generation of the built urban fabric by influencing the variables that affect direction of the organic evolution of São Paulo. A major

mandate of the such an institution should be the reduction of the natural resource intake by buildings during their site plan development, construction and operation. The goals would be to increase in the quality of those aspects underlying human flourishing in order for buildings to positively contribute to the performance of the city and subsequently adding to the common good.

Each building can become a contributing element in a global ecosystem that combines natural and human ecosystems. Buildings can also contribute to the aggregate of the total consumption of the resources of the biosphere (compare 3.31 & 3.32). Buildings are, at a lesser eco-system scale, functioning like the built morphology of the entire city, since they are contributing elements or cells in the aggregate metabolic relationship with the enclosing natural biosphere. The existence of modern buildings is dependent on electrical and water services provided by either municipal, state, and national infrastructure, or a combination of all three. The built and managed internal environmental controls and the basic necessities provided by the massive state electrical, sewer treatment, and potable water infrastructure networks makes modern architecture possible. Because of the natural and human investment into this infrastructure, buildings can exist and be conceived in Modernist models as predominantly compositional elements or as abstract economic tools for sale or rent-taking. They can ignore their immediate micro-climatic reality and their effects on the quality of urban space. Not only do buildings provide a stage for consumption of resources through the generation of their form, buildings are also part of the apparatus that consumes the biosphere's resources by human society for its function and comfort. Thus, the contribution and the place of architecture in an ecological context is not only morphological and spatial, but it is also defined by the built form's contribution to and use of an abstracted and engineered system of natural resource allocation.

As self-evident as it may seem, it is important for conceptual purposes to see that the urban fabric is comprised of an agglomeration of individual built elements or buildings and other urban artifacts. Like the perspective of the city itself, the underlying conception of human environmental design can be derived from a conscious realization that the city and its

The consumption of the biosphere through the construction of buildings

The consumption of resources of the biosphere through the supply of infrasture to support use by human society.

Buildings as threaters for consumption of the biosphere for the use human society.

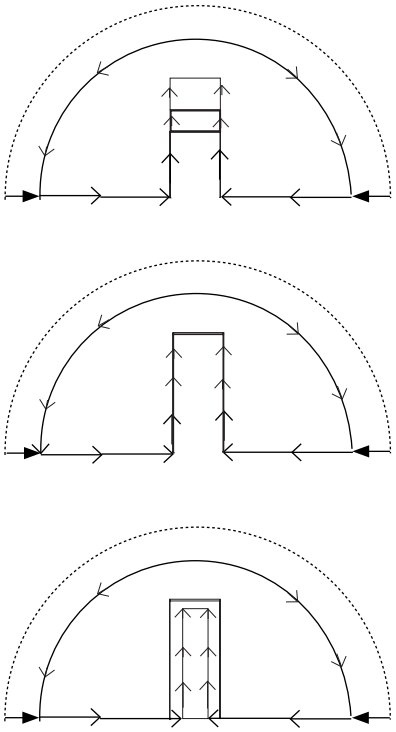


Figure 3.31 **The Three Dimensions Of The Parasitic Nature Of Buildings**.(image by the author)

The reversal of consumption of resources of the biosphere by an infrasture that mimics the vegetated morphology to sustain human society.

The urban form processes solar energy for the electrical services of the building

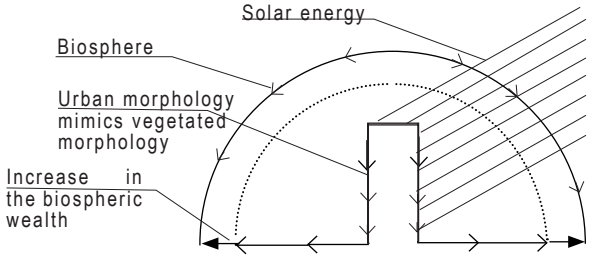
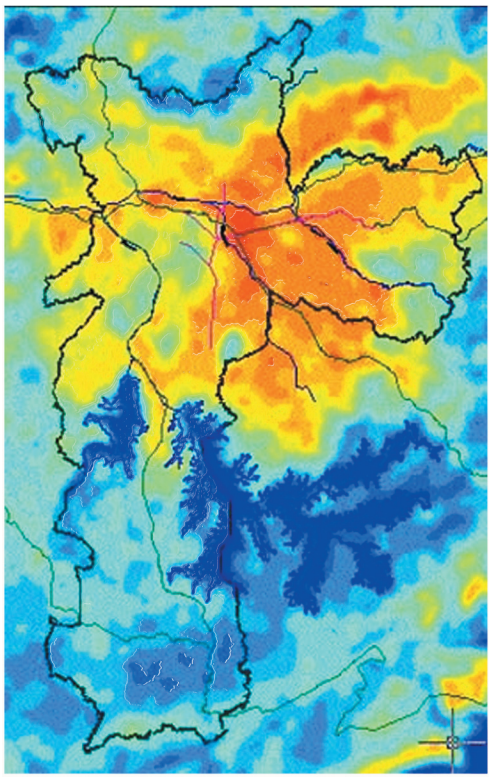


