

©2017

Allison Bridges

ALL RIGHTS RESERVED

LEVERAGING AMENITY-LED GROWTH AND COLLECTIVE ACTION FOR  
SUSTAINABLE DEVELOPMENT IN FLORIANÓPOLIS, 1965-2016

By

ALLISON BRIDGES

A dissertation submitted to the

Graduate School-New Brunswick

Rutgers, The State University of New Jersey

In partial fulfillment of the requirements

For the degree of

Doctor of Philosophy

Graduate Program in Planning and Public Policy

Written under the direction of

Professor Thomas K. Rudel

And approved by

---

---

---

---

New Brunswick, New Jersey

October, 2017

## ABSTRACT OF THE DISSERTATION

Leveraging Amenity-led Growth and Collective Action for Sustainable Development in Florianópolis, 1965-2016

By ALLISON BRIDGES

Dissertation Director:

Thomas K. Rudel

Making cities less environmentally degrading is a preeminent challenge of sustainable development. Cities are intrinsically complex and characterized by multiple intersecting and interdependent systems designed to meet basic needs, support economic growth, and enhance opportunity and quality of life. To explore how two key sustainability initiatives emerged and became institutionalized in Florianópolis, Brazil, an integrated approach was developed that draws from the social-ecological systems framework as well as concepts of strategic action fields to understand the role of collective action in instigating shifts in the urban institutional environment. This case study suggests that sustainability studies can benefit from (1) a historical institutional approach to understanding interactions between urban growth strategies and social movements in cities, and (2) the development of an integrated framework for exploring the role of social capital in the institutionalization of sustainability.

Findings indicate the achievement of sustainable outcomes can be hastened by the appropriation of existing innovation-orientated or green-seeking fields of strategic actors. In Florianópolis, the process by which collective strategic action resulted in institutional change in the municipal government, as well as positive sustainability outcomes, was the result of several key historically contingent factors. The private sector and city leaders

embraced tourism and a natural amenity-led growth model that consolidated in parallel to an increase in activism among environmental organizations and neighborhood associations that crystalized the strategy to rehabilitate and preserve the city's natural and cultural heritage. A subsequent initiative by the local government to leverage the amenity-rich city to promote Florianópolis as a technology hub boosted the island's human capital and fostered both technological and institutional innovation. The perpetual modernization of the island's amenities drives developers to adopt smart growth products, such as solar distributed generation, furthering the accumulation of sustainable practices in the urban system. Although each of these historical events contributed to the accretion of sustainable outcomes, this research also suggests the amenity-led growth model can result in negative outcomes and inequality over the long term as amenity migration results in an increase in housing costs. This dissertation advances the development of a theory of amenity-led sustainable development and a framework for exploring the role of institutions and social capital in transitions to sustainability.

## **ACKNOWLEDGEMENTS**

I would like to express my sincere gratitude to the many people who inspired and guided the course of this dissertation. I am especially thankful to my dissertation committee, Dr. Tom Rudel, Dr. Frank Felder, Dr. Clinton Andrews, and Dr. Sandra Baptista, who all provided valuable advice and guidance during my graduate studies. I am especially thankful to my dissertation chair, Tom Rudel, for his invaluable feedback and endless patience with early drafts.

I am also grateful to all the individuals who I have had the privilege to know and learn from over the past four years. My time living in Brazil during the research period was, and continues to be, endlessly enlightening. I am especially thankful to the many people who took their valuable time to sit with me to discuss sustainable development in Florianópolis. Silvia Lenzi, Danilo Funke, and Cibele Lorenzi were invaluable sources of information pertaining to the local government and sustainability planning. Prominent representatives of the tourism and real estate sectors, such as Andrea Druke, Anita Pires, and Leandro Adegas provided critical insight into the challenges and objectives of sustainable development in urban growth. I would also like to thank Ricardo Rütther and Rodolfo Pinto for sharing with me their work in driving change toward distributed generation in Florianópolis. I am also immensely grateful for the many professors and students of the Federal University of Santa Catarina (UFSC), many of whom I met and some of which I did not, whose own work was a tremendous resource. Gabriel Lopes, Jose Kos, Cesar Floriano, Lisiane Librelotto, Ayrton Bueno, Fany Peñafiel, and Paulo Rizzo have all contributed greatly to both my research and to the global body of knowledge on environmental planning and sustainable development. Special thanks to

Caroline Sueidy, Deborah Santos and Rodolfo Swoboda for assisting me with language and cultural graces.

I would also like to gratefully acknowledge financial support for this project from the National Science Foundation IGERT program. Special thanks to Frank Felder, Eric Lam, and Linda Anthony for providing information, valuable field experience, and the coordination of rich opportunities for trainees to engage across disciplines. Additionally, I would like to acknowledge the editors of *Natural Resources Forum: A United Nations Sustainable Development Journal*, and the feedback of blind reviewers, during the preparation of part of this dissertation for publication in November, 2016.

Lastly, I am thankful to my family and friends for their endless support and encouragement. Deep gratitude to my mother, Nancy Bridges, for always encouraging a sense of curiosity and a love of learning, my husband Rodrigo Barfield, for his love and support in all things, and my in-laws Neal and Cida Barfield for their never-ending love and willingness to provide a helping hand.

## DEDICATION

In loving memory of Bob Bridges.

Also, to my mom Nancy Bridges and my family Rodrigo, Olivia and Josephine.

*that we are earnest to explore and learn all things... that land and sea be infinitely wild...*

—Henry David Thoreau, *Walden*, 1854

## TABLE OF CONTENTS

Abstract	ii
Acknowledgements	iv
Dedication	vi
Table of Contents	vii
List of Tables	ix
List of Figures	x

### CHAPTER 1: INTRODUCTION

1.1 Sustainable Development, Cities, and Climate Change .....	3
1.2 Statement of Purpose.....	7
1.3 Research Questions .....	8
1.4 Study Location .....	11
1.5 Methodology .....	14
1.6 Organization of the Dissertation .....	21

### CHAPTER 2: SUSTAINABILITY, INSTITUTIONS, AND COLLECTIVE ACTION: AN INTEGRATED THEORETICAL FRAMEWORK.....

23

2.1. Conceptualizing Sustainability .....	23
2.2. Sustainability and Urban Economic Growth .....	26
2.3. Institutions and Collective Action.....	29
2.4. Institutions, Organizational Fields and Social-Ecological Systems: An Integrated Approach.....	33

### CHAPTER 3: HUMAN SETTLEMENT AND MUNICIPAL GOVERNANCE .....

46

3.1. Human Settlement and Urban Growth on the Island of Santa Catarina.....	46
3.2. 20 <sup>th</sup> Century Florianópolis: Modernity, Tourism, and Master Plans.....	59
3.3. 21 <sup>st</sup> Century: Urban Reform, Sustainability, and Participatory Planning .....	77



CHAPTER 4: LAND, POWER, AND PRIVILEGE .....	91
4.1. The Resource System: Land Conservation in Florianópolis .....	92
4.2. Multi-Level Review of Environmental and Land Use Laws and Regulations.....	102
4.3. Civil Participation in Environmental Governance .....	108
4.4. Environmental NGOs and Neighborhood Associations in Florianópolis .....	112
4.5. Amenity-Driven Development.....	119
4.6. Conservation and Contestation .....	126
4.7. Key Findings .....	133
CHAPTER 5: ENERGY, TECHNOLOGICAL CLUSTERING, AND KNOWLEDGE SPILLOVER.....	138
5.1. The Electricity System in Florianópolis.....	139
5.2. Multi-level Review of Energy Laws and Regulations .....	147
5.3. Energy Sector Actors and Governance in Florianópolis .....	156
5.4. The Market: System, State and Social .....	173
5.5. Key Findings.....	182
CHAPTER 6: EQUALITY, SUSTAINABILITY, AND RESILIENCY .....	191
6.1. Housing, Equality, and Environmental Justice .....	192
6.2. Vulnerability and Risk in Florianópolis.....	198
6.3. Integrating Disaster Preparedness and Adaptation Planning .....	205
Chapter 7: THE SUSTAINABILITY SLIPSTREAM AND THE .....	219
CHALLENGE OF DURABILITY .....	219
7.1. Culturally Constituting Institutions for Sustainability .....	219

7.2. Social Capital and Sustainable Development: Empirical Evidence .....	225
7.3. Migration, Housing, and Durability in Sustainable Urban Form .....	235
7.4. Policy Implications.....	237
 APPENDIX A: LAND USE QUESTIONNAIRE	 244
APPENDIX B: ENERGY QUESTIONNAIRE	245
APPENDIX C: ABBREVIATIONS AND ACRONYMS	246
APPENDIX D: TIMELINE OF CREATION OF MUNICIPAL BODIES AND PARKS IN FLORIANOPOLIS, 1965-2016	252
BIBLIOGRAPHY	256

## LIST OF TABLES

Table 1. Pillars of sustainable urban growth.....	24
Table 2. Key social or environmental associations in Florianópolis, 1980s .....	73
Table 3. Key elements of the City Statute (Law No. 10257).....	79
Table 4. Conservation units of Florianópolis (as of January, 2017). Locations are indicated in Figure 14. ....	95
Table 5. Areas of Permanent Preservation in Florianópolis .....	98
Table 6. Public sector environmental organizations .....	104
Table 7. Installed capacity in Brazil (as of September 2016) .....	140
Table 8. Companies awarded contracts in the August 2015 Solar Auction.....	151
Table 9. Key Electricity Laws and Regulations in Brazil.....	152
Table 10. Average tariff rate by consumer class and region (as of September, 2016).....	176
Table 11. Key risks associated with anthropogenic interference with the climate system (IPCC, 2014) .....	206
Table 12. Primary municipal entities responsible for disaster preparedness and risk mitigation	211

## LIST OF FIGURES

Figure 1. Map of Brazil indicating location of Florianópolis .....	12
Figure 2. Social-Ecological Systems Framework .....	37
Figure 3. Second tier variables of the SES framework .....	39
Figure 4. Luis Teixeira's 1574 map of the captaincies-general of Brazil .....	49
Figure 5. Map of Nossa Senhora do Desterro .....	53
Figure 6. View of Desterro and its port (Vista de Desterro e seu porto), Oscar Canstatt, 1875 ....	58
Figure 7. The Public Market of Florianópolis and Praça XV do Novembro, 1920s.....	59
Figure 8. Construction of the Point Hercílio Luz suspension bridge, 1920-1926.....	61
Figure 9. Florianópolis in 1976.....	66
Figure 10. Relevant Changes in the Administrative Structure of the Municipal Government (1965-2015) .....	68
Figure 11. Population of Florianópolis, 1872-2010 (IBGE, 2011).....	70
Figure 12. Florianópolis city center, 2006. ....	82
Figure 13. Clockwise from upper left: Typical island restinga, mangroves, lower-strata forest regrowth, woodpecker in Lagoa do Peri Municipal Park, Glittering-throated Emerald in Ecological Station of Carijós, and Lagoa do Peri with some of oldest remaining Atlantic Forest remnants on the island in the background.....	94
Figure 14. Location of Conservation Units of Florianópolis (numbers correspond to Table 4)....	97
Figure 15. Encroachment in Permanent Preservation Areas and Preservation Areas for Limited Use .....	128
Figure 16. Location of the Siri community.....	129
Figure 17. Map of the primary ZEIS indicated in the Master Plan and the eight neighborhoods losing property value in Florianópolis .....	131
Figure 18. Location of generation plants and transmission lines in Santa Catarina (state lines are indicated in black).....	144

Figure 19. 1 MW solar plant located at the headquarters of Electrosul, Florianópolis.....	145
Figure 20. Number of residential and commercial solar installations in Florianópolis, 2013-2016 .....	145
Figure 21. Municipal Nursery Hassis and LED bridge lighting .....	161
Figure 22. Distribution and number of solar companies in Brazil (as of February 2017) .....	166
Figure 23. Number of registered solar companies in Brazil by number of years of experience (as of February 2017) .....	167
Figure 24. The Siri neighborhood built on dunes and the Serrinha neighborhood after landslides in 2015 .....	194
Figure 25. Inundation projections for 10-year period and 200-year period.....	200
Figure 26. Areas susceptible to mass movements in Florianópolis .....	203
Figure 27. Map of North Morro do Cruz and South Morro do Cruz indicating sectors that are at low risk of landslides, medium risk, high risk and very high risk .....	205
Figure 28. Number of people affected by floods, landslides, and storms in Brazil (1990-2016)	208
Figure 29. Technology Hub, Creative City, and Sustainability rankings for U.S. cities .....	232

## CHAPTER 1: INTRODUCTION

The aspirational ambitions captured by the Sustainable Development Goals (SDGs) represent simple universal ideals and transcultural human desires. The challenge is reconciling these ambitions with reality. Situating sustainability goals in a local context in a way that takes root and flourishes among the residents who will bring the goals to fruition is beleaguered by complex interactions, feedback loops, negative externalities, and competing development agendas. How have some sustainability initiatives been successful and why have others failed? Without coherent policy direction at the local level, and well documented cases of success in the pursuit of sustainability in urban settings, struggles to overcome barriers to green growth will continue to plague the developing world.

This dissertation is an exploration of the intersection of competing development agendas emerging from local governance institutions, non-governmental organizations, and private companies as well as the accompanying collective action that moves the needle toward sustainability in the local development agenda. To explore these forces, the historical catalysts for environmentally sustainable growth strategies between the years 1965 and 2016 in Florianópolis, Brazil were reviewed. By taking a close look at collective strategic action transforming urban practices, and the institutional consequences, this analysis sheds light on the accretive nature of the transition to sustainability. The goal is to better understand the complex local institutional environment and strategic action fields that give voice to sustainability, legitimize its fundamental rationalities, and authorize action toward a transition pathway.

One type of transformation pathway, identified in this research, is forged by diverse strategic actors who work, either in parallel or together, toward common interests, often despite a lack of alignment in fundamental values. In Florianópolis, the willingness of municipal authorities to preserve large tracts of land and reverse environmental degradation was the result of both pressure from environmental activists as well as land developers pushing to capitalize the island's natural amenities. Over time, city officials leveraged the natural amenities to attract technology companies. This complementary development strategy resulted in the clustering of energy research centers and solar companies who have accelerated the adoption of smart growth products such as solar hot water heating and solar panels. The socio-technical movement driving solar adoption is not tightly collaborative and replaces the activist strategies that characterized transition in the land sector with market-based strategic action. Strategic action is inextricably dependent on multi-level laws and regulations that provide the legal means by which transformation can be propelled, in the initial stages, and then safeguarded, in the later stages. Institutional structures that support sustainable practices were shaped in Florianópolis by federal, state, and local laws and the urban socio-economic characteristics that aligned the cultural values of local environmentalists with the profit motivations of land developers.

This introductory chapter, in Section 1.1 below, provides the reader with an overview of the global context as it relates to sustainable development and situates the dissertation research specifically in relation to local level policy design and urban planning for environmental sustainability and climate change. Section 1.2 summarizes the purpose of the research while Section 1.3 specifies the research questions. The study

location is described in Section 1.4 to familiarize the reader with the site of the case study. Section 1.5 summarizes the methodology and describes activities undertaken during the field research period. Section 1.6 concludes with an overview of the organization of the dissertation.

## **1.1 Sustainable Development, Cities, and Climate Change**

Sustainable development encompasses economic, social, and environmental objectives that seek to encourage long-term development that is economically and socially inclusive as well as minimally impactful to global ecosystems (Barbier, 1987; United Nations General Assembly, 2015b). The most cited definition states that sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development (WCED), 1987). Decades of high-level consensus building on the issue of sustainable development and climate change within the forums and conventions of the United Nations, and other multilateral organizations, have fostered a growing commitment to unified action.<sup>1</sup> The Sustainable Development Goals (SDGs), formally adopted by the United Nations General Assembly (2015a) in the *2030 Agenda for Sustainable Development*, are 17 goals that identify key development issues such as climate action, poverty reduction, and inequality. As stated in the United Nations *The Sustainable Development Goals Report* (2016b), "climate change presents the single

---

<sup>1</sup> Key conferences pertaining to sustainable development and climate change include the United Nations Conference on Environment and Development (Earth Summit) held in 1992; The United Nations Framework Convention on Climate Change (UNFCCC) which took effect in 1994 and is linked to the Kyoto Protocol and the Paris Agreement; The World Summit on Sustainable Development in 2002; The United Nations Conference on Sustainable Development (Rio+20) in 2012; and the United Nations Sustainable Development Summit in 2015 which led to the Sustainable Development Goals (SDGs). The SDGs are based on the Millennium Development Goals (MDGs) established in 2000. Other key conventions are the Convention on Biological Diversity (CBD) and the Convention to Combat Desertification (CCD).



biggest threat to development, and its widespread, unprecedented effects disproportionately burden the poorest and the most vulnerable” (p. 9). Identifying ways to lower greenhouse gas (GHG) emissions while supporting equitable economic growth is the preeminent challenge of this century. It requires unprecedented levels of international, national, and local cooperation and widespread embrace of fundamentally different development epistemologies that will cause us to reformulate or abandon the rationalities that drive our current market society.

With the Paris Agreement (2015a), the United Nations Framework Convention on Climate Change (UNFCCC) sought to strengthen global commitment to mitigation and adaptation planning. The Agreement, brought into force in 2016, calls for parties to set nationally determined contributions (NDCs) that are met based on domestic mitigation measures. Climate change mitigation efforts will not be successful in keeping global temperature rise below 2°C above pre-industrial levels without replacing fossil fuels as a primary energy source and regulating sustainable land use. Globally, the primary sources of GHG emissions are electricity and heat production (24%), agricultural activities and other land use (24%), industrial activity (24%) and transportation (14%) (United States Environmental Protection Agency (US EPA), 2016; UNFCCC, 2016).<sup>2</sup> Of global GHG emissions, 76% is carbon dioxide (CO<sub>2</sub>). Burning fossil fuels and industrial activity emit 65% of total CO<sub>2</sub> with deforestation, land clearing and soil degradation contributing another 11%. Estimates suggest cities, or urban processes such as production, consumption, transportation, and land use, are responsible for 75% of global GHG

---

<sup>2</sup> Greenhouse gases include direct greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF<sub>6</sub>); as well as indirect greenhouse gases such as SO<sub>2</sub>, NO<sub>x</sub>, CO and NMVOC.

emissions (United Nations Environment Program (UNEP), 2016). As cities grow, their carbon footprint grows, infrastructure accumulates, demand for electricity increases, cars proliferate, and land is cleared and developed (Foley et al., 2005; Grimm et al., 2008). In addition to contributing to global GHG emissions, urban land use has other far reaching impacts. Seto, Fragkias, Güneralp, and Reilly (2011) write

on the continuum of anthropogenic activities, urbanization is the most irreversible and human-dominated form of land use. Urbanization results in changes in land-cover, hydrological systems, biogeochemistry, climate, and biodiversity. Worldwide, urban expansion is one of the primary drivers of habitat loss, and species extinction (p. 1).

The area of urbanized land could triple between 2000 and 2030 based on findings that suggest urban land area is growing twice as fast as population rates in some areas (Seto, Güneralp, & Hutyrá, 2012).

It is imperative that urban processes, the growth, and metabolism of the city, are sustainable and carbon-neutral. Globally, 54% of people live in cities. This figure is up from 30% in 1950 and projected to be 66% by 2050 (United Nations Department of Economic and Social Affairs (UNDESA), 2014). In 2014, there were 28 mega-cities, cities with more than 10 million residents. In comparison, the 2014 Revision of World Urbanization Prospects prepared by the Population Division of the Department of Economic and Social Affairs of the United Nations (UNDESA) indicates there are 1,623 cities with between 300,000 and 5 million people. Cities with the fastest growth rate are these mid-sized cities (UNDESA, 2014). In comparison to metropolitan areas in Asia and Africa, the Latin American and Caribbean region experienced rapid urban growth in the past three decades with urbanization increasing from 64% to 79% between 1980 and 2010 (Inter-American Development Bank (IDB), 2016). For this region, projections suggest that 87% of the population will live in urban areas within the next 30 years.

In these rapidly growing urban areas, local level institutions, organizations and individuals must design innovative action plans that guide development towards sustainable pathways. The process by which sustainability goals become laws, regulations, projects, and programs involves the use of institutional authority to change the rules that govern human action and interaction. Nations continue to adopt various sustainability laws and regulations that obligate state and local level institutions to act. While there has been significant analysis regarding international institutional frameworks for sustainable development (Keohane & Victor, 2011; Haas, Keohane, & Levy, 1993; Yamin & Depledge, 2004) and attention to the need for multi-level institutional analysis (Bäckstrand & Lövbrand, 2015; Starik & Rands, 1995; Verbong & Geels, 2007), there is comparatively less research on how urban institutional environments transition to sustainability and how local actors propel, constrain and reorganize in response to the transition. Local governments are influenced by diverse state and non-state actors that have power over the local development agenda (Adger, 2010; Ostrom, 2009; Rudel, 2013). This dissertation, focused in the city of Florianópolis, Brazil, is a historical institutional analysis that explores the ways in which the local government in a rapidly growing mid-sized city has established, or sought to counter, modes of governance that promote and institutionalize sustainability. As sustainable development is a broad multi-dimensional objective, this study is specifically concerned with environmental sustainability and sustainability plans and projects that have an impact on GHG emissions in the study area.

## 1.2 Statement of Purpose

Brazil, the largest country in the Latin American and Caribbean region by both population and land area, already hosts 84% of its population in cities because of decades of economic growth. With over 5,500 cities, two of which are megacities and 54 with populations between 300,000 and 5 million, urban areas in the country continue to face intense pressure from urbanization (IDB, 2016; Martine & McGranahan, 2010; UNDESA, 2014). This dissertation analyzes the emergence of environmentally sustainable practices in one of Brazil's mid-sized cities, Florianópolis. A historical narrative of changes in the institutional environment, this case study identifies some of the key political, economic, and ecological conjunctures that have either promoted or constrained sustainable urban development in the city. The aim is to develop a historically contingent theory of sustainable development in cities characterized by amenity-led growth and a robust technology sector. While the urban development pathway exhibited in Florianópolis is not representative of all mid-sized cities, the features that differentiate the city suggest it may have been more successful in implementing sustainability initiatives than many similarly sized cities in Brazil, as discussed in greater detail below. Additionally, the development pattern and sustainability outcomes found in Florianópolis parallel the experiences of similar natural-amenity rich, technology hubs outside of Brazil such as Silicon Valley and Boulder, Colorado. For this reason, the city served as an ideal case for the empirical exploration of urban institutional change while contributing to the construction of a social theory that accounts for cross-case similarities in development trajectories that have transformative sustainability outcomes.

The historical institutional approach used in this dissertation draws from literature on institutions, collective action, urban growth, and sustainability as they relate to periods of transformation, particularly from entrenched planning practices to planning practices biased towards action to protect and conserve environmental assets. Institutions and organizations are the primary focus as they respond to collective action and guide the transition to urban sustainability by constraining choice and supporting program implementation. Institutions, discussed in greater depth in Chapter 2, can be understood to be constraints that are devised by humans to shape human interaction (North, 1991). This dissertation analyzes structural changes in institutional configurations over time and identifies how environmental rationalities are reconciled with pro-growth market rationalities in local institutional environments. The structure of the local government is reviewed to identify points in time during which environmentally sustainable changes were initiated and institutionalized. Following the identification of historical points at which new institutions originated or existing ones transformed (Chapter 3), the analysis looks in greater depth at the motivations for the iterations and the strategic action fields that drove the change.

### **1.3 Research Questions**

This dissertation is an analysis of how national and local policies and planning directives, in combination with external drivers such as investment activity and amenity migration, appear to have constructed a political-economic ecology that generated opportunities that, taken together, propelled the city toward a more sustainable development pathway. The primary research questions of this case study are:

1. What municipal secretariats, centers or organizations have initiated projects, programs, or initiatives that promote or regulate environmentally sustainable development and when were they established?
2. Are local level institutional practices transforming over time in ways that encourage or enforce urban sustainability?
3. How are non-state organizations and new forms of environmental leadership acting collectively to influence the municipal government to establish sustainable urban practices?

As an in-depth analysis of sustainability initiatives across all sectors is beyond the scope of this dissertation, the analysis focuses on the key sectors that are both performing well in terms environmental sustainability in the study area and have a synergistic relationship to the growth models embraced by the city: land preservation and the adoption of smart growth strategies such as solar distributed generation. This analysis evaluates the dynamic conditions of emergence and institutional durability by considering various types of collective strategic action that have emerged to promote initiatives resulting in sustainable outcomes.

Land preservation in the metropolitan area is particularly useful for understanding sustainability transition as it has been regulated by a combination of federal, state, and municipal authorities, sometimes acting in accordance with a traditional “top-down” planning approach and other times responding to local “bottom-up” pressure. The 1980s ushered in an era of rapid urban growth and a rise in local non-state and private sector actors engaging with municipal authorities in ways that impacted land conservation, both positively and negatively. The research explored (1) the historical policy and planning

practices that led to the presence of large tracts of preserved land in the Florianópolis metropolitan area and how the preservation impacted urban growth patterns; (2) the degree to which local level policies and planning practices enabled municipal institutions to make advances in urban sustainability in terms of land use; (3) how land preservation laws changed over time; and (4) the strategic actors who were responsible for initiating and monitoring land preservation programs in order to discern how governing bodies and non-state actors create new forms of polycentric governance.

Following the embrace of the amenity-led growth model and institutionalization of land preservation policies, city authorities leveraged the amenity rich environment to court technology companies. The energy sector is changing in the Florianópolis metropolitan area as the result of the dynamic interactions between these technology firms, energy companies, land developers, and other research centers with a focus on renewable energy technologies. The environmentally oriented social capital that proliferated in the study area because of the environmental movement has a tolerance and drive for the adoption of green technologies, discussed further in Chapter 5. The municipal government, with a limited institutional legacy for engaging partners in the energy sector, is challenged to harness multiple “bottom-up” market-driven forms of action towards the development of sustainable urban energy practices. The research explored how various stakeholders such as the municipality, local technology and innovation organizations, regulatory bodies, and private energy companies have spurred action towards the increased adoption of smart growth strategies and distributed generation.

## **1.4 Study Location**

Brazil is a country of global and regional importance. It is the fifth most populous country and the ninth largest gross domestic product (GDP) despite a deep recession that began in 2015 (World Bank, 2015). The country is home to over 200 million people as well as the largest tropical rainforest in the world that covers over 5 million square kilometers (World Bank, 2013). Brazil was a leading voice in the formulation of the global climate framework and the resulting Paris Agreement. With over 80% of electricity already produced from renewable sources, Brazil's goal to reduce GHG emissions by 37% below 2005 levels by 2025 will be realized largely by controlling deforestation (Federative Republic of Brazil, 2015). Brazil, as an upper-middle income economy, has experienced a steadily declining poverty rate since 1990 (World Bank, 2015). With some of the most far reaching environmental laws in the world, an increasing per capita income, and far reaching jurisdictional authority at the city level, Brazil is a good arena in which to explore local level sustainability planning.

While many cities in Brazil are initiating local level sustainability projects and policies, this dissertation is primarily concerned with rapidly urbanizing mid-sized cities that can direct urban growth toward a sustainable pathway before unsustainable infrastructure and land use patterns become locked-in and expensive to reverse. Florianópolis, a coastal city, is the capital of the State of Santa Catarina in the Southern region of Brazil. The city has a long history of environmentally oriented city planning that began prior to the adoption of many of the federal environmental laws that exist today. Mostly occupying the Island of Santa Catarina with the greater metropolitan area located on the continent, the city is settled among fragments of the Atlantic Forest that



have experienced regrowth because of several factors including changes in agricultural activity in the city region (Baptista, 2008a). The urban footprint of the city includes a densely urbanized central area that spans from the island to the continent where less dense sprawl dominates urban growth inland and along the coastal highways to the north and south.

Figure 1. Map of Brazil indicating location of Florianópolis



Source: Google Earth

According to the 2010 census, the total population is 405,286 in the municipality of Florianópolis (Instituto Brasileiro de Geografia e Estatística (IBGE), 2016). A popular tourist destination, the population of the city triples during the tourist high season between the months of December and March (IDOM-COBRAPA, 2014c). The term city in this analysis refers to the Municipality of Florianópolis unless otherwise indicated. The State of Santa Catarina defines the area considered the metropolitan nucleus as well as

the metropolitan expansion area.<sup>3</sup> The metropolitan expansion area includes 22 municipalities with a population of 1,111,702 (IBGE, 2010). The 22 regional municipalities are represented in the Association of Municipalities of the Greater Florianópolis Region (GRANFPOLIS) by 12 public officials who take part in efforts to coordinate primarily transportation planning, healthcare, and tourism.

The only non-industrialized capital in southern Brazil, the service sector primarily supports the local economy. For 2014, the service sector represented 62% of the R\$ 17.3 billion (US\$ 7 billion) gross domestic product for Florianópolis (IBGE, 2014). Florianópolis ranks third among Brazil's 5,565 municipalities in terms of human development according to the Municipal Human Development Index (MHDI, 2010). As such, the region has attracted skilled labor which has helped consolidate Florianópolis as a technological and innovation hub. In terms of per capita income, Florianópolis experienced a significant increase between 1990 and 2010, rising from R\$ 921.95 in 1991 to R\$ 1,798.12 in 2010. Although the Gini index decreased from 0.55 in 1991 to 0.54 in 2010, indicating a decrease in inequality in the city, there is still a high level of inequality when compared to developed nations (MHDI, 2010).<sup>4</sup>

---

<sup>3</sup> The 22 municipalities of the metropolitan expansion area are Águas Mornas, Alfredo Wagner, Angelina, Anitápolis, Antônio Carlos, Biguaçu, Canelinha, Florianópolis, Garopaba, Governador Celso Ramos, Leoberto Leal, Major Gercino, Nova Trento, Palhoça, Paulo Lopes, Rancho Queimado, Santo Amaro da Imperatriz, São Bonifácio, São João Batista, São José, São Pedro de Alcântara, and Tijucas. The metropolitan nucleus is composed of only the nine municipalities of Águas Mornas, Antônio Carlos, Biguaçu, Florianópolis, Governador Celso Ramos, Palhoça, Santo Amaro da Imperatriz, São José e São Pedro de Alcântara.

<sup>4</sup> The data for the MHDI is based on the Demographic Census conducted by the Brazilian Institute of Geography and Statistics (IBGE). The income data from the 1991 Census was in cruzeiros of September 1, 1991. For the 2000 Census, the data was in reais of August 1, 2000. Both were converted into reais from August 1, 2010. The National Consumer Price Index (INPC) series was used to adjust for inflation. However, as the series underestimated inflation (by 22.25%) a correction factor was applied for use in the MHDI (MHDI, 2010).

In 2013, the Inter-American Development Bank (IDB) supported the IDOM-COBRAPA consortium to conduct a GHG Emissions Inventory for Florianópolis. The study indicated that 88% of emissions in the Florianópolis metropolitan area are from the burning of fossil fuels (IDOM-COBRAPE, 2014a) with the transport sector emitting 1.8 million tCO<sub>2</sub>e/year. Unfortunately, the inventory failed to consider that Florianópolis is powered not by hydroelectric power like most other cities in Brazil, but by coal-fired thermoelectric generating plants. The impact of this error is significant as accounting for emissions from the consumption of electricity using an emissions factor for coal instead of hydroelectric power indicates electricity consumption is the largest contributor to GHG emissions in the city, not the transportation sector.<sup>5</sup> Sequestration from conservation areas in the city removed nearly 350,000 tCO<sub>2</sub>e in 2013, highlighting the importance of the city's green areas in reducing carbon intensity.

## **1.5 Methodology**

### *1.5.1. Case Study Methodology*

This dissertation is a narrative of the historical changes in networks of associations that can be linked to (1) the adoption of laws, regulations, and initiatives by the local government that support environmental sustainability and (2) an increase in social or institutional capital in support of sustainable development. Using case study methodology, the analysis explores the complex ways stakeholder organizations restructure either in pursuit of sustainable outcomes or in response to sustainability initiatives in the local institutional environment of Florianópolis. Case study

---

<sup>5</sup> Although emissions factors for generating sources vary across sources, the emissions factor for hydroelectric power is approximately 4 while a bituminous coal-fired thermoelectric plant is 318 (IPCC NGGIP, 2017; Center for Climate and Energy Solutions (C2ES), 2017).

methodology is useful for in-depth exploration of situations characterized by numerous interaction effects where a limited set of variables would be insufficient to explain outcomes or in which several sequences of events could lead to the same outcome (George & Bennett, 2005). The aim of this dissertation is to contribute to the development of theory that seeks to understand what historical contingencies promote the emergence of new forms of urban processes that foster and uphold environmental sustainability. Using process-tracing to chronicle the emergence of a socio-economic logic of environmental sustainability in a natural amenity rich city with a growing technology sector, this study concludes with a review of global cities experiencing a similar development trajectory. Multiple hypotheses that could have led to the adoption of sustainable practices at the local level are explored to avoid confirmation bias and a literature review of predominant urban sustainability transition literature was conducted to examine alternative hypotheses. Although a single case study cannot confirm causal linkages, and the possibility of omitted variables is a concern in any research, the cross-sectoral approach allows for many observations across various institutional arrangements and in turn the development of plausible explanations for the initiation and institutionalization of sustainability rationalities. Given the theoretical interest in moments during which new possibilities and new actors emerge in a way that hastens sustainable outcomes, this study traces causal processes in two sectors rather than structuring a with-in case comparison explicitly, particularly given the significant differences in variables across sectors.

### 1.5.2. *Institutional Approach*

Scott (2001) identifies three analytically distinct aspects of institutional change: institutional logics, institutional actors, and governance structures. To evaluate these representative aspects of institutions, this dissertation explores the underlying processes of human agency and interaction that take place over time. Changes in *institutional logics* refers to the changes in both the belief systems informing or inspiring a shift toward more sustainable practices as well as the resulting action-oriented initiatives. Instruments such as sustainability indicators and carbon accounting, in part, aim to initiate and sustain paradigmatic shifts in institutional logic. This dissertation examined shifts in prevailing logics within both the local government and non-state actors. The governmental logic was determined by mapping changes in municipal laws that established new administrative bodies. To explore the agency of relevant non-state actors, a distinction was made between constitutional choice-rules, operational choice-rules, and collective choice-rules. The analysis of municipal laws was complemented by review of archival news, industry journals, and in-person interviews with key informants to gain insight into the catalysts for such changes. Periods of change in the governing logic, or local level regime change, were identified based on this analysis and serve as the basis for a broader exploration of the forces and actors that coalesced to propel periodic shifts in institutional logics.

The second component, *institutional actors*, are how the logic of the institution is enacted and reproduced. As local level actors have significant influence over the degree to which sustainability rationalities are institutionalized, the field of actors is explored in-depth in the focus sectors. The approach considers the strategic action fields in which the

actors operate (individual, state, non-state, market-oriented, non-profit) and the degree of influence the actors have within the local government decision-making arena. Actors are evaluated by the success of the organization in implementing sustainability initiatives, ability to foster collaboration with city offices, the ability to influence the master plan (currently under revision in the study area), and the history of joint ventures with city departments.

The third component of institutional change is *governance structures*. Multi-level analysis plays an important role in understanding sustainability governance structures as there are overlapping jurisdictions of federal, state, and local laws and regulations. Additionally, non-state forms of governance have played an important role in the history of the study area and include activist groups, parties using market-based instruments such as contracts, and trade associations exercising normative-legal control in specific sectors (Streeck & Schmitter, 1985). Federal environmental laws have a long history in Brazil and play a significant role in the enforcement of areas of permanent preservation in the study area. Federal, state, and municipal laws and regulations in the study sectors were reviewed in terms of the institutional legacies and the degree to which public participation has been historically encouraged. The impact of such governance regimes on the development of sustainability initiatives was evaluated.

The historical context of institutional change in Florianópolis is explored to elaborate a theory of the role of institutional change in the achievement of outcomes that support sustainability as characterized in the SDGs. Institutional change is carried out by agents who enact institutional logics drawn from overlapping, sometimes contradictory,

organizational fields. As such, collective action theory was used to explore the emergence of institutional change as well as the challenge of institutional replication and durability. Several frameworks are available to inform collective action research, many of which are discussed further in Chapter 2. To organize the research and to ensure key variables were not missed, the social-ecological systems (SES) framework was used (Ostrom, 2011). As stated by Ostrom (2009),

A core challenge in diagnosing why some SESs are sustainable whereas others collapse is the identification and analysis of relationships among multiple levels of these complex systems at different spatial and temporal scales. Understanding a complex whole requires knowledge about specific variables and how their component parts are related (p. 420).

The SES framework, based on the Institutional Analysis and Development (IAD) framework, is useful for its acknowledgement of nature as a driving force of change, its intention to provide a diagnostic analysis of the policy process, and its nested structure that frames complex cross-scale interactions among various actors. The SES framework was designed to evaluate common pool resources and is increasingly used in social-ecological research addressing public goods.

The core of the SES framework is the action situation in which interactions result in outcomes. The theoretical framework of strategic action fields was used to deepen the analysis of the dynamic nature of the action arena and to capture the networked nature of collaborating parties. The concept is specifically concerned with collective actors who “vie for strategic advantage in and through interaction with other groups in what can be seen as meso-level social orders,” or strategic action fields (Fligstein & McAdam, 2012, p. 2). Considering collective action as occurring in strategic action fields also allows for an analysis of power in a way that the cost-benefit approach of the SES framework does not. As one area of inquiry in this dissertation is a social-technical system (the electricity

system) the strategic action fields concept was also useful in framing a conceptualization of market-based collective action that is not in keeping with the organizational pattern of traditionally conceived social movement organizations. The theoretical framework used in this dissertation is elaborated in Chapter 2 which also includes a review of literature on sustainability, institutions, and collective action.

### *1.5.3. Field Research Period*

Data collection took place during an 18-month field research period in Florianópolis between July 2015 and January 2017. The document review and mapping of historical changes in the municipal governing institutions was completed during this time. The Historical Archive of the Municipality of Florianópolis maintains administrative documents from each of the following eras: Chamber (*Câmara*) of Desterro (1726-1828) that governed the original settlement of Nossa Senhora do Desterro, the Municipal Chamber (*Câmara Municipal*) of Desterro (1828-1888), the Municipal Council (*Conselho Municipal*) of Florianópolis (1889-1926) and the current City Hall (*Prefeitura Municipal*) that was established in 1927. Additionally, the following libraries located in Florianópolis were used during the research: IPHAN Library - Santa Catarina (Brazilian Cultural Heritage), Professor Barreiros Filho Municipal Public Library, Library of the Federal University of Santa Catarina (UFSC), the Environmental Library of the Environmental Foundation of the State of Santa Catarina (FATMA), the Library of the Urban Planning Institute of Florianópolis (IPUF), and the Public Library of Santa Catarina. The Public Library of Santa Catarina maintains a digital newspaper library (*Hemeroteca Digital Catarinense*) with periodicals dating back to 1890.



Semi-structured interviews, following questionnaires that included both open and closed ended questions (Appendix A and B), were conducted with individuals with expert knowledge (municipal employees, academics, real estate developers, energy companies, and activists). The interviews were conducted to gain a qualitative understanding of how planning for sustainability has evolved over time and what power relations are currently driving urban growth in the study area. Respondents for semi-structured interviews were selected using purposive and convenience sampling. Snowball sampling was used to target additional participants once the interview period began to identify people with relevant professional expertise. To complement the 20 semi-structured interviews, additional qualitative data was collected through informal interviews, participant observation, media coverage, and direct observation during site visits.

A document review was conducted to determine the local ecology and geographical characteristics of the study area, the history of human settlement, and urban growth patterns. Data collected during the preparation of the Florianópolis Action Plan (PMF & IDB, 2015), such as metrics on urban growth, the carbon footprint, and vulnerability and risk were reviewed in addition to available geographic mapping detailing changes in urban form and land conservation units over time (IDOM-COBRAPA, 2014c; Baptista, 2008a; SOS Mata Atlântica, 2016). A review of key environmental groups and neighborhood associations, and their action strategies, was undertaken. Related variables that impact decision making in the strategic action field were reviewed including tourism, corruption allegations, environmental justice, and climate adaption planning. Decisions to design and implement energy sector initiatives were evaluated based on several factors including degree of jurisdictional control,

availability of public finance, and multi-level laws and regulations (Aznar et. al, 2015). A document analysis was conducted to review available information regarding support for renewable energy, feasibility studies analyzing the potential for expansion of renewable generation capacity, and interest in distributed generation.

## **1.6 Organization of the Dissertation**

There is an overwhelming imperative to identify ways of better protecting and sustaining the health and welfare of humans and the ecosystems in which we live. Finding institutional and operational cross-system synergies allows for opportunities to develop policies that can address the sometimes-divergent challenges of providing for basic needs, while also addressing global threats such as climate change. An iterative reflexive policy development process that builds on action-oriented analysis at the local level can help address some of the challenges in navigating the field of uncertainty that often characterizes decision-making for sustainability. An integrated approach to transitioning cities toward sustainable development must comprehensively address competing challenges of environmental, social, and economic development.