Figure 3.32 **The Proposal For The Urban Morphology To Act Like The Vegetated Morphology** (image by the author)



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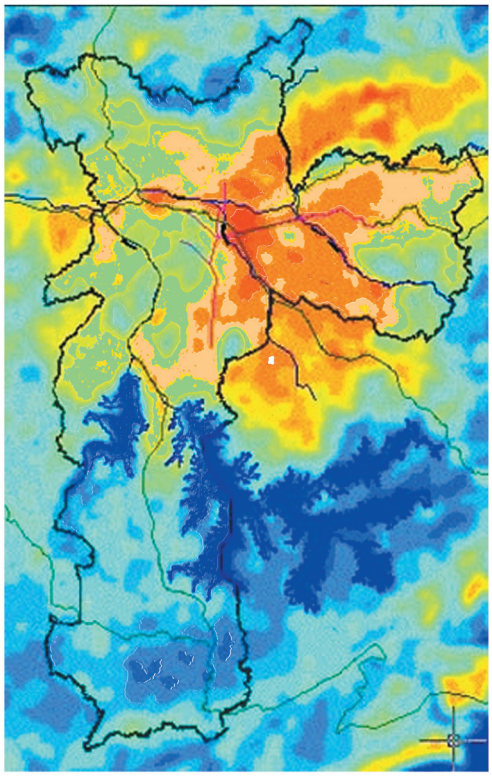

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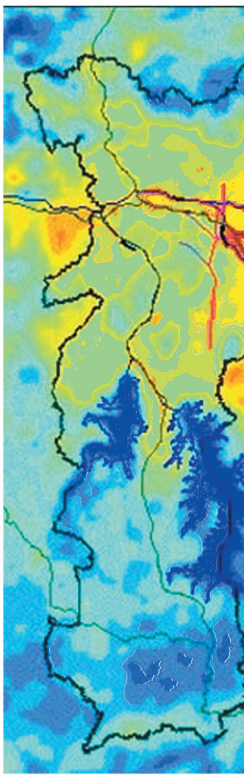

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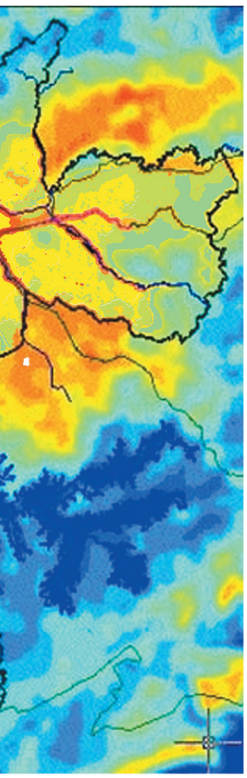
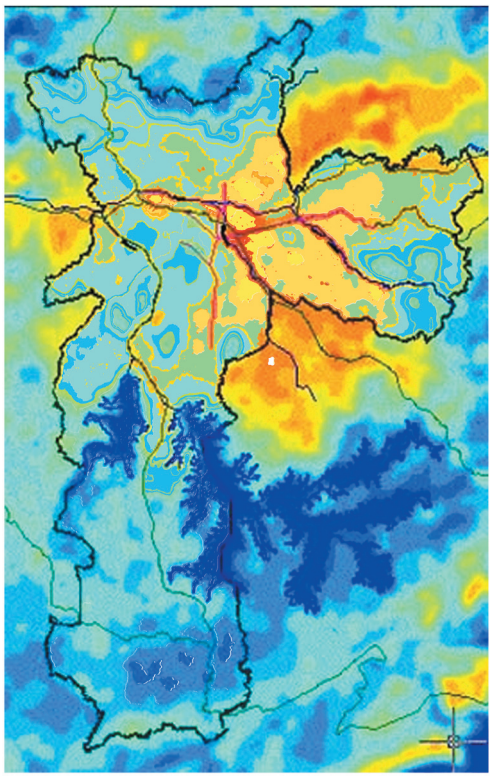
Figure 3.33 **The Ideal Narrative For the Urban Morphology** (image by the author *Source:* www.prefeitura.sp.gov.br)

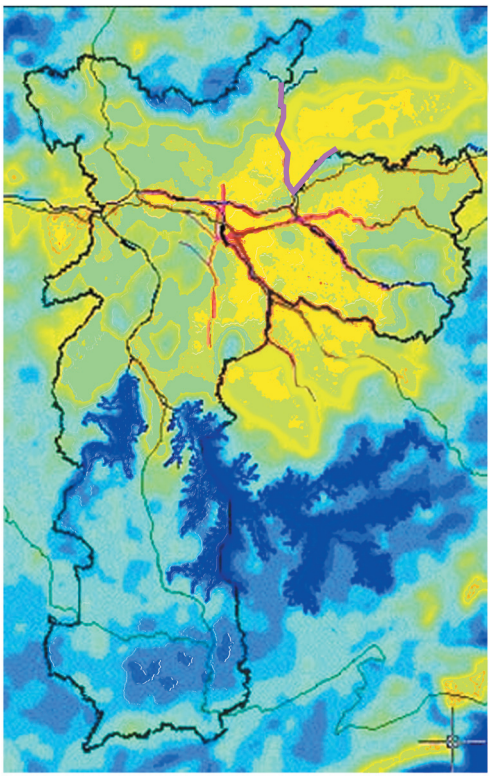
The series of maps are presented as a necessary narrative for a physically heathy urban environment. The objective is to have the urban morphology mimic as closely as possible the natural morphology in its ability to process solar energy. In the case of the maps in this series the reflected heat energy readings off the human-made morphology should look much like the natural.

buildings are not discrete presences apart from the natural biosphere's constituent systems and morphologies. Architectural and urban design, in reality, is designing component ecosystems within a larger ecosystem, which is both human made and natural. The most basic contribution of architecture's built form in São Paulo is as an element in the built urban morphology of the city. Therefore, buildings can also be judged for their contribution in creating a physical context for human flourishing under the same criteria as the city.

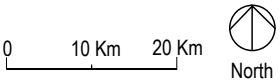




2075



2100



The design of the human-made environment can no longer be seen as only an exercise for conceiving isolated objects in an abstract concept of urban and architectural space. Neither can architectural practice afford the reduction of the idea of context simply to a formal and spatial exercise in composition. The nature of architecture and urban design under a new eco-political perspective challenges the modern concept of context by demanding that the concept of context both be based on and expand on concrete realities. This re-framing recognizes that the role of

each building as an organism within a larger ecology, namely São Paulo, which in turn is within an even larger ecology, the natural ecology.

3.6 THE BROAD GOALS AND REFLECTIONS

The broad goal for the São Paulo's urban fabric, in this theis then, is to invert the erosion of the natural vegetated footprint in the outer edge of the mega-city as well as those green areas within its boundaries (see Figure 3.33). There should be a reduction in the expropriation of the biomass of the region by the urban footprint and subsequent control of the loss of the region's natural ecological wealth (see Figure 3.31). Further increases in the absorption of the sun's energy by decreasing the mass of concrete and asphalt and its replacement perhaps by buildings that are more in tune with fundamental natural systems can mitigate the effects of an increasingly unhealthy urban ambient and increase the flourishing of the population of the city. However, more importantly, the new buildings that would both absorb the growth of the city and replace the outdated buildings must not only minimize the demands on the natural ecology, but they should positively act like a vegetated fabric beginning to control the urban heat island effect and improve air quality. This proposition holds especially for the areas near the reservoirs of the city, as their compromise would be a disaster. By concentrating the future growth of the city, such a strategy would also maximize the proximity of the socio-spatial and economic opportunities, which in turn lowers the ecosystem demands associated with transportation.

These broad strategic strokes come in a particular historical context for São Paulo. The access to public services, such as sewage disposal, hospital services, police services, and ultimately more importantly, the equal participation of all residents in the democratic extension of the political sphere of São Paulo and Brazil have come as a result of political struggle. Most of these gains have come about by moving away from the historical influence of the collusion of largely uncontrolled individual interests and 'public powers', especially in the aftermath of the political retreat of the military administration in the mid 1980s by popular action for political rights. These political struggles took many forms. The rise of trade unions, especially the

autoworkers unions in the (the municipalities Santo Andre, Santo Bernardo, Santo Caetano, Diadema) within the region of greater São Paulo and the many local ‘grass root ’groups that fought for access to public services, have deeply influenced the city. This new and continuous process is, in fact, part of an evolving democratic and Modernizing project of the country in general.