The following chapter, Chapter 2, defines the terms used in the research, reviews relevant theories, and develops an integrated approach to understanding the role of collective action and institutions in sustainable urban development. Chapter 3 details the case study city in terms of the historical urban growth dynamics and urban footprint, human-ecological interactions, and relevant administrative and institutional shifts within the municipal government. To identify which historical events and institutional interactions fostered environmentally sustainable practices in the study area, Chapters 4 and 5 are a thick description of the land and energy sectors in the study area as they are

both critical for low-carbon growth and demonstrate ways in which collective strategic action has led to a sustainable pathway. The municipal institutions of Florianópolis are reviewed as well as private sector and non-governmental organizations that influence strategic planning. Chapter 6 builds on the key findings of Chapters 4 and 5 to explore the question of institutional durability and the limits of amenity-led growth. Chapter 7 elaborates a theory of sustainable urban development that piggy backs on an economic growth strategy that privileges certain key practices such as the preservation of natural amenities and technological innovation.

## **CHAPTER 2: SUSTAINABILITY, INSTITUTIONS, AND COLLECTIVE ACTION: AN INTEGRATED THEORETICAL FRAMEWORK**

Sustainability in Florianópolis is explored in this dissertation through a historical lens in order to explore how the process of collective action transpires in response to multi-level laws and urban growth strategies to determine development trajectories and institutional structures. Understanding the tactics used by actors, who work together to accomplish strategic goals and restructure institutions, is central to understanding the process by which a system can be made more sustainable. Sections 2.1 and 2.2 of this chapter review the primary literature relevant to understanding what is meant by sustainability in the context of this dissertation. Section 2.3 reviews institutional and collective action theories that inform the integrated analytical framework outlined in Section 2.4.

### **2.1. Conceptualizing Sustainability**

Sustainable urban form is established and maintained through the interplay of international norms and standards, multilevel political structures, and new forms of polycentric architecture emerging from networks of non-state actors. In 1980, sustainability was conceived in the World Conservation Strategy as the maintenance of ecological processes, the preservation of genetic diversity, and the sustainable use of ecosystems (International Union for Conservation of Nature (IUCN), 1980; Mazmanian & Kraft, 2009). In the years that followed, sustainability as a development goal was broadened, most notably in *Our Common Future* prepared by the Brundtland Commission (WCED, 1987). This expansion of the concept beyond its ecological grounding into social and economic contexts required a re-orientation in thinking about

ecological limits and multi-generational planning horizons (Bai et al., 2010; Bartelmus, 1986; Martens, 2006). The same year *Our Common Future* was published, Barbier (1987) called for a new analytical approach to the complexity of sustainable economic development. Barbier, recognizing that efforts to develop sustainably would result in the continuous reconfiguration of trade-offs, suggested one possible approach is to view development as the result of the interaction between biological systems, the economic system, and the social system.

While numerous frameworks and sets of indicators are available to further specify the concept of sustainability, the pillars of sustainability outlined by the Inter-American Development Bank (IDB) Emerging and Sustainable Cities (ESC) initiative frame the discussion in this case study. Specific topical areas addressed in the three pillars of environment and climate change, fiscal sustainability, and urban development, are listed below in Table 1.<sup>6</sup>

Table 1. Pillars of sustainable urban growth

Pillar	Topics
Environment and Climate Change	Water Energy Air Quality Greenhouse Gas Emissions Solid Waste Management Sanitation and Drainage Vulnerability to Natural Disasters Mitigation of Climate Change Noise
Urban Development	Land Use Planning and Zoning Urban Inequality Mobility / Transportation Employment Connectivity

<sup>6</sup> Urban sustainability has been portrayed in complementary ways over the years. For example, the ten principles of smart growth developed in the late 1990s by the Smart Growth Network, co-founded by the United States Environmental Protection Agency (EPA), places greater focus on urban design issues such as compact building design, walkable neighborhoods, and mixed land use. Other terms often used interchangeably with urban smart growth and sustainability include eco-city, green city, and low-carbon city.

	Education Security Health
Fiscal Sustainability	Participatory Public Management Modern Public Management Transparency Taxes and Financial Autonomy Expenditure Management Debt

Source: Inter-American Development Bank

The challenge of balancing the environmental, economic, and social dimensions of sustainable development has been explored using numerous approaches including economics (Barbier, 1987; Pearce et al., 1989), spatial studies and ecological footprints (Rees, 1992), metrics of evaluation (Bell & Morse, 2012), environmental justice (Cole & Foster, 2001), sustainability in human development (Sen, 2001), and eco-socialism (Pepper, 1993). Bulkeley (2010) suggests the study of urban sustainability, in particular, should consider governance along both vertical and horizontal orientations of authority. Vertical governance of sustainability, which concerns the division of responsibilities and jurisdictions of federal, state, and local authorities, includes both formal laws as well as multilevel initiatives such as *Agenda 21: A Programme of Action for Sustainable Development* (UNCED, 1992). Agenda 21, as an outcome of the 1992 UNCED, assigns nation-states the responsibility of designing a model of sustainable development that is, in turn, implemented through local action plans (UNCED, 1992). Horizontal fields, on the other hand, are networks of actors able to collectively enact “strategies of action” (Swindler, 1986, p. 276). Actors use their networks to influence local policy, oftentimes without a direct form of authority. While local networks of actors can be informal, international networks, such as Local Governments for Sustainability (ICLEI), Cities for Climate Protection Programme (CCP), the USA Sustainable Cities Initiative, and the 100

Resilient Cities network, often offer formal mechanisms of collaboration and information sharing.

## **2.2. Sustainability and Urban Economic Growth**

Central to the study of sustainability over the past three decades is the question of ecological limits to growth and the carrying capacity of the environment (Rees, 1992; Rees & Wackernagel, 1996). While Malthusian arguments suggest there will eventually be an end to the ability of the ecosphere to absorb the ever-increasing material needs of human society, technological advancements have thus far facilitated growth that is seemingly without limits. While some scholars argue depleted natural capital can be substituted by manufactured capital (Pearce, Markandya, & Barbier, 1989), others suggest this form of “weak sustainability” neglects to acknowledge critical differences between natural and manufactured resources (Rees, 1992). In studying the energy and material consumption of cities relative to the productive capacity of the land they occupy, Rees and Wackernagel (1996) write:

ecological footprint analysis shows that they [cities] act as entropic black holes, sweeping up the output of whole regions of the ecosphere vastly larger than themselves. Given the causal linkage between global ecological change and concentrated local consumption, national and provincial/state governments should assess what powers might be devolved to, or shared with the municipal level to enable cities better to cope with the inherently urban dimensions of sustainability (p. 245).

Shifting to less environmentally depleting or damaging economic growth strategies is one tactic in which municipal governments have significant authority to change local policy in support of sustainable development. While much urban and regional growth theory has focused on agglomeration economies and interregional linkages (Krugman, 1991), Graves and Linneman (1979) found that, while low-income households may prioritize access to affordable housing and employment in migration

decisions, an increase in income can lead households to place greater emphasis on the importance of natural amenities. Partridge (2010) defines amenities as “anything that shifts the household willingness to locate in a particular location. By definition, they are broadly defined and include weather, landscape, public services, public infrastructure, crime, ambience, and so on” (p. 518). As described by Glaeser, Kolko, and Saiz (2001), there are four critical urban amenities: a variety of consumer goods and services, pleasant physical attributes, good public services, and fast efficient transportation. Paris was singled out by these authors as an example of a city that benefits substantially from its robust service sector, its unique products such as art museums, and its aesthetic appeal.

As described in the chapters that follow, Florianópolis has followed an amenity-led course of urban development that resulted from the actions of local authorities, as well as the private sector, who worked strategically to enhance the appeal of the city as a tourist destination. The consumer value of natural amenities in the local economy and the relationship between economic growth and environmental protection has been well documented (Deller et al., 2001; Green, 2001; Green et al., 2005; Johnson & Beale, 1998). Although Storper and Scott (2009) argue that agglomeration economies can lead to an increase in amenities just as amenities can attract new firms and skilled labor, Partridge (2010) found that in the United States “growth patterns have been very consistent with amenity-led migration to places endowed with high levels of natural amenities such as nice climates, pleasant landscapes, lakes/oceans and mountains” (p. 533).

Influencing the policies of the local government, players in the tourism industry in Florianópolis worked to develop an amenity-rich city that was, in turn, leveraged to



attract the skilled labor needed to grow the local technology sector. Clemens (2007)

suggests overlapping networks such as these

are a source of potential disruption and change. Sassen (2006) evokes similar imagery in different terms, describing capabilities developed within one social order that then jump tracks to other configurations as the initial order is deinstitutionalized. This insight informs analysis of how the partial overlap of diverse networks can shift the probability that action will take a particular form or work through one set of social relations rather than another (p. 538).

Glaeser, Kolko, and Saiz (2001) find that firms will be “more productive in cities because they have access to better ideas and technology” (p. 31). In terms of sustainability,

Florida (1996) found that both innovation and close relationships across the production chain facilitated adoption of less environmentally damaging practices among manufacturing firms. Florida, in considering Schumpeter’s (1947) work, writes:

Schumpeter argued, firms possess the capacity for *creative* as well as *adaptive* [italics in original] responses to situations. That is, firms can create organizational and institutional environments suited to their needs—not just adapt to given conditions. Organizational change is both a product of economic conditions and a determinant of those economic conditions. In this context, firms operating in a highly competitive environment pursue strategies to increase profits by reducing cost, improving productivity, and reducing waste. Among the most effective strategies are ones that conform to Schumpeter’s class of *creative responses*—that is, strategies that transform the very nature of competition by overcoming traditional trade-offs (p. 83).

As described in the following chapters, developers in Florianópolis have engaged in both creative and adaptive strategies to enhance profits while protecting natural amenities. As Florida (1996) suggests, modernization in general creates opportunities for environmental innovation. This opportunity presents itself through several mechanisms such as cost-saving strategies and opportunities for upgrading that emerge from close relationships across the production chain. In the case of Florianópolis, the drive to compete in the global amenity market, and attract both domestic and international tourists, led to opportunities to embrace smart growth products such as solar panels and

microturbines. While much research has addressed the ability of environmental innovation in industry to improve corporate performance (Florida, 1996; Frosch, 1992; King & Lenox, 2001; Martínez-Jurado & Moyano-Fuentes, 2014; Porter & Linde, 1995; Rao & Holt, 2005), there is less research addressing the relationship between environmental innovation and institutional innovation in urban areas.

### **2.3. Institutions and Collective Action**

Governing bodies, as well as non-state entities such as markets, non-governmental organizations, and voluntary associations, are all types of institutional arrangements. In his review of organizations and institutions, Scott (2001) offers the following defining characteristics of institutions:

- Institutions are social structures that have attained a high degree of resilience.
- Institutions are composed of cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life.
- Institutions are transmitted by various types of carriers, including symbolic systems, relational systems, routines, and artifacts.
- Institutions operate at multiple levels of jurisdiction, from the world system to localized interpersonal relationships.
- Institutions by definition connote stability but are subject to change processes, both incremental and discontinuous (p. 48).

Many theorists have explored the relationship between cultural rule systems and social governance structures as seen in the work of Montesquieu (1878), Tocqueville (1873), Mill (1870), Weber (2009) and Durkheim (2014) who reflected on the role of institutions in the political economy of modern societies. Institutional research gained popularity across several disciplines at the turn of the 20th century in recognition that institutions establish and regulate relations between actors and orient action toward normative goals. In economics, scholars turned to institutions to address the importance of variations in economic systems over time and between places, as well as the importance of non-market

relations (Commons, 1924; Veblen, 1912). Some of the most cited economists of the 20th century addressed the importance of social institutions in the shaping of individual preferences (Polanyi, 2001; Schumpeter, 1934) and the role of governance institutions in constraining and regularizing behavior (North, 1991). In the first half of the 20th century, institutional economists considered how institutions influence economic behavior, such as urban rent seeking (Hodgson, 2000). New institutional economics, on the other hand, focused closely on humans as rational, maximizing agents (Hodgson, 2000). Although institutional analysis experienced some resurgence over the years, neoclassical economic theory, beginning in the years following World War II, has largely dominated the field.

The field of political science is rich with institutional approaches to understanding laws and administrative procedures of government structures. By the mid-20th century there arose within political science a shift away from the study of formal institutions of government, bureaucracies, and legal frameworks, towards analysis of the role of power and political behavior (Olson, 2009; Morgenthau, 1948). Drawing from this work, a reinvigorated focus on institutions emerged in the late 1970s. The new institutionalism emerging in this period had cross-disciplinary influence and led to a long-lasting interest in rational choice theory and the role of individual utility maximization. The new institutional, or neoinstitutional, movement gave rise to historical institutionalism that involves the analysis of governance mechanisms as well as informal rules and norms that dictate social behavior over time.

Historical institutionalists, taking a constructivist approach, look closely at how social structures evolve over time as the result of constrained choice and context dependent modes of empowerment that reflect institutional form (March & Olsen, 2010;

Skocpol & Amenta, 1986). As described by Greif (1998), historical institutional analysis considers factors that determine which rules of the game are relevant within institutional environments. Historical institutional analysis often approaches institutional dynamics using a game-theoretical approach and equilibrium analysis (Scharpf, 1997; Simon, 1982; Thelen, 1999). Although some scholars, such as Aoki (2007), emphasize the usefulness of considering limited rationality and social embeddedness in a historical approach to institutional change (Aoki, Kim, & Okuno-Fujiwara, 1997), new institutionalism within political science largely did not emphasize the role of culture in understanding institutional action.

In sociology, new institutionalism drew from organizational theory that gained popularity in the 1940s (Parsons, 1956; Selznick, 1949). Selznick (1949) suggested organizations, or structural systems that reflect the common values of participants, become institutionalized over time. As a result, they no longer require continued mobilization of collective action. In differentiating between institutions and organizations, Scott (2001) suggests there are six institutional levels widely employed by social scientists: world system, society, organizational field, organizational population, organization, and organizational subsystem. Organizational fields, as presented by DiMaggio and Powell (1983), are action arenas subject to both political and cultural influences. Rules-in-use are established by institutional logic and set the parameters for intra-institutional interactions as well as the strategies used to achieve objectives (Ostrom, 2009; Scott, 2001). Recognizing the limitations of the concept of an organizational field to explain institutional change, research emerged that incorporated social movement theory with institutional or organizational theory to explain how

collective action challenges incumbents in an effort to achieve desired change (Armstrong, 2002; Davis et al., 2005; Fligstein & McAdam, 2012; Scott, 2000).

Drawing in part from previous work in field dynamics (Bourdieu & Wacquant, 1992; DiMaggio & Powell, 1983), Fligstein (2008) introduced the concept of strategic action fields to comprehensively consider group emergence and the conditions under which both gradual and revolutionary change can occur. Fligstein and McAdam (2012) unpackage what Scott (2001) refers to as organizational or institutional logic by suggesting the actions that take place under the umbrella of logic are diverse and fed by heterogeneous intentions, perspectives, and positions of power. Introducing the concept of strategic action fields as the fundamental element of collective action, these authors stress that organizational fields or logics are not settled, but rather they are perpetually undergoing change and readjustment. Strategic action fields are composed of incumbent individuals or coalitions who are challenged by often less organized opposition. Fligstein and McAdam (2012) draw heavily from social movement theory, and its attention to transformation and conflict, to complement institutional approaches to understanding regularization, stability, and organizational reproduction.

According to Scott (2001, p. 57) the cultural-cognitive pillar of institutions stresses “the shared conceptions that constitute the nature of social reality and the frames through which meaning is made.” In *A Theory of Fields*, Fligstein and McAdam (2012) refer to the capacity of skilled actors to drive change through innovation within strategic action fields as institutional entrepreneurs. For example, there was a strong push toward the protection of land and environmental resources by environmental groups and organizations in Florianópolis starting in the 1970s. In response to the environmental

damage sustained by a mangrove system after years of poorly managed public dumping, local neighborhood associations began lobbying the local government to make changes in the processing of solid waste. Referring to the actors who engage in this form of collective action as defensive environmentalists, Rudel (2015) suggests that

by bringing people together in pursuit of a common cause such as restoring a degraded community forest, defensive environmentalists increase the social capital in communities (Klyza, Isham, & Savage, 2006). The capital comes in the form of social networks that prove useful in mobilizing people in later years to press for other policy changes. These networks are the “silent partners” of social movements. Relative to the general public, network participants trust one another. They reaffirm their collective identities when they communicate about emerging political opportunities (Tarrow, 2000). The immediate cause around which activists in local networks first mobilized may have disappeared, but the organizations and networks constructed around these controversies persist (p. 176).

The sustainability pathways presented in this dissertation demonstrate that sustainable outcomes result from changes in federal laws that enable local sustainability initiatives as well as from the collective action of local groups (public and private) who influence urban policies. The effort, then, in developing an institutional approach to the study of social-ecological systems is to identify a concept of collective action that allows for a broad analysis of the drivers of institutional restructuring while also having the analytical power to draw out the nuanced differences between the types of social-cultural movements that can initiate sustainability transitions.

#### **2.4. Institutions, Organizational Fields and Social-Ecological Systems: An Integrated Approach**

This dissertation explores the role of collective action, organizations, and institutions in the process of urban transition. The goal is to describe how various fields of actors catalyzed change during a period of numerous social and political changes in Florianópolis (1965-2016). With a focus on environmental sustainability and low-carbon growth, this case study contributes to the development of a theory of sustainable

development as it transpires in amenity-rich technology hubs. Emphasizing the emergence period during which a new approach to guiding urban form and function challenged incumbent practices, the goal is to explore the interaction dynamics between incumbent institutions and collective action groups over time. To consider various emergence pathways in a single environment, two urban systems were chosen for review: (1) the ecological system of the city as it is preserved in public land, and (2) the electricity system. In Florianópolis, both systems have experienced a period during which a sustainable alternative to business-as-usual emerged and challenged the predominate unsustainable mode of development. While comparative research, including within-case analysis, is often used to strengthen the reliability of findings, this research instead stresses the importance of the ordering of events rather than the specification of variables and their relative impact on change in the target systems. As such, the analysis constructs a narrative of the ongoing process of social ordering and re-ordering, as it responds to various trajectories of urban development, as well as the linked process of institutional restructuration.

The city is a complex system composed of overlapping and interdependent sub-systems that are critical to urban life. In considering how complexity is addressed from a historical social science perspective, Clemens (2007, p. 528) states “the historical sociologist strives to appreciate all this complexity and yet find patterns by looking across cases, down branching paths, or within complex sequences.” The cross-system impact of climate change, in particular, requires the coordination of policies and actions across multiple sectors both within and across established urban systems (Aylett, 2015). In considering the challenges of climate governance, Stripple and Bulkeley (2013, p. 5)

suggest that not enough attention is paid “to how institutions and governance emerge at the intersection of several influences such as law, advocacy, expert networks, market relations, and stakeholder bargaining processes.”

The challenge of effectively institutionalizing sustainability within existing urban governance structures has been explored using a range of action-oriented analytical tools. Many of the tools specifically address the interactions and feedback loops of coupled human-environment systems. Examples include sustainability science (Blackstock & Carter, 2007; Clark & Dickson, 2003; Levin & Clark, 2010; Matson et al., 2016; Robinson et al., 2011; Talwar et al., 2011; Wiek et al., 2012), complexity science (Broekhoven et al., 2015, Castellani & Hafferty, 2009; Flood & Carson, 2013; Tainter, 1990; Norberg & Cumming, 2013), multilevel perspective (Rip & Kemp, 1998), and transition management (Bergh & Bruinsma, 2008; Loorbach, 2010; McCauley & Stephens, 2012). Although transition management is useful for its consideration of both technical data and policy-making institutions, its foundation as a governance evaluation tool, rather than a tool for evaluating social-economic and political macro-environments, makes its application in this dissertation limiting.

Institutions are formed by the combined actions and behaviors of individuals and social groups acting in reference to governance regimes. Commenting on the appropriateness of behaviorist or microeconomic approaches to institutional research, Schneiberg and Clemens (2006) suggest these approaches

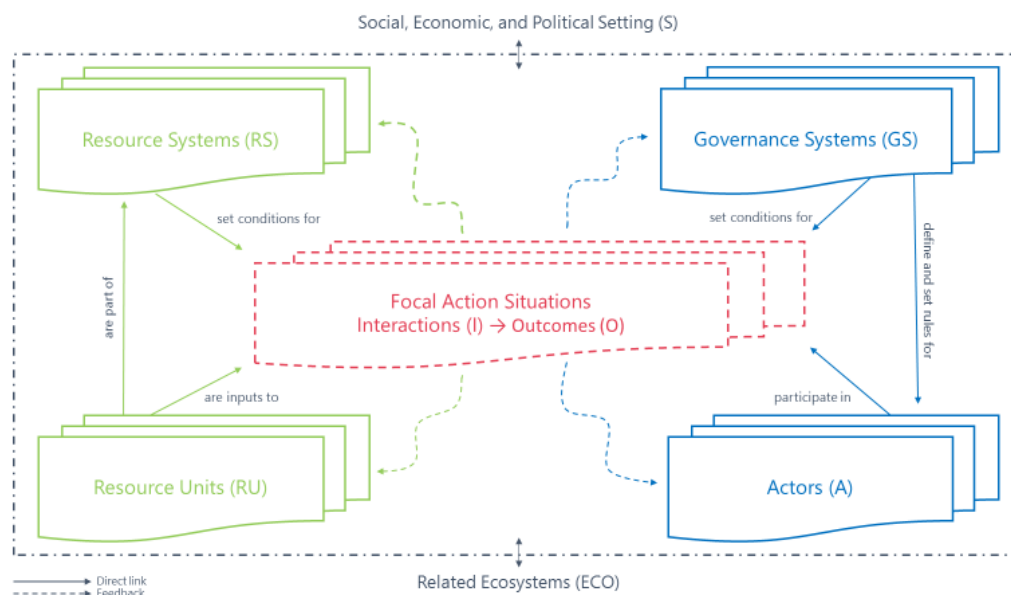
embody a commitment to methodological individualism or actor-centered analysis. Institutional theory, however, requires research designs that link levels of analysis. The first methodological challenge for institutionalists is to compare the explanatory power of factors at the same, or lower, level of analysis as the entity in question with the explanatory power of external or higher-order factors (p. 195).



The Social-Ecological System (SES) framework, proposed by Elinor Ostrom in 2009, was originally applied to the management of common pool resources and was built on the foundation of the Institutional Analysis and Development (IAD) framework developed by scholars of the Vincent and Elinor Ostrom Workshop in Political Theory and Policy Analysis (McGinnis & Ostrom, 2014). In developing the IAD framework, the workshop participants were concerned with the complex nature of policy analysis and the need for the consistent application of a common framework for understanding how individuals and groups, interacting within dynamic situations, design new policies to solve policy problems (McGinnis & Ostrom, 2014). The IAD framework helps organize various diagnostic, analytical, and prescriptive tools, as well as provides a multilevel conceptual map for evaluating not only arenas of institutional action, but also linked patterns of interaction and the resulting outcomes. Accommodating a wide spectrum of theories, such as the historical institutional approach taken in this dissertation, the SES framework organizes the components of action situations that result from actors and governance systems operating at multiple scales and within nested sub-systems (McGinnis & Ostrom, 2014).

In recognition that the SES framework is also relevant in the study of public goods and ecosystem services, its application has moved beyond common pool resources and is generally applied to the study of complex multi-resource systems (McGinnis & Ostrom, 2014). In new revisions to the SES framework (Figure 2), actors include multiple public and private parties, resource systems, and multilevel governance systems.

Figure 2. Social-Ecological Systems Framework



Source: McGinnis and Ostrom, 2014

As with the original IAD framework, the first stage in using the SES framework is the identification of an action arena, or action situation. Action arenas are defined by the participants, their positions, the outcomes of their actions, the linkages between their actions and the outcomes, the control they exercise, the information available, and the costs and benefits of the outcomes (Ostrom, 2010). Actors in the action situations are assumed to be boundedly rational and working to achieve their own goals or the goals of their community (local, regional, or international). The analysis conducted in this dissertation involved the review of changes in institutions and institutional relations along the following lines of inquiry: the identification of decision makers, the implementation and application of institutional rules, the identification of motivational influences, the definition of how to gauge progress toward sustainability, the mapping of the rules of

engagement between organizations and institutions, and analysis of how such relations assist in the sustainability transition.

As the SES framework was intended to be used for epistemological research that could inform policy design that strengthens institutional capacity for managing social-ecological systems, it was used as an organizational framework for this dissertation. The SES framework has the degree of flexibility necessary to accommodate contextually specific differences between systems as well as non-linear characteristics common in social-ecological systems (Agrawal, 2001; Basurto & Ostrom, 2009; Ostrom, 2009). The SES framework provides a systematic means by which complex systems can be analyzed in structural and behavioral terms (Partelow, 2016). The first-tier variables of the framework are those included in Figure 2 above. The subcategories of nested second-tier variables (Figure 3) were identified by prior research and served as a guide during the research period to ensure all potentially relevant variables were considered (McGinnis & Ostrom, 2014).

Figure 3. Second tier variables of the SES framework<sup>7</sup>

Resource System (RS), Interactions (I), Outcomes (O), Governance Systems (GS), Actors (A)

Source: Ostrom, 2014; McGinnis and Ostrom, 2014

The SES framework is a diagnostic tool that uses empirical research in combination with theory to identify characteristics or patterns that could inform policy design. The SES framework does not provide explanatory power, as such causal explanations are presented as conjunctions of variables that seem to have favored the embrace of sustainability rationalities in the study area. To complement the diagnostic strength of the SES framework, this dissertation draws from the analogous concept of strategic action fields, developed by Fligstein and McAdam (2012), to further account for the social-cultural fields that influence how the actors in the action arena drive the

<sup>7</sup> The darker shaded variables were identified as most relevant in this dissertation. As one of the objectives of this dissertation was to explore how emerging forms of environmental leadership and governance have impacted the institutional environment, this dissertation made use of the alternative list of second-tier variables for Governance Systems proposed by McGinnis and Ostrom (2014). These second-tier variables are a departure from the standard list of variables used in other analyses using the SES framework.

process of change. In *A Theory of Fields*, Fligstein and McAdam (2012) aim to integrate the literature on collective action, culture, institutions, and the state in a way that highlights the importance of structure and action. Fligstein and McAdam (2012) write:

We have only begun to theorize the complex dynamics of emergence and institutionalization, stability and change, and rupture and settlement in constructed social worlds. While scholars have invoked the idea of institutional entrepreneurs as agents of change, there has been little concern with thinking about what kind of specific social processes and skills helps these actors get what they want or successfully resist other actors' power. There has also been a decided lack of attention to how the opportunities and constraints that shape the prospects for strategic action within fields depend critically on the complex latticework of relations that tie the strategic action field to a host of other state and non-state fields (p. 6).

In the elaboration of the concept of strategic action fields, these authors describe networks of fields as either horizontally or vertically linked, distant or proximate in overlap of action, and state or non-state. These characteristics allow for a more detailed account of what enables successful collective strategic action and the accompanying dynamic patterns of relations that are taking place between the variables presented in the SES framework.

Additionally, it was understood from the outset of the research that a deeper analysis of the impact of socio-economic attributes of actors would be necessary. The amenity-led growth model can lead to increased cost of housing because of population growth and increasing demand for amenities. Inequalities in access to land and affordable housing can lead to a "hollowing out" of the middle class as lower wage earners migrate to find employment in the tourism industry and real estate developers continue to profit from the much-maligned growth machine (Marcouiller, Kim, & Deller, 2004). Considering the actions of social rights groups, environmental groups, and developers as occurring in fields of collective strategic action affords the research a more nuanced

understanding of the social and cultural dynamics not easily captured by the state variables of the SES framework.

As summarized by Clemens and Cook (1999, p. 446),

the once stark lines between rational choice (the ‘positive theory of institutions’) and historical or cultural institutional analyses have been eroded by the elaboration of a ‘choice-theoretic’ or ‘choice-within-constraints’ version of institutional theory, which adopts a culturally or contextually nuanced sense of ‘thick rationality’ (Nee, 1998, p.10-11).

This direction in institutional analysis blurs the distinction between institutions as a mechanism of constraint and institutions as cultural constructs. If institutions are understood as constituted by both structural schemas and socio-cultural resources, then institutional change can emerge from either change to the organizational structure or to the embedded cultural “tool kit” which people use to solve various problems (Clemens & Clark, 1999; Swidler, 1986). In cities such as Florianópolis where there are multiple competing development rationalities, institutional innovation has emerged from the merging and restructuring of institutional schema in response to heterogenous strategic action fields.

This case study uses the interplay between non-state actors, city officials, and local business leaders, to elaborate a theory of the role of institutional and cultural capital in sustainable development characterized by an amenity-led growth model and a robust technology sector. To do this, the research draws from institutional theory and collective action theory. As discussed in this chapter, the social constructivist elements of institutional theory are used to understand how shared understandings of what is at stake have informed action among environmentalists in the study area. These understandings continue to inform decisions regarding the adoption of environmental add-ons as they become available from local energy and technology companies. Institutional theory also

suggests multi-level governance institutions respond to both local and global signals in the adoption of policies. At the local level, city officials work to meet the demands of both non-profit organizations and developers or firms who lobby for political support for diverse objectives.

With urban governance institutions actively pursuing growth in the technology sector since the 1980s, the city seems to have, purposely and inadvertently, cultivated the social capital necessary to hasten the embrace of key sustainable practices in the areas of land conservation and adoption of renewable energy. Florianópolis provides an example of a case in which a growth strategy based on the preservation of natural amenities has worked to both grow the local tourism industry and protect large tracts of land. This growth strategy has seemingly resulted in an amenity-rich city that, in addition to drawing a bohemian sub-culture, has been leveraged to attract a highly skilled work force. As recognized by Florida (2012),

a number of studies have pointed to the role of amenities in economic growth. An early one by Paul Gottlieb found a relationship between the presence of amenities and high-tech companies in New Jersey. Another by the economists Dora Costa and Matthew Kahn found that high-income power couples preferred locations with high levels of amenities. In a detailed study of the rise of the consumer city, Edward Glaeser and his collaborators concluded: “The future of most cities depends on their being desirable places for consumers to live. As consumers become richer and firms become mobile, location choices are based as much on their advantage for workers as on their advantage for firms” (p. 239).

Florida’s (2012) creativity index is based on what he refers to as the 3T’s of economic development: technology, talent, and tolerance. Florida emphasizes that universities and a robust technology sector are not sufficient for prosperity, tolerance is also required to attract top talent. Florianópolis, with a significant artist population, a large gay population, and a well-known bohemian counter-culture, well fits Florida’s formula for a robust creative economy.

The social capital working to propel sustainable development in the study area is comprised of three primary strategic action fields that are likely to be early adopters of sustainable technologies: (1) technology entrepreneurs driving the goods and services needed for sustainability innovation, (2) environmentally minded individuals and businesses looking to embrace environmentally sustainable practices, and (3) groups and individuals affiliated with the Federal University of Santa Catarina. The tendency of these groups to embrace innovation, and particularly environmental innovation, taken together with the financially rational decision among local business to both lower energy costs and embrace green marketing, has seemingly created an urban growth model that accelerates the achievement of sustainable outcomes. As stated by Fligstein and McAdam (2012, p. 18), “collective strategic action is rooted at least as much in Weber’s stress on meaning making and Mead’s focus on empathy as on the naked instrumental rationality of Marx.” As such, the analytical tools chosen for this research have the flexibility to capture both strategies of action that emerge from individual or group considerations of costs and benefits with the SES framework as well as the “existential function of the social” and cultural repertoires captured in theories of strategic action fields (Fligstein & McAdam, 2012, p. 16).

As Florianópolis has long institutionalized the dual amenity-led/tech-hub growth model, the city serves as both a model for achievement in sustainable outcomes as well as a cautionary tale. As noted by Clemens (2007), the critical periods during which change occurs have long been identified as interesting for sociological study. However, “reproduction and duration are also defined as theoretically interesting phenomena (although the tension with the demands of culturally compelling narrative means that



rather less attention is directed to explaining duration than change or novelty)” (Clemens, 2007, p. 533). Durability is addressed in this dissertation as the sustainability success stories in the Florianópolis area are facing pressure under increasing population growth.

As much institutional theory minimizes the role of power in the formation of organizational fields, the work of Fligstein and McAdam (2012) aids in addressing why the positive sustainability outcomes that result from the amenity and technology led growth model are inevitably challenged by inequalities in access to resources (such as housing and land). Socio-economic inequalities are less apparent in resource abundant environments. When resources become scarce, systemic inequality can undermine the durability of sustainable systems and demand institutional restructuring to correct inequalities in the greater economic system. As described by Polanyi (2001) in *The Great Transformation*,

In the half-century 1879–1929, Western societies developed into close-knit units, in which powerful disruptive strains were latent. The more immediate source of this development was the impaired self-regulation of market economy. Since society was made to conform to the needs of the market mechanism, imperfections in the functioning of that mechanism created cumulative strains in the body social. Impaired self-regulation was an effect of protectionism.

This ongoing process of protectionism from market mechanisms is playing out in the housing sector in numerous cities that have protected natural amenities, thereby at once limiting land available for housing and boosting in-migration. Protectionists policies such as affordable housing programs that seek to safeguard the welfare of those unable to afford adequate accommodation is an ongoing challenge in places such as Florianópolis.

The chapters that follow address the macro-level variables of the SES framework (social, economic, and political) in Chapter 3 in order to introduce important historical trajectories that allowed for the particular form of amenity-led development that

characterizes the island. Chapters 4 and 5 apply the integrated approach introduced above by (1) applying the SES framework to organize the analysis, and (2) giving in-depth consideration to the strategic collective action taking place in the two systems experiencing different trajectories of emergence, institutionalization, and stabilization within the case study area. Chapter 6 considers the limits to certain drivers, such as amenity-led development, that have historically played a critical role in the establishment of certain forms of sustainable development in Florianópolis. Chapter 7 concludes by considering additional cases globally that have experienced similar growth trajectories such as Silicon Valley and Boulder, Colorado.

### CHAPTER 3: HUMAN SETTLEMENT AND MUNICIPAL GOVERNANCE

Dubbed the “The Island of Magic” (*Isla de la Magia*), Florianópolis is a city rich with history, culture, and natural beauty. This chapter provides an overview of the history that has both determined the course of human settlement and urban growth on the island as well as the linkages between the historical urban settlement pattern and governance institutions in Florianópolis. The historical macro-context summarized in this chapter corresponds to the social, political, and economic setting of the SES framework, and highlights the key governance rationalities that continue to reverberate in the urban form today. The evolution of these rationalities contextualizes the thick descriptions found in the chapters that follow. Multi-directional interactions and feedback loops are a dynamic constant in the policy sphere and as such make comprehensive inclusion of all nested variables beyond the scope of this dissertation. The local context is, instead, described in detail below to introduce the key characteristics of the amenity-led development in the study area, in terms of tourism, the community, the local economy, and the political environment that has influenced or directed urban growth in the study area over time.

#### **3.1. Human Settlement and Urban Growth on the Island of Santa Catarina**

##### *3.1.1. Pre-Columbian Era*

Cultural heritage sites represent a large portion of the land preserved in Florianópolis. Pre-colonial archaeological sites found along the coast of southern Brazil are largely between 2,000 and 5,000 years old although some research suggests human settlements may have existed in the coastal region as long as 17,000 years ago, in areas now inundated by sea level rise (Baptista, 2008a; Fairbridge, 1976; Prous & Fogaça, 1999; Silverman & Isbell, 2008). The earliest coastal hunter-gatherer populations in the

Florianópolis area were characterized by large shell middens (*sambaqui*), reaching as high as 30 meters, composed of predominately discarded shellfish and sand. *Sambaqui* may also include layers of charcoal and burned bones suggesting the mounds served a mortuary purpose. Popular tourist sites, there are 133 remaining pre-colonial archaeological sites registered in Florianópolis despite the *sambaqui* having suffered widespread destruction by miners seeking calcium carbonate (IPHAN, 2016; Silverman & Isbell, 2008). The degradation of many cultural and archaeological sites in the mid-20<sup>th</sup> century led to the passing of Federal Law 3924 in 1961 that explicitly protects Brazil's archaeological heritage (Funari, 2009).

Around 3,000 years ago, the Jê population of Central Brazil, identified by their linguistic branch and ceramic traditions, began to migrate south eventually reaching the coastal areas of Santa Catarina (Schmitz, 2013). They are differentiated from earlier settlements of the Santa Catarina coast in part because of collective burial rituals as opposed to funerary rituals involving *sambaqui*. The ceramic culture of the southern Jê, referred to as the Taquara-Itararé tradition, has been found in the Florianópolis area indicating year-round or seasonal habitation. Between 2,000 and 3,000 years ago, indigenous Guarani, believed to be of Amazonian origin, migrated to southern Brazil along river routes into the Paraná and Uruguay basins (de Mello, 2006; Noelli, 2004). With an estimated population of 2 million in the 16<sup>th</sup> century, the Tupi-Guarani society was culturally complex with several sub-groups coexisting in the coastal region of Santa Catarina, possibly as early as 2,000 years ago, with greater occurrence around 1,000

years ago, (Bonomo, Angrizani, Apolinaire & Noelli, 2015).<sup>8</sup> The Guarani, referred to as *Carijós* by early colonists, had an advanced economy based primarily on corn and manioc with cultural materials known to include decorated ceramics, lip plugs, stone axes, burial urns, and polished-stone axes (Bonomo, Angrizani, Apolinaire & Noelli, 2015).

### 3.1.2. *European Contact*

European arrival on the coast of Santa Catarina was dominated initially by French mariners who established trade relations with coastal indigenous groups beginning in the early 16<sup>th</sup> century (Araujo, 2005; Baptista, 2008a). The Island of Santa Catarina, called *Jureremirim* or *Meiembipe* by the native Guarani, became a regular stop for expeditions throughout the 1500s. The Portuguese crown, focused on establishing trading routes with the east, was initially apprehensive to invest heavily in New World development as there was still uncertainty surrounding the profitability of exploration and colonization. King João III of Portugal, encouraging expansion into the New World using the *donatário* system, catalyzed private investment in colonial exploration through hereditary captaincies (*capitanias hereditárias*).<sup>9</sup> The captaincies, the first 15 of which were granted in 1534 to 12 owners, placed the financial risk of new world enterprise on private investors who, in exchange, were granted far-reaching jurisdictional power over local affairs (Lang, 2013). As seen in Figure 4 below, the southernmost captaincy includes the modern-day states of Paraná, Santa Catarina, and Rio Grande do Sul as well as parts of

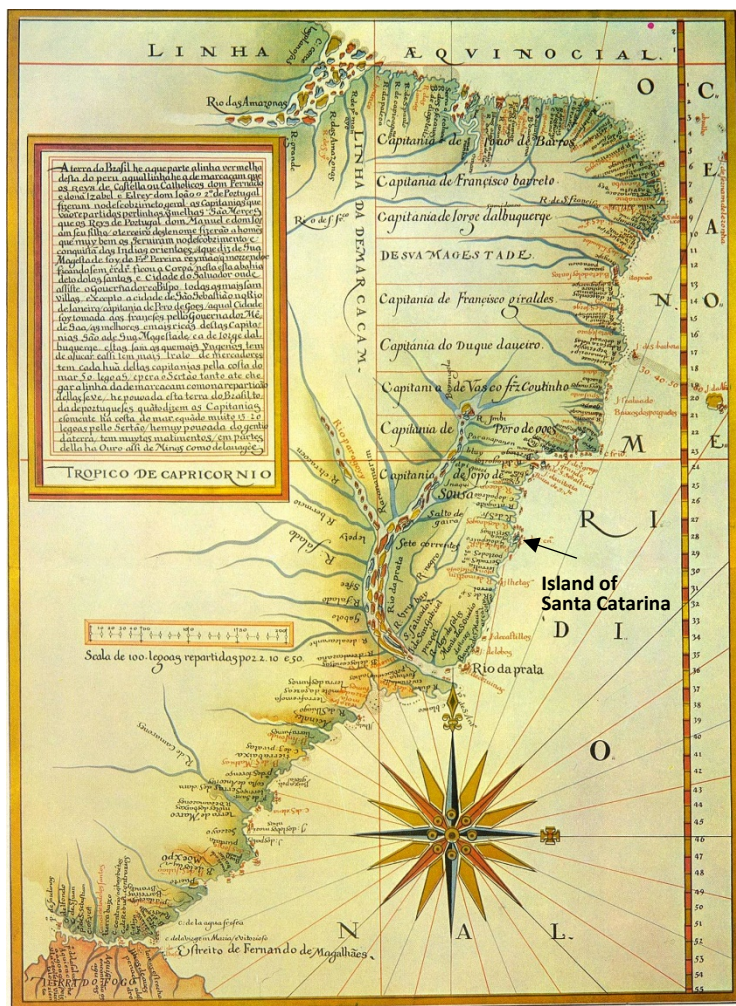
---

<sup>8</sup> Subgroups living in the study area included Guarani Mbyá, Guarani Nhandeva e Chiripá; however, the Guarani Kaiowá and Guarani Chiriguano subgroups living inland may have traded with coastal settlements (de Mello, 2006).