The regularization of the owership of the lands in urban settlements of São Paulo, attempted in recent years to provide institutions to respond to the health and education rights of historically marginalized population, have started shifting the character of the city. The traditional favelas of the city have begun to be considered legitimate parts of São Paulo by the administration of the city. Programs to map and assign property rights to the owners of these settlements in combination with micro-credit low interest rates loan program may insert these residents into the wider real-estate markets. The effect is not limited to the possible valuation of property and its ease in exchange in a wider real-estate market, but the potential of that property, because of its integral role in the cycle of accumulation of capital, a factor to be used as an entry point into the wider ‘formal economic market’[41]. The municipal administration is in effect stitching these communities into the legal, social, economic, and the urban systems to correlate with the extension of the political sphere won by the traditional excluded population during the 1980s. To support the expansion of the socio-economic and political tapestry to all the residents of the city, transportation and other services have started to physically link these communities with the rest of São Paulo.

However impressive these social, political and economic gains may be, Brazilian society still deserves to have a clearer measure of the state of its relationship with the natural world or the gains may become illusory. A more rigorous way to conceive São Paulo must develop to face the ultimate challenge of an urban civilization to live within the bounds of the natural world. São Paulo’s potential may be found first in harnessing the power of change, growth and organization of the market and democratic society. Furthermore, its urban architecture has the potential to be a bridge toward shifting the relationship between human civilization and the

natural world. This is the ultimate goal of the eco-political perspective.

In order to propose a set of principles to serve as a framework for effective and positive urban and architectural design, the thesis has characterized the phenomenon of São Paulo from with an assertion that any city is itself an ecological entity that is embedded within a series of higher and lower level ecologies. The nature of both the propelling force of change and order of São Paulo, as well as the resultant nature of the metabolic relationship between the urban system and the wider natural ecology, form the eco-political perspective. These two components historical questions form the heuristic method that has shaped the development of the description and characterization of the urban phenomenon of São Paulo.

Since São Paulo's intergration, especially during the coffee epoch, in the global network of resource exchange, its relationship with the biosphere has become increasingly parasitic, and is part of an uneven use of the natural resources between regions of an increasingly market and industrially orgainzed world and more locally between the regions of São Paulo. Driving the phenomenon is the fatal assumption of Modernism that the biosphere can provide for humanity's unlimited ambitions, an assumption which has no correspondence with natural limits. The gamble with post-war development led São Paulo to be used as an instrument for the modernization of Brazilian society and, as such, it is a particular creation of the 'development ethos'. Like other mega-cities, São Paulo stands out as a testament to the contradictions of modern projects, of values, and of the city's concrete realities. São Paulo's relationship with the biosphere is a fundamental aspect of this phenomenon.

As an open experiment with development, São Paulo, with its awesome physical and psychological presence, continues to expose many of Modernity's greatest contradictions. The development phase in Brazilian history and the evolution of São Paulo is itself a part of a bigger historical progression of the spread of Western modern principles, concepts, and practices throughout the globe. The work of Sevecenko (1993) provides the clearest view of São Paulo as a city swept and shaped by the power of Modernity. Through his eyes, it is possible to make sense of a city that is characterized by continued horizontal and vertical swelling in size, and in social and environmental degradation.

Sevcenko (1993) noted that, “Rather than cubist, it was a surrealist situation turned into a social experiment on an astonishing large scale. São Paulo was a daring Modernist work of art in its own right, with its intrinsic contradictions, its collection of delirious ambitions and its contempt for history, ancient and recent. Scattered inside this architectonic paradigm of São Paulo, the few Portuguese houses, which remained from colonial village, small, decorative and old, were as useless as chalets under an avalanche. They could serve, nevertheless, as a reference by which we can assess the dimensions of the cataclysm”. [1]

The idea of referring to what was lost in chasing this dream should not be reserved to simple comparisons between what those Portuguese houses noted by Sevcenko represented, but should extend to embrace the idea of a historical marker to consider the spent natural capital used to date to create São Paulo and that still needed to sustain the experiment. What was realized throughout the synthesis of the research presented in this thesis is that one of the most frightening dimensions of the cataclysm is the looming consequence of the relationship between human culture and the natural world. São Paulo’s forms speak of a manic global society built on the faith in the limitless possibility of Modernism’s cultural and intellectual foundations: rationalization, progress, and the striving of self-interest. Urban and architectural design in São Paulo should start its reconsideration by accounting for its participation in creating the cataclysm.