<sup>9</sup> *Donatário* refers to a proprietary landlord who was given a land grant by the Portuguese crown to settle colonized areas such as the Azores. The grant required the recipient to defend and settle the land at their own expense (Marchant, 1942).

São Paulo and Mato Grosso do Sul. The expansiveness of the southernmost captaincy proved to be difficult to govern, leading to a tumultuous, conflictual course of development as the colonial empires of Spain and Portugal fought for control of the region.

Figure 4. Luis Teixeira's 1574 map of the captaincies-general of Brazil<sup>10</sup>



Source: Brown University Libraries, Center for Digital Scholarship, Brazil: Five Centuries of Change, open access image from Wikimedia Commons

<sup>10</sup> Land was divided in parcels running parallel to the equator and demarcated by the Atlantic Ocean to the east and the line of the Treaty of Tordesilhas to the west. This map depicts more land under control of the crown of Portugal than similar maps created by Spanish cartographers in the same period (Sadler, 2010). The Island of Santa Catarina is indicated although it was alternatively referred to as Porto dos Patos at this time.

With the resource demands of colonial agricultural enterprise steadily increasing, the Island of Santa Catarina experienced a violent depopulation into the mid-17<sup>th</sup> century as many local Guarani died of disease or were forced into slavery (Baptista, 2008a; de Mello, 2006; Russell-Wood, 2005). Expeditions in search of extractive resources and slaves, initially referred to as *entradas*, needed coastal hubs to serve as waystations and ports of trade. The *entradas*, later known as *bandeiras* as the practice became increasingly self-organized by individuals and slave raiders, led to the establishment of Nossa Senhora do Desterro on the Island of Santa Catarina in 1673 (Pereira, 2003). Although the south of Brazil was extensively settled by Jesuit missions (*aldeias*), the Island of Santa Catarina was a *bandeira* outpost meant to serve the commercial enterprises of the crown and the colonists. The Island of Santa Catarina is strategically located halfway between Rio de Janeiro and Rio de la Plata, the river and estuary that is formed by the Uruguay and Paraná rivers, a strategic point of entry for explorations seeking mineral resources inland. Nossa Senhora do Desterro served as a port in which mariners could stop for food and water, medical treatment, or repair of sailing vessels.

Portugal experienced tremendous changes in the late 16<sup>th</sup> and 17<sup>th</sup> centuries as the country came under Spanish rule from 1580-1640, the economy suffered under Dutch occupation of Northeast Brazil from 1630-1654, and increasing sugar production in Caribbean plantations lowered the price of sugar in European markets (Schwartz, 2004). With Portugal's economy in deep recession by 1680, the empire began to look for new sources of revenue. Efforts intensified in Brazil to identify mineral resources, diversify crops, and expand settlements to hold potentially lucrative land. The otherwise less productive areas of southern Brazil experienced increasing waves of expeditions and

established settlements developed more robust subsistence economies. After the discovery of gold and diamonds beginning in Minas Gerais in 1693, the Luso-Brazilian economy transformed because of the gold rush that lasted into the 19<sup>th</sup> century (Landers, 2010).

What remains today the city center of Florianópolis, Nossa Senhora do Desterro was established in 1673 and experienced steady growth despite volatility in the economy of the Portuguese Empire. A church was constructed between 1675 and 1678 in the center of the settlement, a space now occupied by the new Metropolitan Cathedral of Florianópolis built between 1753-1773. In 1713, a smaller church was constructed by Jesuits who were active establishing churches and schools in settlements (*aldeiras*) largely populated by Guarani converts.<sup>11</sup> The churches were located on Praça XV de Novembro, a public area that has been continuously the primary public space of the growing city and is now the historic center of Florianópolis (Konzen, 2013). Although the population of Desterro fell following the murder of its founder, Dias Velho, in 1687, there was a population resurgence in the early eighteenth century as new administrative, military, and commercial activities reached the region.

### 3.1.3. *Expansion in the Eighteenth and Nineteenth Centuries*

The original system of hereditary captaincies was largely a failure due to the administrative and economic burden placed on private owners. As the *donatário*

---

<sup>11</sup> The first Jesuit mission to Brazil was in 1549 as ordered by King João III of Portugal. Jesuits were allowed to forcefully recruit indigenous labor as well as educate and convert them in Jesuit settlements (*aldeias*). Although initially useful to the crown, the order used its autonomy to amass large labor forces and establish financially lucrative agricultural estates. Tensions between the crown and the Jesuits grew culminating with their expulsion from the Portuguese Empire in 1759 (Alden, 1996). As the population of indigenous people inhabiting the Island of Santa Catarina dropped during the time of *bandeirismo*, the Jesuits played a lesser role in the history of the island. For a more in-depth discussion on the role of Jesuits in colonial Brazil see *The Making of an Enterprise: The Society of Jesus in Portugal, Its Empire, and Beyond 1540-1750* by Dauril Alden (1996).



captaincies failed, they reverted to the crown and were controlled as crown captaincies. The colonial administrative system was altered several times in the 16<sup>th</sup> century, first by King João III who placed the captaincies under control of a single Governate General of Brazil in 1549. This Governate later split into two bodies in 1572 with the south being controlled by the Governate General of Rio de Janeiro. This arrangement of two Governate Generals to rule the north and south persisted into the 18<sup>th</sup> century. Following a military incursion by the Spanish on the most southern Portuguese colony of Sacramento in 1735, located across the La Plata River (*Rio de la Plata*) from modern day Buenos Aires, King João V ordered the Governor of Rio de Janeiro (Gomes Freire de Andrade) to fortify the south under the leadership of Brigadeiro José da Silva Paes. Although not referred to as a sub-captaincy until years later, 1738 marks the beginning of an official government under the authority of the Portuguese crown on the Island of Santa Catarina reinforcing Portuguese authority in the region between São Paulo and Rio de la Plata (da Silva, 2008).

José da Silva Paes, governor of Santa Catarina from 1739-1749, oversaw the fortification of the area by constructing a series of forts to defend the north and south of the island.<sup>12</sup> These forts were refurbished and serve the city as tourist attractions and recreation areas. Local commerce developed around both the burgeoning whaling industry<sup>13</sup> and in response to growing demand for manioc flour by residents, military

---

<sup>12</sup> The forts of Santa Cruz de Anhatomirim (located on the small Island of Anhatomirim), São José da Ponta Grossa (on the northern tip of the Island of Santa Catarina) and Santo Antônio de Ratones (on the small island of Ratones Grande) formed a triangular defense system to protect the north and Nossa Senhora da Conceição de Araçatuba, located on the continent, protected the south.

<sup>13</sup> The Island of Santa Catarina had six whaling stations (*armações*) for processing whale oil. Export of this product gradually declined and contributed to an economic depression in the early 19<sup>th</sup> century (Lopes, 2015).

personnel and activities of the royal warehouses of Rio de Janeiro and Rio Grande de São Pedro (da Silva, 2008). Desterro, officially recognized by the Portuguese crown as a village in 1714 and later as a town in 1726, become the capital of the new military base and administrative seat of the southern coastal region (Miranda, 2000).

Figure 5. Map of Nossa Senhora do Desterro.<sup>14</sup>



Source: fortalezas.org

Reforms initiated under King João V of Portugal, who ruled Portugal from 1707-1750, reorganized colonial administration to strengthen authority over the provinces and the newly discovered mineral resources. His son, King José I (1750-1777) continued to strengthen the administrative structure and appointed Sebastião José de Carvalho e Melo as the Secretary of State of Internal Affairs. Known as the Marquis of Pombal, he served in this position from 1755-1777 and was responsible for wide-sweeping administrative

<sup>14</sup> The map was drawn during a brief occupation by the Spanish in 1777.

and fiscal reforms. Colonial policy under Pombal focused primarily on the captaincies of Pernambuco and Paraíba in the north, the centers of commerce and sugar production in Brazil (Maxwell, 1995). Recognizing the economic survival of Portugal was heavily dependent on the colonies, the policies of Pombal tightened control of resources, increased taxation, and established administrative structures in Brazil that were empowered to tightly monitor and enforce trade rules (Russell-Wood, 1975).<sup>15</sup> The administrative system introduced by Pombal set the course of administrative evolution in the colony, and later in the republic.

The jurisdictional area of the Governate of Santa Catarina was in dispute throughout much of the 18th and 19th centuries as claims to land were simultaneously pursued by individuals, heirs of captaincies, Jesuits, and colonial administrators working on behalf of the monarchy. Fearing either the British or the Spanish would try to claim the Rio de la Plata region, Pombal moved to again strengthen defenses in Brazil.<sup>16</sup> To strengthen the claim of the Portuguese crown on the region, immigration from other colonies was encouraged. Facing overpopulation in the Portuguese controlled Archipelago of the Azores, 7,000 settlers relocated from the Azores and Madeira to the coasts of Santa Catarina and Rio Grande do Sul between 1748-1756. The Azorean influence and cultural heritage remains a point of pride on the island and has inspired several annual cultural events as well as commercial goods for tourism. Population

---

<sup>15</sup> Continuing conflict with the Jesuits, who had significant power over economic activity in the colony through the *aldeia* system, resulted in the eventual abolishment of the jurisdictional authority of the Jesuits over native villages in 1755. The Jesuit educational system that was established in the villages, and eventually throughout the Brazilian colony, was replaced by a public state-administered system.

<sup>16</sup> Although Pombal sought to reduce Portugal's dependency on Britain, the Seven Years War (1754-1763) resulted in a shifting balance of power in Europe and a stark reminder that the Portuguese military was unable to hold off Spanish advances without the aid of the British Empire (Maxwell, 1995).

growth, and the accompanying economic growth, that accompanied the Azorean immigration improved the administrative prominence of the region as demonstrated by the introduction of the term captaincy, or sub-captaincy, to refer to the region beginning around 1760 (da Silva, 2008).

The mid-18<sup>th</sup> century, despite economic and population growth, marked the decline of importance of the region as the ascendant Rio Grande de São Pedro (modern day Rio Grande do Sul) to the south of Desterro was established as a captaincy in 1760. As Portuguese control of the far south of Brazil strengthened, the political and strategic importance of Santa Catarina diminished.<sup>17</sup> Under direction of Pombal, new commercial ventures were promulgated, capital was mobilized to import African slaves, and new export commodities began to enter European markets. Pombal's efforts to rationalize and centralize the administration of the Empire culminated in the creation of a royal treasury and modern bookkeeping techniques used throughout the colonies by the end of the 18th century (Maxwell, 1995). In addition to the standardization of administration and fiscal reforms instituted by Pombal, he also instructed the governors of the Brazilian Captaincies, in the 1770s, to constitute local armies who would serve as identical colonial units of the existing Portuguese military (Maxwell, 1995). The establishment of these armies proved to be the means by which independence from the crown was later accomplished.

The population of the sub-captaincy of Santa Catarina tripled between 1780-1810 to just over 30,000 people, with 24% being slaves (Baptista, 2008a). Although

---

<sup>17</sup> Although official documents indicate the sub-captaincy of Santa Catarina was established as subordinate to the captaincy of Rio Grande de São Pedro in 1807, in practice the Governor of Santa Catarina maintained administrative functions as subordinate only to the seat of the monarchy in Rio de Janeiro (de Silva, 2008).

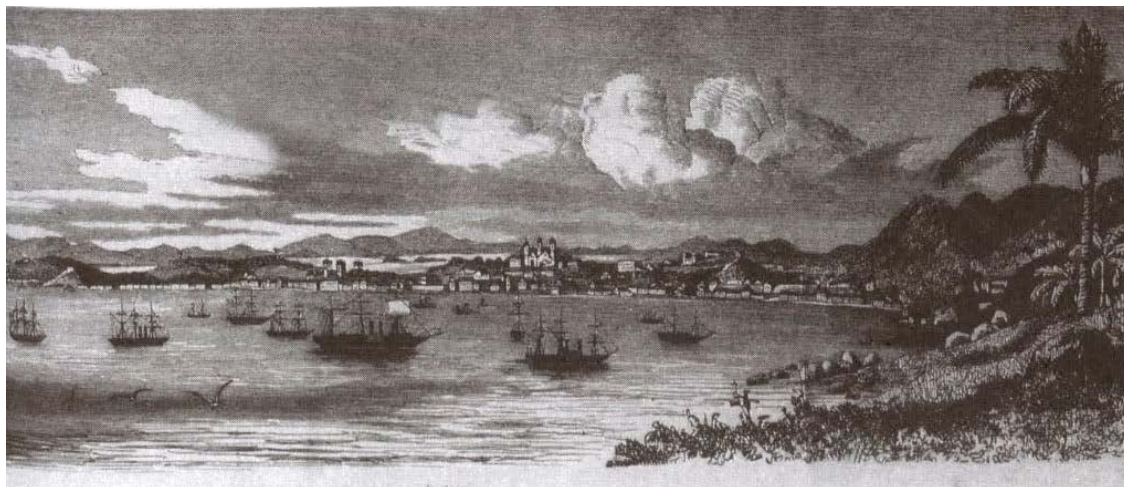
consistently noted as an island of rich vegetation, trees, and numerous species of birds, the Island of Santa Catarina experienced a period of forest loss as agricultural activity increased to feed the growing population (Baptista, 2008a; Caruso, 1990; Campos, 1991). Prince Regent Dom João, who established a royal court in Rio de Janeiro in 1808, initiated a new era of growth and administrative change in Brazil as the territory was opened to foreign trade, reversing the tight trade policies of Pombal (Russell-Wood, 1975).<sup>18</sup> Fearing that the newly gained political autonomy of Brazil (having been declared a kingdom in 1815) would be revoked, local discontent grew and the British continued to pressure the Portuguese crown to loosen economic restrictions over the kingdom (Russell-Wood, 1975). Seeing little economic option, Dom Pedro I declared Brazil's independence from Portugal in 1822 (de Silva, 2008). Following independence, the captaincies were transformed into provinces of the Empire of Brazil and the town of Desterro was elevated to city status as the capital of the new Province of Santa Catarina (Baptista, 2008a). The Brazilian Constitutional Charter of 1824 required cities to form a Council (*Câmara*) to oversee the economic and administrative needs of the population, but they lacked political influence or autonomy over their own interests (IBGE, 2011). The City Council (*Câmara Municipal*) of Florianópolis continues today as the legislative branch of the municipality. It is composed of 23 elected councilmen (*vereadores*) who pass legislation and provide oversight to executive functions. Ruled initially by the imperial regime of Dom Pedro I, he abdicated the throne to his young son Dom Pedro II in 1831. Although Brazil was governed by regents until the boy came of age in 1840, the rule of Dom Pedro II dominated the course of development in the 19<sup>th</sup> century.

---

<sup>18</sup> Although Dom João VI returned to Portugal in 1821 to re-establish the court in Portugal, he left his son in Rio de Janeiro to maintain the court in Brazil.

Dom Pedro II ushered in an era of industrialization and peace. Seeking to institute a political culture in Brazil similar to contemporary Europe, he engendered a vision of a Brazilian nation-state that was embraced into the 20<sup>th</sup> century by the regimes that followed the fall of the monarchy in 1889 (Barman, 1999). Although Dom Pedro II did conduct at least two official visits to Santa Catarina during his reign, the area remained less populated and less economically productive in comparison to other parts of the kingdom. Desterro, the provincial capital, was run by a merchant class that primarily supplied goods domestically. The Conservative Party gained power in Desterro in 1847 under the leadership of João Pinto, a merchant-ship owner (Bastos, 2000). With a focus on expanding trade with Europe, Desterro prospered in the late 19<sup>th</sup> century as it became an important commercial port of trade for the region. Urbanization during this time was characterized by the wealthier classes, mostly merchants, residing west of the Praça XV de Novembro and the poorer classes to the east (Lopes, 2015). With small farms being established inland to the North of the Praça, roads were constructed in the late 1800s in support of the mercantile economy. Although there were some large farms on the continent near the Island of Santa Catarina, the landed oligarchs who dominated socio-economic relations and hierarchies throughout much of Brazil were not as influential in the small port city of Desterro.

Figure 6. View of Desterro and its port (*Vista de Desterro e seu porto*), Oscar Canstatt, 1875



Source: Corrêa, Carlos Humberto, *História de Florianópolis – Ilustrada*, 2004

With Brazil the last remaining nation with legal slaves in the New World, militant pressure to abolish slavery began to rise in 1886 (Barman, 1999). With Dom Pedro II in Europe seeking treatment for his deteriorating health, his daughter Dona Isabel was acting regent. She demanded the abolition of slavery in light of rising incidents of violence, but the ruling Conservative cabinet refused and eventually resigned. Accepting their resignation and appointing a new cabinet, Dona Isabel abolished slavery in 1888. At the same time, the prominence of military officials was steadily declining. The armed units, established by Pombal, were under-funded and commanders with political influence, such as the Baron of Caixas, were aging and dying.<sup>19</sup> With the military class holding contempt for the monarchy and the oligarchs now bereft of slave labor as well as political power, Manuel Deodoro da Fonseca led a successful military coup to install the

---

<sup>19</sup> The Baron of Caixas was responsible for defeating rebel groups in Rio Grande do Sul. Rio Grande do Sul and adjacent regions experienced near constant conflict as a result of colonial struggles between Spain and Portugal, particularly in the area that is modern day Uruguay. Settlers in the south, *gaúchos*, fought for independence from the monarchy during the Farroupilha Revolution (1835-1845), briefly holding the province of Santa Catarina for four months in 1839 (during which it was renamed the Juliana Republic). They were stopped, however, before they were able to take Desterro.



new Republican Party to govern the First Brazilian Federative Republic (*República Velha*) from 1889 to 1930 (Barman, 1999). With the Proclamation of the Republic, the Brazilian Provinces became States.

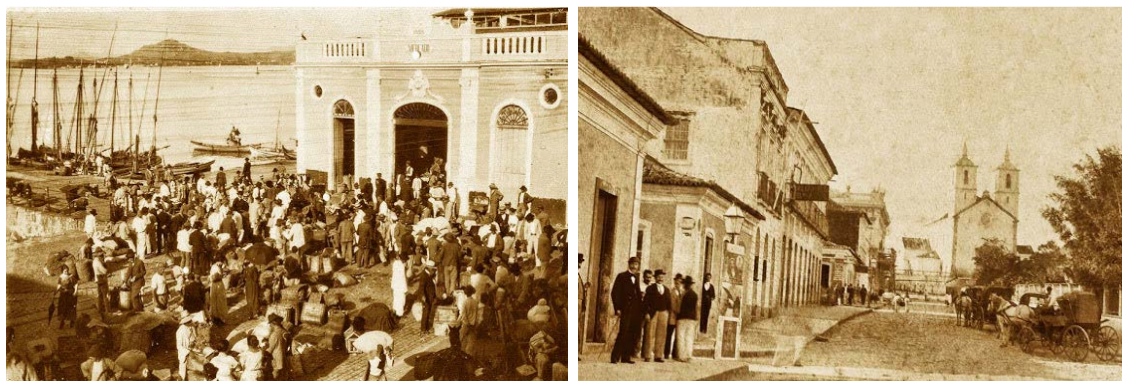
### 3.2. 20<sup>th</sup> Century Florianópolis: Modernity, Tourism, and Master Plans

#### 3.2.1. Early 20<sup>th</sup> Century Urban Modernization

Under the new Republic, Desterro was renamed Florianópolis in 1894 in honor of the second President, Floriano Vieira Peixoto, who served from 1891 to 1894. Following Dom Pedro II's push to industrialize and the Republic's aspirations for modernization, economic conditions allowed for a comparatively early urbanization in Brazil.

Florianópolis was named capital of the State of Santa Catarina and the local government focused on a period of modernization in keeping with the idealistic goals of the nascent country. The population of the city rose from just over 30,000 in 1900 to over 40,000 by 1919 (IBGE, 2016). The city center around the Praça underwent a period of investment as the new Public Market was built in 1899, the Metropolitan Cathedral was renovated and restored in 1922 and the first hotel with an elevator was built (Lopes, 2015; Santos & Pereira, 2008).