Eco-political design perspective principles should affect the form and evolution of São Paulo’s urban fabric from this historical position. More importantly as part of the civilizational enterprise, the urban fabric of São Paulo must be judged by future Brazilian society for its performance in creating a new theatre for human flourishing with the minimum natural cost. In the case of urban and architectural design, the challenge is to leave the blind complicit and promotional nature of Modernist architecture and urban design and propose a position relevant to the more complex framework in which the city has actually developed. For creating the human-made environment maturity must develop from an appreciation of the concrete effect of the human made environment on society and, especially, societies ultimate source of survival,

humanity's relationship with the biosphere

This perspective considers the city and the urban environment as a cultural and ecosystem product that should be measured. As a 'yield' by Brazilian society of the pursuit of modernizing the country, São Paulo's human-made environment has a performance that can be measured, as the 'common good', by considering the amount of natural resources used by an environment to satisfy human flourishing. This perspective can and should be framed by a much bigger aspiration to calibrate the historical relationship between human civilization and the biosphere. Urban and architectural design in São Paulo must be derived from this sense of responsibility to the civilizational enterprise and truly work together with society towards improving the odds of the gamble.

This thesis assumes the essence of the city as a form of ecology. The potential for considering São Paulo as an ecological phenomenon, however, has not been fully realized. Future speculation should focus on two interdependent sets of generally applicable questions:

> (1)How far does the ecological analogy go towards understanding the order and type of change of the mega-city? Beyond this, is there an epistemological and conceptual correspondence with existing economic and geographic descriptive models? In other words, what and how far can the existing descriptive concepts developed explain the complex and emergent order of natural ecologies, economies, social agglomerations and consequently the mega-city.
>
> (2) What are the basic systemic health indicators for the mega-city and what should they be, if indeed the ecological analogy holds descriptive potential,- as the criteria for judging the success or failure of an ecology? What conditions are desirable in an urban ecology that is translated from desirable conditions found in the natural ecology? Can ecological concepts such as

> resiliency and diversity have any consequences for setting objectives for urban ecology? Should urban ecology have the same underlying objectives as natural ecology? What are the limits of the concepts used to understand the complex organization for the development of the adaptive management and the necessary administrative principles that correspond to the ecological nature of the organization of the urban and natural systems?

Beyond the discussion of the ecology of the mega-city, there is also a need for a deeper discussion of the epistemological state of contemporary architectural and urban design and the intertwined relationship between human-made environments, such as the city, and the aspirations for a form of sustainable social and economic development in the developing world. For a truly relevant contribution to today's global society, the meaning of architecture must be derived from a more profound appreciation of its impact in the most concrete relationships between civilization and the natural world. The challenges represented by the mega-city require placing human-made design within a wider and more mature discussion on its place in the global challenges that are current faced.

There is a further need to extend other principles developed in the thesis, not only to challenge the initial guiding assumption for the speculation on the city, but the notion of design as an exercise in designing ecologies rather than simple reified objects in space. The next step is to develop an ecological design process to test and perfect it with actual design projects as in the very preliminary case studies in this thesis. First, however, the process must be informed with the knowledge of the extent of the impact of human-made environments on human physiology, the working of natural ecologies, and meteorological effects of urban form on the city. Fortunately there are extensive studies on these subjects, some of which explicitly link the flux of solar energy throughout systems, which should make synthesizing and representing these systems easier. Surprisingly, the area that still requires extensive study and subsequent representational tools is the impact of human-made environments on the more abstract dimensions of human society, such as the symbiotic relationship between the human-made environment and socio-

economic structures of society. An important challenge here is to express with the use of graphics the abstract aspects that make up the urban geography in order to more fully represent the influence in the generation of a building, such as the real estate market.

The geometries of mega-cities, like São Paulo, speak with iconographic power to the awesome forces of Modernity and globalization. In the face of the growing tensions emerging from the developing world, the underlying ideas structuring global society will define the nature of global urban life and consequently humanity's relationship with the natural world. The way São Paulo faces its challenges, could be of immense theoretical benefit for architectural and urban thinking and a lesson for the gambles the other less mature mega-cities of the globalizing world are taking.

INTRODUCTION:

[1] Jacobs, " The Death And Life Of Great American Cities", 28

[2] This conversation is attributed to General Medici in 1960s folklore. It is an episode transmitted by those who live under his administration, thus it has no direct reference.

[3] Jenks, M. "Compact Cities", 1-2

[4] Ibid. 17

[5] Gottmann, "Megalopolis Revisited", 6

[6] Sachs, "Planet Dialectics", 17

[7] Ibid.4

[8] Jacobs, " The Death And Life Of Great American Cities", 428

[9] Sachs, "Planet Dialectics", 17

[10] Prefeitura De São Paulo

[11] Ibid.

[12] IBGE

[13] Ibid.

[14] Convênio SAEDE–DIESE.

Chapter I: THE MAKING OF AN ECOLOGICAL ECONOMY:

[1] Barker, Theo “Megalopolis: The Giant City in History”, 188-189

[2] Ibid. 175-194

[3] Ibid. 176

[4] Ibid. 176

[5] Ibid. 187

[6] Ibid. 176

[7] Ibid. 178

[8] Ibid.178

[9] Ibid. 177

[10] Ibid. 178

[11] Ibid. 187

[12] Ibid. 182

[13] Ibid. 188

[14] Ibid. 177

[15] Ibid. 188

[16] Ibid. 186

[17] Esteva, “Development”,8

[18] Ibid. 8

[19] Sachs, “Planet Dialectics”, 5

[20] Ibid. 12-16

[21] Harry S. Truman, Inaugural Address

[22] Ibid. 3-8

[23] Ibid. 4

[24] Ibid. 4

[25] Ibid. 4

[26] Escobar, "Planning", 136

[27] In "Planet Dialectics: Explorations in Environment and Development", by Wolfgang Sachs. is an exposition and critique of the notion of development, Sachs aggressively builds up the cultural and political underpinnings of the United Nations and the international financial institutions. Sachs claims that they are ultimately dedicated in transforming existing or traditional cultures into societies that are organized by market principles and industrial organization demands. The point of development is to spread the economic ethos and to reconfigure the cultural foundations of world societies in order to pattern not only behaviour, but also the social structures along the principles structuring western society.

[28] Ibid. 135

[29] Ibid. 17

[30] During the better part of the last century Brazil's state guided economic development, concepts like François Perroux's growth poles affected the way the resources were focused into São Paulo. This economic theory argued for the interdependency of the development of industries around focal industries. It is thought that the externalities created by the generation of a large industry, like in the case of Brazil and São Paulo, the introduction of the automotive industry in São Paulo during the late nineteen fifties, prompted the growth of other industries, such as machining, rubber manufacturers and transportation companies, natural materialize to compliment the automotive sector. Even though Perrroux strongly resisted abstracting economic space into the concrete geographic regions, many policy makers applied it in the national economic plans of the countries of the developing world. This was the case of São Paulo. Because of the socio economic gravitational pull of São Paulo itfocused a disproportionate resources into the city.

[31] Hurst, "I came To The City", 92

[32] The core idea of the growth poles theory is that economic development, or growth, is not uniform over an entire region, but instead takes place around a specific pole. This pole is often characterized by a key industry around which linked industries develop, mainly through direct and indirect effects. The expansion of this key industry implies the expansion of output, employment, related investments, as well as new technologies and new industrial sectors.

Because of scale and agglomeration economies near the growth pole, regional development is unbalanced. Transportation, especially transport terminals, can play a significant role in such a process. The more dependent or related an activity is to transportation, the more likely and strong this relationship. At a later stage, the emergence of a secondary growth pole is possible, mainly if a secondary industrial sector emerges with its own linked industries {www. people. hofstra.edu/geotrans/eng/ch7en/conc7en/growthpoles.html}

[33] Becker, "Brazil", 100

[34] Fausto, "Historia Concisa do Brasil", 205

[35] Becker, "Brazil", 46

[36]Ibid.52

[37] Ibid.87

[38] Ibid.88

[39] Ibid.100

[40] Blumenfeld, "Theory of CityForm", 63

[41] Autocatalysis: catalysis in which the catalyst is one of the products of the reaction. Form www.dictionary.com

[42] Ibid.63

[43] Ibid.63

[44] Ibid.63

[45] Ibid.63

[46] Ibid.63

[47] Ibid.63

[48] Ibid.63

[49] Ibid.63

[50] Heilbroner, “The Making of Economic Society”, 1-16

[51] Ibid.1-16

[52] Ibid.1-16

[53] Heilbroner, “The Making of Economic Society”, 105

[54] “Planet Dialectics” by Wolfgang Sachs and “Historical Capitalism” by Immanuel Walerstein ares the most explicit work that research has used to place São Paulo in the global context. Desenvolvimento: Politics and Economy in Brazil written by Wilber Albert Chaffee and The Political Economy of Brazil edited by Graham and Wilson. Robert L. Heilbroner. , gives tbe account of Brazil’s economic context in more detail and from the a more particular position. The Worldly Philosophers and The Making of Economic Society, by Heilbroner gives a very detailed and comprehensive account of the evolution of the global socio economic system