Figure 7. The Public Market of Florianópolis (left) and Praça XV do Novembro (right), 1920s



Source: [www.ihgsc.org.br](http://www.ihgsc.org.br)



As Corrêa (2004) summarizes, Florianópolis had only a handful of large industrial facilities in 1914 including a nail factory, a shipyard, and an embroidery factory as well as no more than 14 smaller factories providing consumer goods such as furniture, coffee roasting, cement tiles, vinegar, beverages, soap, cigarettes, pasta, and sugar refining. The Governor of Santa Catarina, Hercílio Luz (1918-1922 and 1922-1924), pushed for modernization, even threatening to transfer the capital inland if the conditions of the city were not improved. In addition to state-financed improvements to the Public Market in the interest of health and hygiene, the old wooden pier was replaced by a permanent structure in 1926 to better welcome people arriving to the city from the continent. The pier housed the Miramar Bar and Restaurant, opened in 1928. It was an icon of modernity and a meeting point for the political, economic, and cultural elite until its demolition in 1974 (Almeida, 2008). The Miramar also served as the starting point for the public bus system that began circulation in the 1930s.

A steel suspension bridge (*Ponte Hercílio Luz*), named in honor of the Governor, also began construction in 1920 and was completed in 1926. The bridge facilitated commerce, and although the region was not experiencing the same pace of industrialization experienced by Rio de Janeiro and São Paulo, this period marked the beginning of a drive by the municipal government to consolidate the city center and centralize administration.

Figure 8. Construction of the Point Hercílio Luz suspension bridge, 1920-1926.



Source: <http://construcaopontehercilioluz.blogspot.com>, Wikimedia Commons

In Brazil, the early 20<sup>th</sup> century was a period of intensifying conflict between the large landed property owners who dominated the agricultural export market (*latifundia*) and small farmers who intensively farmed plots able to feed themselves and a limited local market (*minifundia*). In the microregion of Florianópolis, however, only 9% of the land was held in large estates with over 53% held by small farmers, many of whom cultivated coffee (Lago, 1978; Lopes, 2015). Traditionally communal lands began to be appropriated in the early 19th century, particularly in the north of the island where Azorean descendants managed land and marine stocks as common pool resources (Sugai, 1994). As the *latifundia* and the industrial bourgeoisie consolidated power, the embattled military elite of Rio Grande do Sul successfully overthrew the federal government in

1930 and installed Getúlio Vargas from the Liberal Alliance Party. A new constitution was adopted in 1934, and replaced in 1937, that established Brazil as a corporatist state, the New State (*Estado Novo*), ruled under a dictatorship until the end of World War II in 1945. The Federal Constitution of 1934 granted a degree of autonomy to municipalities (Art. 13) allowing authority over taxes and administrative organization, and introduced a system for transferring state tax revenues to municipalities (IBGE, 2011).

### 3.2.2. *Administrative Rationalization and Brazilian Modernism*

In the 1950s, agricultural activities, taking place on land held by the rural elite, began to mechanize further driving rural to urban migration. Following the death of President Vargas in 1954 (and a brief transitional period), Juscelino Kubitschek was democratically elected in 1955 and remained president until 1961. Kubitschek took advantage of funds available from international sources established during the Bretton Woods Conference in 1944 and embarked on programs of industrialization and modernization. With the modern capital of Brasília under construction between 1956-1960, urban areas throughout Brazil began to embark on modernization programs to boost economic growth and offer more opportunities for education and public services. New legislation on land use was introduced and the first Master Plan of Florianópolis was approved by the Municipal Council in 1955 (Law No. 246).<sup>20</sup> The plan proposed several modern initiatives such as wide avenues and eight story buildings as well as banned certain activities including industrial facilities and ports (Lopes, 2015). Brazilian modernism heavily influenced how municipal authorities approached planning. Lúcio Costa and Oscar Neimeyer developed plans for parts of Florianópolis as well as the

---

<sup>20</sup> The plan at this time was referred to as the Municipal Code of Florianópolis (*Código Municipal de Florianópolis*) not as the Master Plan (*Plano Diretor*).

naturalist landscape architect Roberto Marx. Neimeyer's plan for the northern beaches emphasized the integration of nature and physical form by calling for wide bands of preserved land. Three major roadways were proposed to facilitate economic growth throughout the island and begin to service a nascent interest in the island as a leisure destination. A new road connecting the island with the mainland was proposed in the Master Plan as well as an expressway to the south and a wide avenue along the north bay. As wealthy landowners had acquired the less developed land to the east and north of Praça XV do Novembro, the municipal government was persuaded to invest in projects encouraging growth in these areas by building a new hospital (Celso Ramos), the Government Palace, and the Federal University of Santa Catarina (Pereira, 2003).

Although the expressway to the south was not constructed at this time, the north bay avenue (*Avenida Beira-Mar Norte*), north of the original city center, was built. Partially built on reclaimed land, *Avenida Beira-Mar Norte*, was financed by the state government beginning in the 1960s and paved in the 1970s. Its completion ushered in a new era of development along the north shore of the peninsula. Roadways were also constructed that facilitated urban growth past the hill located directly east of the original city center (*Morro da Cruz*).<sup>21</sup> The construction of the roadways to facilitate travel, now both to the continent and on the island, marked the end of the dominance of water based transportation in the city.

---

<sup>21</sup> A road was built over the hill to reach the opposite side where the Federal University of Santa Catarina was constructed in the late 1950s in the neighborhood of Trindade. This neighborhood was also connected to the north bay avenue along the northern base of the hill and to the original city center along the southern base. Trindade was then connected by road to the town of Lagoa da Conceição directly to the east, on the shore. Although there was a road connecting the north of the island at this time, having once provided access to one of the forts constructed in the 1700s, it was not paved (Lopes, 2015).

The 1960s were a time of intensifying international interference in domestic affairs in the context of the Cold War. In Brazil, President Goulart was deemed a socialist threat and, with political backing from the United States, a coup was orchestrated that installed a military government that ruled from 1964 to 1985. Under the military government, the character and pace of urbanization in Florianópolis changed in the 1970s as commercial markets came to be dominated by national and regional companies rather than by local companies and businesses (Bastos, 2000). Utility services were modernized by large statewide companies providing basic services to the city. During this time, many of the small fishing villages of Florianópolis were serviced with running water, electricity, and a network of paved roads. The development of a new Master Plan was initiated in 1969 under the guidance of architect Luiz Felipe Gama (Pereira, 2003). This plan, approved in 1976 (Law No. 1440/76), demonstrated a greater integration with state planning authorities who were financing and constructing roadways that passed through the greater metropolitan area. Industrial and commercial development increased rapidly along the corridors of BR-282 and BR-101 on the mainland as the population of the greater metropolitan area grew.

As the Hercílio Luz bridge was aging, the 1976 Master Plan also initiated a landfill project in the south bay area that was used to construct a second bridge to the mainland. The second bridge (*Ponte Colombo Salles*), connecting to the island near Praça XV do Novembro, was completed in 1975. The plan included the connection of this bridge to a new expressway to the south of the island via a tunnel through the hill obstructing access to the south from the city center. Expansion and paving of roadways throughout the island to facilitate tourism was also prioritized. Included in the plan was a

stretch of road connecting the eastern shore beaches of Joaquina, Praia do Campeche and Morro das Pedras. This beachside roadway has not been completed and continues to be a contentious point of debate in the development of the new Master Plan, discussed in greater detail in Section 3.3.

The new plan also prioritized administrative and organizational changes and the construction of new buildings to house the administrative and financial functions of the city. In 1972, the Municipality of Florianópolis passed Law No. 1110 that created the Municipal Development Council. The Council was created to unify action in support of physical, social, and economic development. Although the term *sustainability* was not used in the language of the document, the Council was designated to work on behalf of collective interests towards a unified vision of urban development. The Council, supported by the budgetary resources of the Municipal Council of Engineering, Architecture, and Urbanism, was composed of four state level members<sup>22</sup> and four municipal level members.<sup>23</sup>

Following the completion of highway BR-101 during this same period, Florianópolis began to experience a real estate boom and an increase in tourism (Konzen, 2013). With much of the island now accessible by paved roads, as well as electricity and water connections in the fishing villages, tourism began its ascent to a place of economic prominence in the city. Real estate investment focused on the city center, the new avenue *Beira-Mar Norte*, the nearby Trindade neighborhood, and the seaside towns and resorts

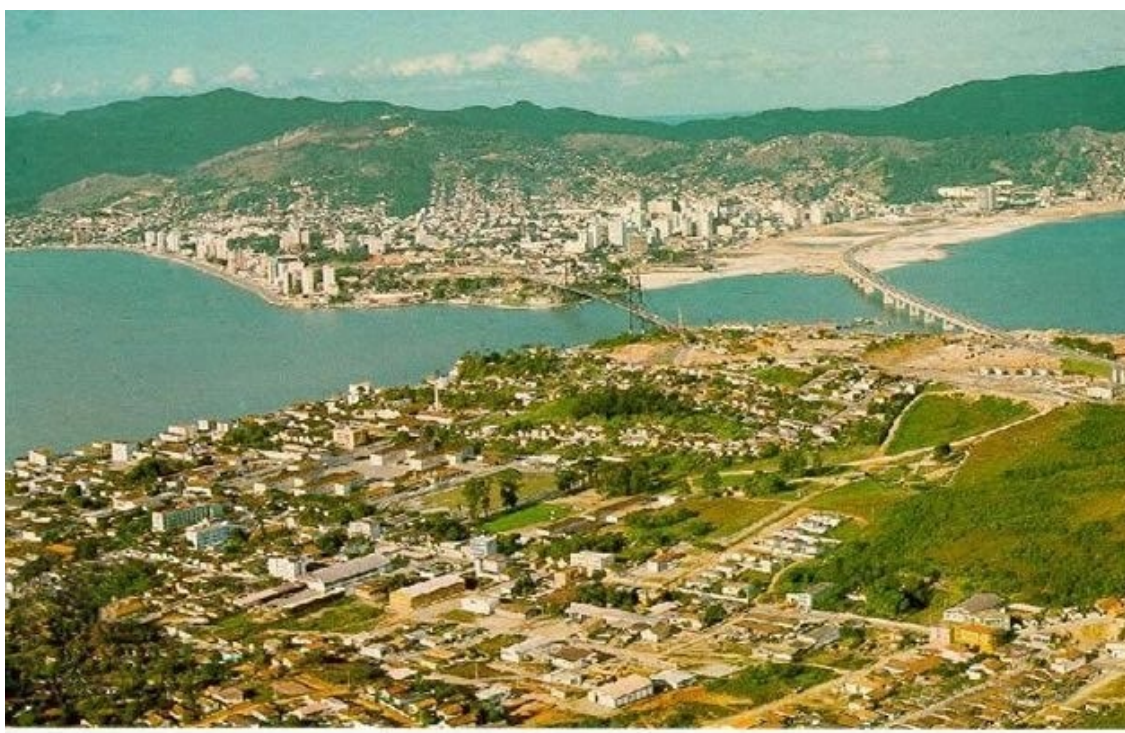
---

<sup>22</sup> Representatives from the State Secretariat of Transport and Public Works and the Secretariat of Development, a sociologist from the Federal University of the State of Santa Catarina – UFSC, and either an architect or an engineer from the Regional Council of Engineering and Agronomy of Santa Catarina – CREA.

<sup>23</sup> One representative each from City Hall, the Metropolitan Council, the Secretariat of Public Works, and the Attorney General.

(*balnearios*), particularly the area of Campeche (Lopes, 2015). The 1969 plan included road improvements to the north of island, but development to the south was the priority as the southern expressway was to connect to BR-101 from the mainland. Also, no provisions were made for tourist infrastructure in the north. Although the Master Plan does provide a guiding instrument for planning, it is subject to revision as priorities and political interests change.

Figure 9. Florianópolis in 1976



Source: [fotosantigasflorianopolis.blogspot.com](http://fotosantigasflorianopolis.blogspot.com)

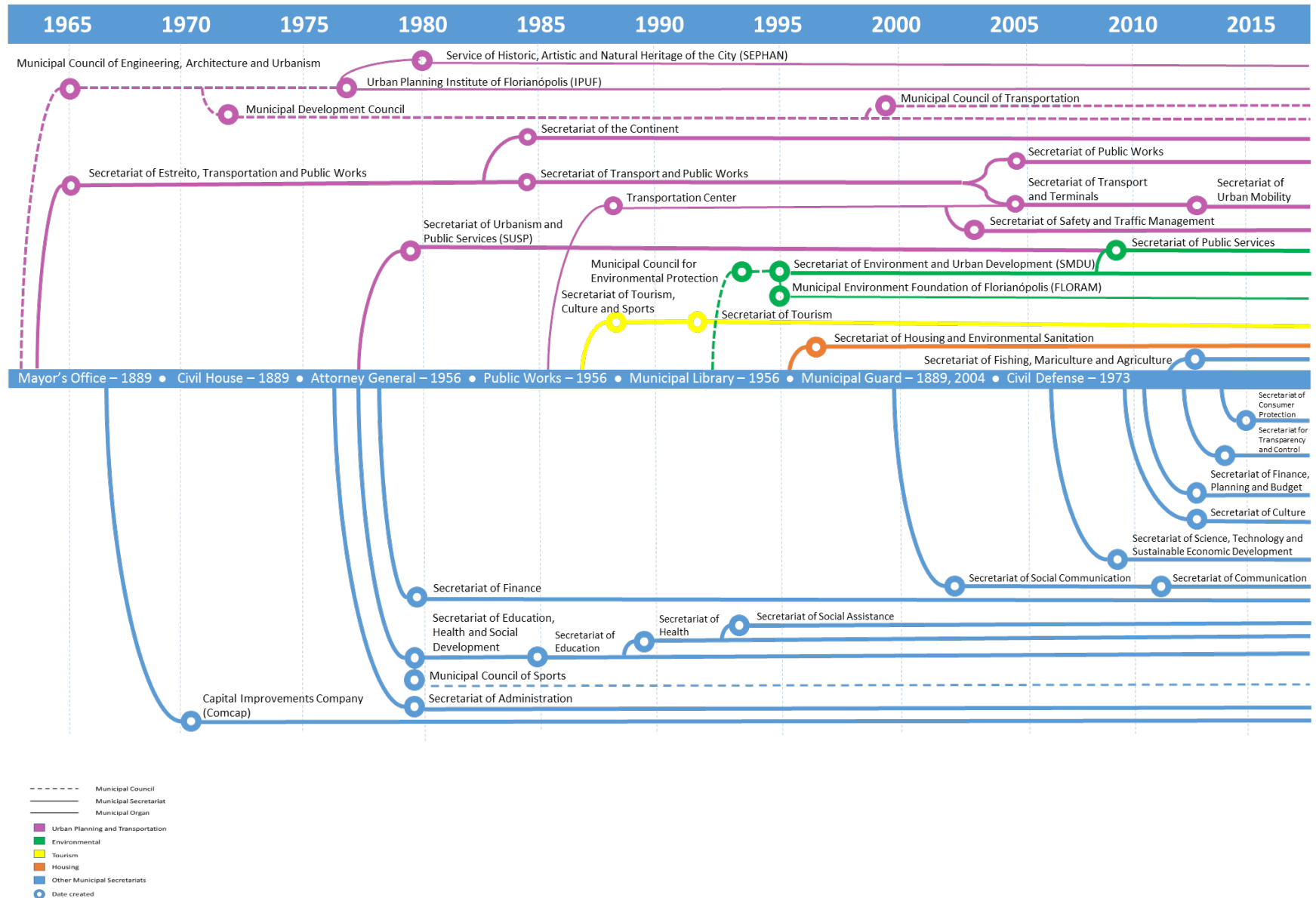
In 1979, Law No. 1674 made some important structural changes in the administration of the city. The Law established a decentralized structure that provided for greater managerial autonomy among the various municipal bodies operating under the Mayor. The municipal bodies designated to operate directly under the supervision of the Mayor's Office were the Secretariats, the Attorney General, COMCAP (a privately-

owned business responsible for waste removal), the Urban Planning Institute of Florianópolis (IPUF), the Municipal Council for Development, and the Municipal Commission of Civil Defense and Military Service. At this time, the Secretariat of Urbanism and Public Services was responsible for monitoring and licensing related to building codes and the Master Plan. This Secretariat also administered: land titles, zoning, preservation of the natural landscape and environmental equilibrium, afforestation services, and preservation of parks, squares, and gardens. In 1979, the two-year-old IPUF was responsible for traffic planning and management, cartography and land registry, and guidelines for managing and preserving natural, historic, and artistic heritage. IPUF, with only minimal responsibilities, was also afforded significant autonomy in priority setting and budget allocation. This authority proved to be important in the ability of IPUF to create the first city park (Peri Lagoon) with an environmental education and preservation focus in 1981 (personal communication, 2016). The Technical Commission of Service of Artistic and Natural Patrimonial History of the City (COTESPHAN), also important in the designation of historical and archeological sites as cultural heritage preserves, was designated as subordinate to IPUF.

As seen in Figure 10, the administrative restructuring in 1979 also significantly changed the composition of the Municipal Development Council reflecting the changing management needs and priorities of the city and the nation.



Figure 10. Relevant Changes in the Administrative Structure of the Municipal Government (1965-2015)



In 1979, the Municipal Development Council dropped all members except for representatives from the City Council and the state level Secretariat of Transportation and Public Works and added representatives from the municipal level Secretariat of Estreito, Transportation and Public Works (representing the continent part of Florianópolis), the newly created IPUF, the Commercial Association, and the waste management company (COMCAP). Representatives from the state-wide electricity provider (CELESC), water and sanitation utility (CASAN), and telecommunications provider (TELESC) were also newly included in the council. State government representatives now included a member of the state Environmental Foundation (FATMA), created in 1975, and a representative from the state traffic department (DETRAN). The military government, seeking to centralize power while investing heavily in roads and infrastructure, also were represented in the council at this time with a member each from the National Department of Roads and Highways and the National Department of Public Works and Sanitation.

The city, having banned industry on the island in the 1950s, was searching for new ways to boost the local GDP. A strong national economy in the 1970s increased car ownership among middle-class Brazilians who also had the disposable income to use the federally financed road network to travel to more distant locations. Florianópolis, gaining prominence as a tourist destination, also drew tourists from nearby Argentina, Uruguay, and Chile. The small local airport, now called Hercílio Luz International Airport, was expanded in 1976 and a runway expansion in 1978 increased air traffic.<sup>24</sup> An administrative plan for tourism development under the authority of the Mayor was also an important change initiated under Law No. 1674. The development of programs and

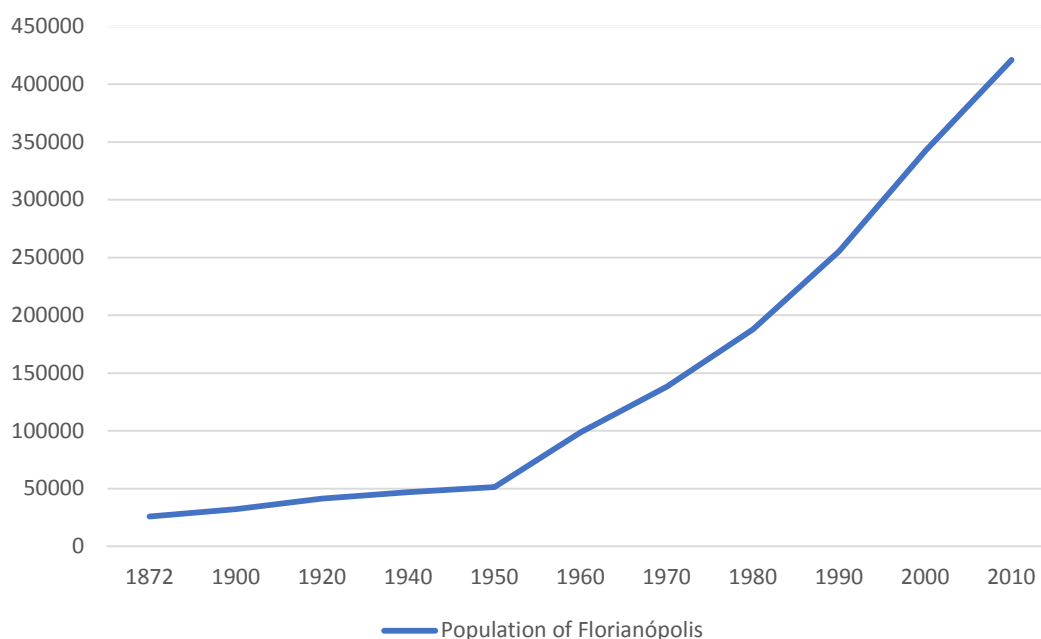
---

<sup>24</sup> The airport was approved for international flights in 1995.

events for tourists visiting the island to enjoy nature was specifically included in the law. The 1979 administrative restructuring set into motion studies and programs to change the Department of Tourism and Culture to the Secretariat of Tourism, Culture and Sports by 1981.