[55] Escobar, Arturo “Planning”, 37

[56] Becker, “Brazil”, 39

[57] Ibid.4-104

[58] Ibid.30

[59] It is interesting to note that the city of Rio de Janeiro (translated directly as the The River of January, for the date of its establishment) was transferred the capital form Salvador because of its proximity to recently discovered mines of Minas Gerais. Of further interest is the fact that Paulistas discovered the mines during the Banderiantes (these were the Brazilian version of the conquistadores of Spain. Athough in service of the Portuguese crown, the main difference is that they were all lead by very old families in Sâo Paulo region. It was as close to a nationalistic endeavour that Brazil could have at the time) campaigns of conquests during the eighteenth century.

[60] Becker, “Brazil”, 29,33-35

[61] Ibid.35

[62] Ibid.16-38

[63] Prefeitura De São Paulo

[64]Filho, “Evolução Urbana Do Brasil”, 122-183

[65] Ibid. 35-38

[66] Ibid. 35-38

[67] Ibid. 35-38

[68] Although Becker, and Egler, discuss the industrialization of coffee productionin "Brazil: A New Regional Power In The World-Economy" the actual general description of the difference between industrial farming and traditional farming practices is discussed in Robert L Heilbroner's " Making Of Economic Society".

[69] Becker, "Brazil",32-35

[70] Fausto, "Historia Concisa do Brasil", 108

[71] Ibid. 125

[72] Becker," Brazil", 35-38

[73] Ibid. 37

[74] Ibid. 37

[75] Ibid. 9

[76] Fausto, "Historia Concisa do Brasil", 185-219

[77] Ibid. 185-219

[78] Ibid. 185-219

[79] Becker, "Brazil", 46-54

[80] Ibid. 185-219

[81] Ibid. 84-6,87

[82] Ibid. 50

[83] Fausto, "Historia Concisa do Brasil", 236

[84] Ibid. 269

[85]The discussion on the affects of modernization in Brazil encompasses a large body of work. The author of this thesis used Boris Fausto's "Historia Concisa do Brasil", Wolfgang Sachs' "Planet Dialectics", Teresa P.R. Caldeira's "City of Walls: Crime, Segregation, and Citizenship in São Paulo" and "Rio +10" revue on the environmental condition of Brazil.

[86] Ibid. 269

[87] Ibid. 55-72

[88] Becker, "Brazil", 55-72

[89] Ibid. 215-220

[90] Ibid. 215-220

[91] Ibid. 221

[92] Ibid. 213-220

[93] Ibid. 213

[94] Ibid. 221

[95] Ibid. 221

[96] Ibid. 221

[97] Ibid. 221

[98] Ibid. 222

[99] Ibid. 218

[100] Ibid. 222

[101] Ibid. 218-219

[102] Ibid. 213-220

[103] Ibid. 217

[104] Ibid. 213-220

[105] Ibid. 217

[106] Ibid. 217

[107] Ibid. 213-220

[108] Ibid. 225

[109] Ibid. 225

[110] Ibid. 225

[111] Ibid. 226

[112] Ibid. 226

Chapter II: SÃO PAULO: A PARASITIC ECOLOGY

[1] Kander, John "Sipapu-The Chaco World Great House Database" {http//sipopu.gsu.edu/chacoworld.html}

[2] Sharp, Jay "Anassazi"{www. Desertusa.com}

[3] Sharp, Jay "Anassazi"{www. Desertusa.com}

[4] Kander, John "Sipapu-The Chaco World Great House Database" {http//sipopu.gsu.edu/chacoworld.html}

[5] Ibid.

[6] Sharp, Jay "Anassazi"

[7] Ibid.

[8] Wright,"A Short History of Progress", 36

[9] Ibid. 30

[10] Ibid. 65

[11] This is an inferred form Wright's argument concerning the pattern of the development of civilization in general.

[12] Ibid. 55-65

[13] Ibid. 55-65

[14] Ibid. 60

[15] Ibid. 55-81[16] Wright, "A Short History of Progress", 125

[17] Rees, "Sustainable Development and the Biosphere; Concepts and Principles" , 2

[18] Ibid. 14

[19] Ibid. 5

[20] Wright, "A Short History of Progress", 131

[21] Rees, "Sustainable Development and the Biosphere; Concepts and Principles", 9

[22] Ibid. 9

[23] Ibid. 9

[24] Wright, "A Short History of Progress", 124

[25] Rees, "Sustainable Development and the Biosphere; Concepts and Principles" , 9-11

[2] Fausto, "*Historia Concisa Do Brasil"*, 269

[26] Ibid. 61

[27] Ibid. 63

[28] Wright, "A Short History of Progress", 63

[29] Ibid. 129

[30] This is based on the author of this thesis' 'guess'. He bases these assumptions on his own personal experience in Brazil, because during the research no reference to the per-capita ecological footprint on socio-economic class structure is available. All the resources available express a national average per-capita ecological footprint for Brazil.

[31] This is in reference to Frederick Winslow Taylor (1856-1915). American inventor, engineer, and efficiency expert noted for his innovations in industrial engineering and management (www.dictionary.com). Any organizational and systemic manifestation of industrial process is referred to Taylor's influence. Taylorization or Taylorism is, in contemporary social and cultural critique, to be an awful influence in the structure of modern industrial society.

[32] Ibid. 133

[33] Escobar, "Planning", 133

[34]The notion of an incomplete development came from the writing of the sociologist and expresident of Brazil, Fernando Henrique Cardoso, His major work include "Another Development" and "Dependency and Development in Latin America", which Cardoso coauthored with Enzo Falleto. Both books consider the modernization and development of the Latin America to be essentially incomplete because the political demands of modernity were not satisfied only the economic demands were satisfied.

[35] Caldeira, "City of Walls", 220-231
[36] Ibid. 220-231

[37] Wright, "A Short History of Progress", 40

Chapter III: BROAD PRINCIPLES FOR A DESIGN MANIFESTO FOR SÃO PAULO:

[1] Barker, “Megalopolis”, 186

[2] Ibid. 187

[3] Ibid. 187

[4] Ibid. 187

[5] Ibid. 187

[6] Ibid. 187

[7] Santos, Milton, “The Two Circuits of Urban Economy in Underdeveloped of Countries”

[8] Blumenfeld, “Theory of CityForm”, 187
[9] Ibid. 187

[10] Ibid. 187

[11] Ibid. 187

[12] Ibid. 187

[13] Ibid. 187

[14] Ibid. 187

[15] Ibid.187

[16] Ibid. 187

[17] Ibid. 187

[18] Ibid. 187

[19] Dandekar, “City Space +Globalization: An International Perspective”, 18

[20] Ibid. 19

[21] The porportion of each socio-economic class in the population of SãoPaulo is found in Alejandro Portes and Kelly Hoffman□s 2002 essay, □Latin America Class Structures: Their

Composition and Change during the Neo-Liberal Era□, which references ECLAC (Economic Comission for Latin America and the Caribean) for the break down of the socio-economic structure of Brazil and other Latin American countries. Although only for a speculative purposes, this thesis combines both ECLA□s Professional and petty entrepeneurs into class II in order to correspond with the social and economic indicators employed by the research.

The ecological footprint numbers where taken from www.ecouncil.ac.cr and assumes that the Socio-economic Structure III is equivilant to wealthier countries, such as the United States. For the Socio-economic class structure II is the average assigned for Brazil by www.ecouncil.ac.cr . Socio-economic class I takes the world average to more accurately represent the poorer working class consumption of natural resources.

[22] In Jane Jacobs', " The Economy of Cities" she elaborates the process of creation of goods and the necessary steps that need to happen in order to generate new goods. Although implied, the mutual dependence involved with the construction of new goods efficiently can only happen in the city because of two factors: the increase in free time away from providing for their own necessity primarily, food by farming and the division of labour which makes it possible to share in the production of increasingly complex goods with others. The latter becomes affected directly by proximity and diversity because of the increase in size of the pool of choices inside a short range.

[23] Ibid. 428

[24] Ibid. 429

[25] Ibid. 429

[26] Ibid. 435

[27] Ibid. 431

[28] Ibid. 436

[29] Ibid. 437

[30] Ibid. 436

[31] Ibid. 436

[32] Ibid. 437

[33] Ibid. 437

[34] Ibid. 431

[35] Ibid. 432

[36] Ibid. 432

[37] Ibid. 439

[38] Ibid. 439

[39] Ibid. 439

[40] For the better part of the century this was a common practice during the second half of the century, thanks to the theoretical work of the British economist John Maynard Keynes.

[41] Please refer to the work of Hernando de Soto, " The Mistory Of Capital: Why Capitalism Triumphs In The West And Fails Everywhere Else" Basic Books, New York, 2000, where he discusses the basic reasons why countries in the developing world failed to replicate the cycle of accumulation of capital.

CONCLUSION:

[1] Barker, "Megalopolis", 189

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