Although a recession and political unrest in Brazil in the 1980s contracted private investment in real estate, Florianópolis authorities continued to invest in roadways. Roads were built to beaches popular for second homes and tourist amenities. With the availability of affordable housing in these areas increasingly constrained, a socio-economic spatial division began to emerge that was a departure from the previous pattern that showed high value real estate in the city center and a low value for land in coastal areas occupied by rural fishermen (Lopes, 2015). This rise in demand for coastal real estate marked the beginning of increasing inequalities in the socio-spatial development pattern that will be discussed in greater depth in Chapters 4 and 6.

Figure 11. Population of Florianópolis, 1872-2010 (IBGE, 2011)



Continuing to boom in the late 1980s and 1990s, the tourism industry attracted migrants eager to work in the service industry during the high season, but who were left with few employment opportunities the remainder of the year. Informal settlements began to grow, primarily in the neighborhoods of Serrinha, Campeche, and on the continent in Chico Mendes. These areas quickly swelled to accommodate high season labor who could not afford housing in the local market and who had intermittent periods of employment (Pimenta & Pimenta, 2011). The rise in tourism, and its establishment as the primary economic activity of the city, led to an increase in real estate developers investing in hotels, resorts, and amenities. The fishing villages, home to Azorean descendants whose traditional fishing practices characterized the island, began to provide services for tourists such as food and low-cost accommodation (*pousadas*). Resentment grew between outsiders and locals, known as *manezinhos*.<sup>25</sup> The Azorean identity became a way of differentiating between locals and outsiders who were rapidly changing the cultural landscape of the island. Changes in the physical landscape in terms of urban growth, together with early signs of environmental degradation, led to a cultural push back from locals against the tourism industry with the goal to preserve cultural heritage as well as the natural environment. In 1985, the government of Florianópolis initiated the Master Plan for Seaside Towns (*Plano Director dos Balneários*) (Law No. 2193/85) to address the growing inability of the 1976 Master Plan to effectively manage development of coastal areas.

---

<sup>25</sup> This name derived from Manuel, a common name among the large wave of Azorean immigrants in the 18th century.

Although popular support for democratization and decentralization in urban management and governance was growing in the 1960s in Brazil, the military dictatorship that lasted from 1964 to 1985 hampered the adoption of federal laws supporting legal and regulatory devolution. President João Figueiredo, in favor of a more open Brazil, initiated a gradual change back to democracy in 1974. By the 1980s, with the Brazilian economy suffering under the burden of heavy international debt and high unemployment, Florianópolis experienced a rise in the number of non-state organizations and associations. The Florianópolis Union of Community Entities (UFECO) was created to represent community associations and create a Federation of Residents' Associations and Community Councils. Before this unifying organization was created, the autonomously created resident associations were distinct from the Community Councils (created by the state government during military rule). The social movement in Florianópolis, although active on a smaller scale than in the larger cities of Rio de Janeiro and São Paulo, included many of the same elements. NGOs championing social and environmental issues began to proliferate in the 1980s as the city government of Florianópolis began to struggle under the demands of population growth. State level environmental organizations, such as the Federation of Ecological Entities of Santa Catarina (FEEC) and the state government Foundation for Support to Technology and the Environment (FATMA), were also created at this time. The diverse amalgam of associations and organizations interested in social change or the environment in Florianópolis is captured in the list below highlighting some of the most active non-state organizations in the area in the 1980s.

Table 2. Key social or environmental associations in Florianópolis, 1980s

Association	Sector	Date created
Basic Ecclesial Communities of the Catholic Church <i>Comunidades Eclesiais de Base – CEBs</i>	Poverty/ Housing	1970s
The Catarinense Association for the Protection of Animals <i>Associação Catarinense de Proteção dos Animais – ACAPRA</i>	Environmental/ Animal Welfare	1981
Free Ecological Movement <i>Movimento Ecológico Livre – MEL</i>	Environmental	1983
Surf Association of Campeche <i>Associação de Surf do Campeche</i>	Environmental/ Community	1984
Residents Association of Lagoa de Conceição <i>Associação dos Moradores da Lagoa de Conceição – AMOLA</i>	Environmental/ Community	1984
Barddal Foundation of Education and Culture <i>Fundação Barddal de Educação e Cultura</i>	Environmental/ Social	1984
Center for Support and Promotion of Migrants <i>Centro de Apoio e Promoção do Migrante – CAPROM</i>	Migration/ Housing	1984/1987 <sup>26</sup>
Florianópolis Union of Community Entities <i>União Florianopolitana de Entidades Comunitárias – UFECO</i>	Housing	1985/1987 <sup>27</sup>
Residents Association of Porto da Lagoa <i>Associação dos Moradores do Porto da Lagoa – AMPOLA</i>	Environmental/ Community	1986
Popular Education and Evangelization Center <i>Centro de Educação e Evangelização Popular – CEDEP</i>	Migration/ Housing	1987
Homeless Movement <i>Movimento Sem-Teto – MST</i>	Housing	1988
SOS Fauna <i>SOS Fauna</i>	Environmental/ Animal Welfare	1989
Ecological Association of Paulo Lopes <i>Associação Ecológica de Paulo Lopes</i>	Environmental	1990

Source: (Binotto, 1994; Machado, 1996; Peñafiel, 2005)

With social movements gaining power in the political sphere, the military government officially ended in 1985 ushering in the period of the New Republic (*Nova República*). In Florianópolis, Edison Andrino of the Brazilian Democratic Movement Party (PMDB) was elected in 1985, the first mayor not appointed by the State since 1964. Andrino, seeking to include community associations in the administration of the city, initiated participatory budgeting and began the process of revising the Master Plan in 1986. However, at this time, organizations such as UFECO were not sufficiently

<sup>26</sup> Organized in 1984 but not formally established as an NGO until 1987

<sup>27</sup> Organized in 1985 but not formally establishes as an NGO until 1987

organized to effectively negotiate the process (Binotto, 1994). Another influential organization fighting for solutions to the housing deficit was the Homeless Movement (MST) that was organized in 1988 by several community associations representing *favelas*.<sup>28</sup> With Esperidiao Amin from the center-right Progressive Party (PP) returning to City Hall for a second term in 1989, participatory budgeting was suspended leaving the only avenue for public participation in city decision-making in the Municipal Council for Health.

Under the leadership of President José Sarney, the new Federal Constitution was adopted 1988. Of the 285 amendments made to the 1976 Florianópolis Master Plan, 158 amendments were made by Mayor Amin between 1989 and 1992 as legal and administrative changes occurred at all levels of governance (Lopes, 2015). Under the New Republic, the 1990s initiated a relaxing of the protectionist policies for national companies and an opening to foreign investment, particularly as many state-owned companies began to privatize in keeping with global trends toward economic liberalization. The Real Plan of 1993, initiated under the Presidency of Itamar Franco, led to economic recovery and a slow return of the construction sector in the Florianópolis area. With additional federal financing for public infrastructure (*Caixa Econômica Federal*), the area experienced another period of rapid urbanization beginning in the 1990s and lasting into the 21<sup>st</sup> century. Different from the military government, the New Republic pushed neo-liberal policies calling for privatization and decentralization. Souza (2008) argues that there arose a leftist technocracy in this period at the federal level that

---

<sup>28</sup> The Homeless Movement, also known as the Homeless Workers Movement, is a shack-dwellers movement that has its origins in the Landless Workers Movement.

believed wholly in the potential for urban planning tools to be the agents of urban reform across social, political, and environmental dimensions.

Beginning in the late 1980s, the staff of IPUF embarked on a series of global study tours in search of models of development to inform urban planning in Florianópolis. Influenced by development both in Britain's New Town Movement (that grew from the Garden City Movement) as well as the Technopolis model used in Tsukuba, Japan, technology parks were proposed for the neighborhoods of Campeche and Saco Grande in the early 1990s (Rizzo, 2013). Owing to the large presence of companies connected to telecommunications and electricity services in the city, the proposal was to encourage investment in the technology sector (Rizzo, 2013). Political leadership of Florianópolis, cognizant that the capital of Santa Catarina was less developed than other capitals of the south of Brazil, prioritized development of the tourism and technology sectors in the 1990s. These sectors, already showing growth potential, were considered less damaging to the natural assets of the island (Rizzo, 2013).

In 1992, professors from UFSC, many of whom were active in the social movements of the 1980s, began working with the city government in a collaborative forum called the Studies and Research in Social Work and Popular Organization (NESSOP), linked to the Department of Social Work (Rizzo, 2013). The success of this forum in providing space for the entrance of the ideals of the social movement into city decision making threatened the business elite, primarily working in the tourism industry, and led to the founding of a parallel non-governmental organization to promote pro-tourist development. This organization, FloripAmanhã is discussed in greater detail in Section 3.3.3.



Determining a need to better regulate and monitor the natural assets of the city, the creation of the Municipal Environment Foundation of Florianópolis (FLORAM), in 1995, resulted from discussions between the Environmental Advisory Office (AMA), the Secretariat of Urban Services (SUSP), the Urban Planning Institute of Florianópolis (IPUF) and the Capital Improvement Company (COMCAP) (FLORAM, 2011). Also in 1995, the Tourist Development Plan (*Plano de Desenvolvimento Turístico*) was adopted cementing tourism and amenity development as critical to the island economy. The 1990s was a time of pro-growth politics on the island. As recounted by Rizzo (2013), discussions between the Civil Construction Union (*Sindicato da Indústria da Construção Civil – Sinduscon*) and the Municipal government centered on how Federal Laws protecting Areas of Permanent Preservation (APP) – applying to 42% of the island at that time – were subject to interpretation due to built in flexibilities designed to give city officials some discretion over planning.<sup>29</sup>

With the 1976 Master Plan out of date, the Mayor began a process to develop a new plan. Beginning in the early 1990s, IPUF developed a new Master Plan that was eventually sent to the City Council for approval in 1995 but was withdrawn following public outcry. Many felt the proposed Master Plan was developed without weighing community opinion and did not uphold directives of the Master Plan for Seaside Towns adopted in 1985 (Rizzo, 2013). To address the concerns of the public, IPUF divided the plan into parts and held meetings with 22 concerned communities in 1997. Concerned citizens were presented the plan that corresponded to their neighborhood and then given a

---

<sup>29</sup> The percentage of land in Florianópolis designated as Areas of Permanent Preservation (APP) has changed over the years depending on the nature of the laws and regulations currently in force. For example, in the 1990s some of the area designated as APP was Rural Exploration Area (*Área de Exploração Rural*) and subject to development under the discretion of municipal authorities.

period of thirty days to suggest modifications, provided the suggestion did not wholly modify the existing plan (Rizzo, 2013). Although, a new Master Plan was approved in 1997 (Complementary Law No. 001/97), NGOs and community associations mostly from the Campeche area were able to stop the City Council from drafting bills related to the execution of the plan in particular areas. After the passing of new federal legislation in 2001 that called for improvements in participatory planning mechanisms at the municipal level, discussed further below, forums were held between IPUF and community groups that led to the development of an alternative plan in the early 2000s.

### **3.3. 21<sup>st</sup> Century: Urban Reform, Sustainability, and Participatory Planning**

#### *3.3.1. Urban Reform*

National efforts to reform policies related to the use of public land in urban areas was put forward in Congress in the 1960s. However, progress toward the urban reform agenda stalled under the military government. With the clear intention to begin a period of political transformation in the 1970s, the urban reform movement again gained traction as a part of the larger social movement that was sweeping the country. Viewed as a means by which social inequality could be overcome, the goal of the National Urban Reform Movement, officially taking this name in 1985, was to address local housing issues and access to basic services in the city. Although the belief that property serves a social function has been part of Brazilian Constitutional Law since 1934, the 1916 Civil Code enforcing individual property rights effectively negated the ability of local officials to effectively govern land use in a socially equitable way (Fernandes, 2010). This inadequate authority over planning at the local level combined with a lack of attention to

urban planning at the federal level led to a pattern of socio-spatial segregation and a persistent housing deficit.

Beginning in the 1970s, the military government initiated a gradual opening and transition back to democracy that allowed the social movement to gain momentum. Municipal governments began to experiment with democratic planning procedures. Participatory budgeting, originating in the 1970s in nearby Porto Alegre, Rio Grande do Sul, established a municipal mechanism that allowed public access to municipal decision-making. The embrace of this kind of access-widening municipal tool was closely followed by federal laws addressing public land issues such as the regularization of informal settlements (Law No. 6766/79). In response to the social movement, the National Constituent Assembly, composed of the 1986 Chamber of Deputies and the Senate, called on public participation in the development of the new Federal Constitution. Through this mechanism, collective rights began to take priority over private property and individual interests. The Federal Constitution of 1988 includes two Articles (182 and 183) that specifically address urban policy. The National Forum on Urban Reform (FNUR) was created to regulate these Articles until the City Statute (Law No. 10257) was passed in 2001. The Statute was a landmark achievement in giving authority to municipal governments to apply locally developed urban planning tools, regularize informal settlements, and institute democratic participatory planning instruments. Playing an important role in sustainability planning, the Statute guides zoning and land use regulations as well as calls for participatory budgeting and participatory procedures for drafting the Master Plan. Table 3 below details the key elements of the City Statute.

Table 3. Key elements of the City Statute (Law No. 10257)

Element	Description
Social function of the city	Principal governing the social function of property gives legal authority to public officials to control land use and urban development in a way that ensures an organized city on behalf of the public. Seeks to balance private interest with the social, cultural, and environmental collective interests.
Planning tools	The Statute regulates the urban and financial instruments of the 1988 Federal Constitution as well as introduces tools designed to influence property markets to function according to the principals of inclusive growth and environmental sustainability. The tools include those already in use in many Brazilian cities (zoning, occupancy rates, settlement models, building coefficients) as well as new instruments including progressive taxation, surface rights, municipal preferential rights, and building rights transfers.
Democratization of urban planning and management	Identification and implementation of methods whereby the public can be included in the decision-making process. Cities have instituted a range of procedures including consultative meetings, neighborhood impact reports, and participatory planning and budgeting.
Land tenure and regularization of informal settlements	Allows municipal authorities to initiate programs to address informal settlements. The Statute regulates previously adopted instruments such as <i>Special Usucapiao</i> , a constitutional means by which squatters can acquire land. The Statute also introduced new tools including the municipal zoning of lands as being either currently occupied by informal settlements or set aside for low-income housing development ( <i>Special Zones of Social Interest - ZEIS</i> ). The Statute pays particular attention to occupation of public lands in a way that conflicts with environmental laws and provides for a means by which authorities can provide special concessions for land occupancy or transfer occupiers when needed ( <i>Provisional Measure</i> ).

Source: (Fernandes, 2010)

Following the adoption of the City Statute, initiatives by the Municipal government of Florianópolis in support of various civil and participatory initiatives were created and implemented in keeping with the universal ideals of human rights. Municipal organs and secretariats with a social or civil mandate created or restructured at this time include the Institute of Florianópolis for the Generation of Opportunities (2003), the Municipal Directorate of Consumer Protection (2005), the Municipal Council for the Promotion of Equality and the Coordination of Public Policies for the Promotion of Racial Equality (2007), the Open University of Brazil in Florianopolis (2007), the Coordinator for Women (2008), Coordinator for Youth (2009), the Municipal Secretariat

of Culture (2013), the Free Music School (2013), the Florianopolis Welfare Institute (2013), and the Municipal Secretariat of Consumer Protection (2015).

### 3.3.2. *The New Master Plan*

The Municipal Secretariat of Environment and Urban Development (SMDU) is responsible for coordinating secretariats and organs involved in urban planning and environmental licensing in Florianopolis (IPUF, FLORAM and the Executive Secretariat of Public Services – SESP) as per Complementary Law No. 465, of 2013. The Master Plan, developed by IPUF in consultation with the other bodies of the municipal government, is the primary means of regulating how land is used and the intensity of land use. As seen in Figure 10, administration over city planning, and the Master Plan, has been restructured numerous times since the mid-20<sup>th</sup> century reflecting changes in federal authority, global trends in urban development, and a consolidation of influence among a field of non-state actors. The municipal government of Florianópolis has proven to be able to restructure quickly in response to federal and state laws, as well as in response to collective action among non-state actors in both the private sphere and in the increasingly professionalized civic arena.

In 2006, in keeping with the requirements of the City Statute, Mayor Dário Berger initiated a process to revise the contested 1997 Master Plan through a consultative process (Decree No. 4215). In general, the Master Plan includes the over-arching Urban Development Policy of the city as well as the specific Use and Occupancy Plan, the urban instruments, and the management system. The participatory process for Florianópolis was contentious as all parties found it difficult to find common ground. In 2010, Rubén Pesci, an architect and urban planner who is considered one of the pioneers of sustainable

development in Latin America, proposed a master plan for the city. Pesci is president of the CEPA Foundation, Center for Environmental Studies and Projects (*Fundación CEPA - Centro de Estudios y Proyección Ambiental*), headquartered in Buenos Aires. CEPA has worked on several projects focused on land use in the Florianópolis metropolitan region, but lacking sufficient political support, the Master Plan was not adopted.

A Master Plan was finally approved under Mayor Cezar Souza Junior, who took office in 2012. The Plan was also highly contentious and many felt it favored real estate developers and elite land interests without upholding the principles of the City Statute in regard to housing inequality, environmental protection, and a consultative process. Only three months after its approval in 2014, Federal Justice Marcelo Krás revoked the Master Plan. The ruling stated there were no district hearings or public audiences as required by the City Statute. Complementary Law No. 482 initiated a revision of the Master Plan for Florianópolis in 2014.

Figure 12. Florianópolis city center, 2006.



Source: Mariordo Mario Roberto Duran Ortiz

The 2014 Master Plan, still active as the guiding plan while revisions are made, proposed to control excessive vertical construction by instituting a plan for new urban centralities that induce growth in designated nuclei while preserving large areas as urban parks and protected land. Using the Master Plan to ensure a good quality of life across all facets of society is a departure from the competitive city model of growth followed in the mid to late 20<sup>th</sup> century. The 2014 Master Plan uses the word *sustainability* specifically as one of the 13 objectives of the Plan and identifies the goals and tools to be used to create a sustainable city in Article 292. Article 292 authorizes, by executive authority, the creation of programs and incentives to preserve vegetation and promote the use of energy efficient architecture and equipment that reduces the overall impact of the city on the environment.

The 2014 Master Plan clearly states that the city aims to have the largest quantity of protected land of any state capital in Brazil. This aim is to be jointly pursued with the goal to preserve the cultural landscape and quality of life of the city. As a means by which transportation services could be improved for both tourists and locals, the new Master Plan calls for the development of marine transportation and facilities for encouraging water sports and other job creating industries tied to the historical importance of the sea. Section III of Complementary Law 482 (renewing efforts to create an updated Master Plan in 2014), established the System of Evaluation of Urban Performance Indicators (SAIDU), aimed at requesting, receiving, processing, administering, and consolidating data and providing information to the various organs of the Municipal Public Administration. SAIDU is meant to facilitate planning, monitoring, implementation, and evaluation of urban policies to inform and support decision-making of the local government and the Municipal Urban Policy Management System (SMGPU). The system is intended for the self-assessment of government management in urban-environmental issues.

IPUF based the development strategy of the Master Plan on population growth estimates and growth patterns that will naturally occur along new roadways given the geographical limitations of the island. Dense centralities scattered throughout the island, connected by public transportation, is envisioned by the architects of the Master Plan. However, opposition to this form of development was raised by several community associations, most prominently in Campeche by the same organizations that had been involved in the development of various alternative Master Plans since the 1990s. With significant investment and growth primarily in the North and City Center, the Plan aims



to support investment in new infrastructure to better provide basic services while maintaining large swaths of land protected by federal, state, and local laws. Community associations along the east coast of the island expressed disapproval of significant increases in public services in the neighborhoods in an effort to discourage migration to those areas. These communities favored maintaining minimal public services and limited commerce. Having its roots in colonial mercantile circuits, this method of commerce requires residents to commute to the commercial center for some specific types of goods (*comércio vicinal*).

The challenge in integrating the various planning laws (the Master Plan of 1997 and the Master Plan for Seaside Towns of 1985) with the legal provisions of the City Statute, and the suggested modifications offered by community organizations, led to a protracted planning timeline. The process of revision, taking place between 2014 and 2016, included 29 meetings of the IPUF Central Management, 17 public hearings, district meetings and workshops (IPUF, 2016). With the last debate of the 2016 Public Hearings taking place in December, the plan was submitted to the Federal Judge. Despite two years of efforts to negotiate the terms of the Plan, it was again revoked by the Federal Judge in December 2016 for the stated reason that the plan had not adequately integrated the suggestions of the public and it was not in compliance with federal environmental law. The Mayor was issued a fine of R\$ 100,000 (G1 SC, 2016).<sup>30</sup> The 2014 Master Plan continues to be under debate. With a call for greater transparency in the process, IPUF created a web-based Master Plan that is open to the public to assuage fears that the Plan is a tool of the local real estate elite.

---

<sup>30</sup> With an exchange rate of 3.38 BRL to 1 USD on December 16, 2016, the fine was equal to USD 338,000.

### 3.3.3. *Sustainability Initiatives*

Between 1965 and 2016, the word *sustainable* (*sustentável*) appears 314 times in the Municipal Laws of Florianópolis. First appearing in 1995 in Law No. 4645 creating the Municipal Foundation for the Environment (FLORAM), sustainable development was referenced as an overarching aim of the Foundation whose mandate is to protect the environment and ecosystem of Florianópolis. The word *environment* (*meio ambiente*) appears in Municipal Law 889 times in the same period, 16 years before *sustainable* with the first appearance in Law No. 1674/1979 that calls for the Municipal Development Council to include a member of the Foundation for Technology and the Environment (FATMA), a state-level environmental foundation, created in 1975.

The Emerging and Sustainable Cities Initiative (ESC) of the Inter-American Development Bank (IDB), recognizing the trend toward political decentralization without fiscal decentralization, has supported the development of an Action Plan (PMF & IDB, 2015) for sustainability in Florianópolis. The IDB program supports mid-sized cities in the development of strategic sustainability projects despite the constraints of limited tax revenues and credit capacity. The ESC methodology includes a rapid assessment of sustainability indicators which enables governments of emerging cities to quickly prepare action plans based on identified needs, fiscal capacity, and citizen demand. The methodology has been tested in 40 cities which resulted in the preparation of 15 action plans, one of which is for Florianópolis. A Commission for Monitoring and Implementation was created to support the work and the Brazilian Association for Municipal Administration (IBAM) was selected to execute the Action Plan.

The sustainability criteria used by the City of Florianópolis and the IDB to prepare the Action Plan for Florianópolis included 121 indicators across the three thematic areas of environmental sustainability, urban development, and governance. Analysis of the sustainability indicators, combined with the results of public opinion surveys, led to the near-term prioritization of sanitation management, improvements in land use planning and urban mobility, and technological innovation in public administration (PMF & IDB, 2015). The promotion of energy efficiency and renewable energy was highlighted in the report as a cross-cutting issue to be pursued as allowable under federal and state laws. These areas were prioritized considering impact, feasibility, execution time and citizen opinion.

The rise of non-state actors in sustainability planning in the city is apparent in the collaborative development of the Floripa2030 project beginning in 2008. This project, initiated before the IDB ESC project, outlines a strategic direction for sustainable development in the metropolitan region. FloripAmanhã, the NGO founded by leaders in the tourism industry, developed the plan in partnership with the city government. Outlining a sustainable development for the next 20 years, the project brought together 148 participants from 84 local public and private institutions and was awarded the Von Martius Sustainability Award in humanity in 2010.

FloripAmanhã grew out of the tourism commission of the Commercial and Industrial Association of Florianópolis which later gave rise to the Convention Bureau. The founder of FloripAmanhã, Alaor Tissot, also began organizing council meetings that eventually led to the creation of the Metropolitan Council for the Development of Greater Florianópolis (COMDES). Established in 2011 with 15 members, COMDES was

instrumental in working to legally establish the Metropolitan Region of Greater Florianópolis (RMF), approved by the Legislative Assembly in 2014.<sup>31</sup> Tissot is now the president of the Supreme Council of Federation of Industries of the State of Santa Catarina (FACISC Council). FACISC was influential in the 2015 amendment to the State-level legislative processes (Internal Rules of the House). This amendment allows for the participation of civil society representatives in the state legislative process.

FloripAmanhã, on behalf of the Municipal Council for Tourism, also oversaw the 2007 application process for several beaches in Florianópolis to be certified as Blue Flag Beaches. The Blue Flag is an international certification of the Foundation for Environmental Education (FEE) that indicates a beach or marina meets a set of stringent standards for water quality and environmental management. The Blue Flag Beach initiative was championed by the largest landowners and developers of Jurerê beach on

---

<sup>31</sup> COMDES is composed of: Brazilian Association of Event Companies (ABEOC Brasil SC), Brazilian Hotel Industry Association (ABIH), Catarinense Association of Technology Businesses (ACATE), Catarinense Association Engineers (ACE), Biguaçu Business and Cultural Association (ACIBIG), Commercial and Industrial Association of Florianópolis (ACIF), Business Association of Palhoça (ACIP), Commercial and Industrial Association of Santo Amaro da Imperatriz (ACISAI), Association of Materials, Trade, and Construction (ACOMAC), Association for Community Development - Jurerê (ADECOM Jurerê), Business Association of the Metropolitan Region of Florianópolis (AEMFLO), Brazilian Association of Architecture Offices (ASBEA), Association of Santa Catarina Highways Users (AURESC), Architecture and Urbanism Council of Santa Catarina (CAU/SC), Committee for the Democratization of Informatics (CDI), Council of Shopkeepers (CDL) Biguaçu, CDL Florianópolis, CDL Palhoça, CDL São José, Reference Centers for Innovative Technologies (CERTI), Floripa Convention and Visitors Bureau (CVB), Regional Council of Administration of Santa Catarina (CRA/SC), Regional Accounting Council of Santa Catarina (CRCSC), Regional Council of Engineering and Agronomy of Santa Catarina (CREA/SC), Regional Council of Realtors of Santa Catarina (CRECI-SC), Federation of Agricultural Engineers of Santa Catarina (FEAGRO/SC), Federation of Trade in Goods, Services and Tourism – Santa Catarina (FECOMÉRCIO SC), FloripAmanhã, Association of Municipalities of Greater Florianópolis (GRANFPOLIS), University Press – Santa Catarina (IU SC), Greater Florianópolis Community Institute (ICOM), Brazilian Bar Association – Santa Catarina (OAB SC), Order of Economists of Santa Catarina, Syndicate of Engineers of Santa Catarina (SENGE/SC), Trade Union of Accounting Services, Consulting, Consultancy, Skills, Information and Research of Greater Florianópolis (SESCON Greater Florianópolis), Union of Urban Transport Companies of Florianópolis (SETUF), Trade Union of Hotels, Restaurants, and Bars (Sindicato HRBS), Trade Union of Retailers (SINCOVAR), Union of Realtors of the State of Santa Catarina (SINDIMÓVEIS SC), Union of the Civil Construction Industry (SINDUSCON), Trade Union of Precast Industries and Cement Artifacts (SINPREMAC) and Association of Users of Computers and Telecommunications (SUCESU).

the northern shore of the island, Grupo Habitasul. With the water and waste effluents already managed by Habitasul, the water quality of Jurerê beach is better than many other locations around the island that experience direct dumping of sewage. Efforts to earn the Blue Flag Beach certification led to the passing of permitting regulations for informal beachside services, the creation of a system by which beach front restaurant owners would be responsible for removing trash from the beach, labeling of sensitive ecosystems in the area, and offering regular opportunities for environmental education. Jurerê was the first beach in Latin America to earn the Blue Flag certification. However, the increase in tourism led to a deterioration in the cleanliness of the beach, an increase in unauthorized busking, and poorer water quality as the area strained to accommodate swelling numbers of tourists. In particular, the division of labor in managing trash through a voluntary system, without binding authority, became a point of disagreement. Although Jurerê was not able to regain certification (at time of writing), another smaller beach in the less developed southern part of the island, a lake beach on the Lagoa do Peri, was awarded the Blue Flag Beach Certification in 2016. The beach is located in a municipal land conservation unit, the monitoring of which is under full authority of the Municipal Environment Foundation of Florianópolis (FLORAM) that has offices on the premises.

Project Orla (*Projecto Orla*), introduced in 2012, is an integrated management plan for the coastal areas of the municipality (the coastal area is considered a band 50 meters inland from the water in urbanized areas and 200 meters inland in non-urbanized areas). The initiative aims to better manage and control competing interests along the shores of the island. Although the federal government has authority over coastal areas, the project is a local level action plan that works to enforce federal, state, and local

environmental standards and regulatory policy by mobilizing communities and municipal resources in support of the protection and sustainable use of coastal and marine resources. The project brings together over 30 representatives from federal, state, and local level government bodies as well as representatives from local universities to identify and establish ways to engage civil society in coastal management.

In addition to the IDB ESC network, Florianópolis is also a member or signatory to several other global sustainability initiatives. The city was approved as a member of the UNESCO Creative Cities Network, created in 2004. The network seeks to promote cooperation among cities that are leveraging creativity in support of sustainable urban development. Florianópolis, a member since 2014, is a Creative City of Gastronomy and uses this status to promote annual food events as well as research and training in the gastronomy sector (UNESCO, 2016b). Since 2015, Florianópolis also has been a member of the Compact of Mayors, launched by UN Secretary-General Ban Ki-moon and Michael R. Bloomberg (Special Envoy for Cities and Climate Change). With support from UN-Habitat, pre-existing global city networks (C40 Cities Climate Leadership Group, Local Governments for Sustainability – ICLEI, and the United Cities and Local Governments) came together to establish a common framework for assessing GHG emissions and climate risk as the Compact of Mayors (Compact of Mayors, 2016).

FloripAmanhã, one of the most active NGOs working across several sectors towards greater sustainability in the Florianópolis region, is governed by a board composed in part by the people most criticized by neighborhood associations and environmental groups – resort developers. Land in Florianópolis is subject to constant contestation because of (1) the struggle of the urban entrepreneurs to commercialize

public land, (2) the struggle of social NGOs and individuals to claim public land as an entitlement of the poor, and (3) the struggle of environmentalists to preserve biodiversity and forest land. Chapter 4 takes a closer look at the ways in which the constant construction of informal housing on public land, government institutions, and real estate developers interact to produce both positive and negative sustainability outcomes in relation to the preservation of land and biodiversity in Florianópolis.

## **CHAPTER 4: LAND, POWER, AND PRIVILEGE**

This chapter outlines the types of protected land in the Municipality of Florianópolis, and examines the attributes of the governance systems and the actors within the institutional environment contributing to (or diminishing) the sustainability of the sector. Section 4.1 gives a brief overview of the ecosystem characteristics (the resource system in the SES framework) and describes the areas currently under legal protection. Section 4.2 reviews the multi-level governance system for environmental protection and 4.3 outlines the history of civil participation in environmental governance. These two sections also summarize the salient points of the governance system in terms of rule-making bodies and the openings in the system that allow for public participation. Section 4.4 considers the role of collective strategic action by environmental non-governmental organizations (NGO) and community-based organizations and 4.5 the role of private sector organizations to explore rules-in-use and how organizations are using the institutional environment to achieve their goals. Within the action situation, meaning the ongoing debates, deliberations, and conflicts around conservation areas, two forces are identified as relevant to the long-term viability of urban reserves: the actors physically eroding the borders of the preserves and the actors using institutional mechanisms to retain the borders. Section 4.6 looks more closely at the interactions taking place between actors and the persistent condition of contestation in the land sector. Section 4.7 briefly summarizes the key findings.



## 4.1. The Resource System: Land Conservation in Florianópolis

### 4.1.1. Natural Characteristics

The 531 km long coast of Santa Catarina has a diverse topography of steep forest covered hills, rocky slopes, islands, beaches, dunes, estuaries, lagoons, bays, mangroves and *restinga* (ICMBio, 2015b).<sup>32</sup> The Island of Santa Catarina is approximately 51 km from north to south and ranges in width from 1.5 km to 18 km. With a sub-tropical climate, the temperature on the island ranges from an average daytime high of 17°C (62.6°F) in July to 24°C (75.2°F) in February. With no dry season, rainfall ranges from a monthly average of 77mm in June to 209mm in February (INMET, 2017).<sup>33</sup> The island is composed of primarily two terrains: sedimentary coastal plains rising from sea level to 10 meters, and the sierras of Tabuleiro and Itajaí characterized by steep slopes, deep valleys, and rocky granite hills (*morros*) (Secretaria Municipal da Habitacao e Saneamento Ambiental (SMHSA), 2009). *Morros* occupy 192.5 km<sup>2</sup> of the island and reach a maximum height of 532 meters above sea level (Almeida, 2008). Sedimentary soils, the result of millennia of sea level rise and retreat, form flat plains between the mountains.<sup>34</sup> Lagoons and rivers occupy 29.4 km<sup>2</sup> of the island with the largest body of water (20 km<sup>2</sup>) being the centrally located Conception Lagoon (*Lagoa da Conceição*). The smaller Peri Lagoon (*Lagoa do Peri*), in the south, is 5 km<sup>2</sup> and is the largest source of fresh water on the island. These lagoons, in addition to several other smaller ones dotted throughout the

---

<sup>32</sup> *Restinga* is type of tropical or sub-tropical broadleaf forest that forms on sandy, nutrient-poor soil.

<sup>33</sup> The climatological data is calculated based on the monthly and quarterly averages from the period 1961 to 2009.

<sup>34</sup> For complete information on the geological composition of the island, see *Estudo 2: Vulnerabilidade e riscos naturais*, prepared by the IDOM- Confederação Brasileira de Pádel (COBRAPA) Consortium (2014).

island, feed the drainage basins that make up six significant island watersheds (Bastos, 2004).

The island is blanketed by Quaternary coastal plain forests, dense broadleaf forests, mangroves and *restinga*. The Atlantic Forest (*Mata Atlântica*) covers 22.1% (21,195 km<sup>2</sup>) of the State of Santa Catarina. A tropical moist biome of coastal evergreens and semi-deciduous inland forests, the Atlantic Forest is estimated to have once covered 1.1 million km<sup>2</sup>. On the island, the forest has four strata of vegetation with the tallest emergent species commonly including Leguminosae (*Copaifera trapezifolia*), Sapotaceae (*Pouteria*, *Chrysophyllum*), and Lauraceae with lower strata often composed of various species of Bromeliaceae, Myrtaceae and Orchidaceae (Silva, 1980; WWF, 2016). The Atlantic Forest is among the most biodiverse ecosystems in the world with over 20,000 plant species and over 2,200 species of mammals, birds, reptiles, amphibians, and fish. The Island of Santa Catarina is home to numerous species of marine and terrestrial fauna, many of which are still being registered. The federal Carijós Ecological Station near the northern coast of the island has recorded 227 species of birds alone (representing 32% of the recorded bird species of Santa Catarina and 64% of the species found in the municipality of Florianópolis (ICMBio, 2015a).

The Atlantic Forest continues to be threatened by urban growth, logging, and expansion of agricultural land (Fundação SOS Mata Atlântica, 2011; IBGE, 2011). In partnership with the National Institute of Space Research (INP), Fundação SOS Mata Atlântica (2011) has been tracking the remaining area of the forest at regular intervals since 1985. Between 2008 and 2010 Santa Catarina lost 1.19% of its remaining Atlantic Forest. The Atlantic Forest Law (Law No. 11428 of 2006) applies to 66,970 ha of the

total 67,540 ha of the municipality of Florianópolis (99.2% of the total area).<sup>35</sup> The Atlas of the Municipalities of the Atlantic Forest, prepared by Fundação SOS Mata Atlântica and INPE, indicates that protected areas of Atlantic Forest in Florianópolis decreased by 98 hectares between 1985-1990 and again by 42 hectares between 1990-1995. While the coastal areas experienced forest loss, the greater metropolitan area experienced forest expansion as pasture land was left fallow (Baptista, 2008b; Baptista & Rudel, 2006). In comparison to other cities located within the remnants of the Atlantic Forest throughout Brazil, Florianópolis is experiencing less deforestation with the preserved area being maintained after 1995 before dropping slightly, by 4 hectares, between 2000-2005.

Figure 13. Clockwise from upper left: Typical island restinga, mangroves, lower-strata forest regrowth, woodpecker in Lagoa do Peri Municipal Park, Glittering-throated Emerald in Ecological Station of Carijós, and Lagoa do Peri with some of oldest remaining Atlantic Forest remnants on the island in the background.



<sup>35</sup> The reported area of the municipality varies across sources. This figure is as reported by SOS Mata Atlântica and is consistent with the IBGE (2016) official size of Florianópolis (675.409 km<sup>2</sup> - 67,540.9 ha). Various municipal and academic reports and articles indicate the size of the city as ranging from 422-436 km<sup>2</sup>.

Source: Author (2016), woodpecker by Augusto Nogueira (2016)

#### 4.1.2. Types and Location of Protected Land in Florianópolis

In 2010, approximately 60% of the Florianópolis territory was urbanized. Of the undeveloped land, 27% is in legally protected environmental areas (PMF & IDB, 2015). The three primary designations for preserved land are Permanent Preservation Areas (APP), Preservation Areas with Limited Use (APL), and Conservation Units. Law 9985 of 2000 established Brazil's National System of Conservation Units and defines a conservation unit as a protected territorial space and its environmental resources. The spaces can include jurisdictional waters, and their adjacent natural characteristics, that are legally established to serve a conservation objective. Land regulated by the Department of Conservation Units of the Environmental Foundation of Florianópolis (FLORAM) is listed in Table 4 below. A complete timeline of park creation, as well as the creation of the municipal bodies, is included in Appendix C.

Table 4. Conservation units of Florianópolis (as of January, 2017). Locations are indicated in Figure 14.

No.	Unit	Size (ha)	Law/Date created
	Federal		
1	Pirajubaé Marine Extractive Reserve <i>Reserva Extrativista Marinha do Pirajubaé</i>	1712	Dec. No. 533, 1992
2	Ecological Station of Carijós <i>Estação Ecológica de Carijós</i>	759	Dec. No. 94656, 1987
	State		
3	State Park of Serra do Tabuleiro (Tabuleirinho Park) <sup>36</sup> <i>Parque Estadual da Serra do Tabuleiro (Parque do Tabuleirinho)</i>	347	Dec. No. 2335, 1977
4	State Park of Rio Vermelho <sup>37</sup>	1532	Dec No. 308, 2007

<sup>36</sup> This is a small part of the larger Serra do Tabuleiro State Park that occupies 84,130 ha of the State of Santa Catarina. The Tabuleirinho – Naufragados section is in Florianópolis with the rest of the park in the municipalities of Palhoça, Santo Amaro da Imperatriz, Águas Mornas, São Bonifácio, São Martinho, Imaruí and Paulo Lopes as well as the islands of Siriú, Cardos, Largo, Andrade and Coral, and the Três Irmãs e Moleques do Sul archipelago.

<sup>37</sup> This park was established by the State as a Forest Station in 1962 to experiment with various tree species that could grow well on the coast. Several species of American pine and eucalyptus were planted as well as casuarina and acacias. The species are now known to be invasive and detrimental to the native

	<i>Parque Estadual do Rio Vermelho</i>		
	Municipal		
5	Municipal Park of La Lagoa do Peri <sup>38</sup> <i>Parque Municipal da Lagoa do Peri</i>	2030	Law No. 1828, 1981
6	Municipal Park of Lagoinha do Leste <i>Parque Municipal da Lagoinha do Leste</i>	481	Law No. 4701, 1992
7	Municipal Park of Galheta <i>Parque Municipal da Galheta</i>	149	Law No. 3455, 1990
8	Municipal Park of Maciço da Costeira <i>Parque Municipal do Maciço da Costeira</i>	1453	Law No. 4605, 1995
9	Municipal Park of the Dunes of Lagoa da Conceição <sup>39</sup> <i>Parque Municipal das Dunas da Lagoa da Conceição</i>	453	Dec. No. 231, 1988
10	Municipal Park of Manguezal do Itacorubi <i>Parque Municipal do Manguezal do Itacorubi</i>	150	Dec. No. 1529, 2002
11	Municipal Park of Morro da Cruz <i>Parque Municipal do Morro da Cruz</i>	145	Law No. 6893, 2005
12	Municipal Park of Annibal da Rocha Nunes Pires (Sambaqui Point) <i>Parque Municipal Annibal da Rocha Nunes Pires (Ponta do Sambaqui)</i>	1	Law No 4645, 1995
	Private Reserves of Natural Heritage (RPPN)		
13	<i>RPPN das Aranhas</i>	44	MoE Ord. 43, 1999
14	<i>RPPN Menino Deus</i>	16	MoE Ord. 85, 1999
	Federal University of Santa Catarina (UFSC)		
15	Desterro Environmental Conservation Unit <sup>40</sup> <i>Unidade de Conservação Ambiental Desterro</i>	492	Land Deed
	Proposed Conservation Units		
16	Municipal Park of the Dunes of Ingleses e Santinho <i>Parque Natural Municipal das Dunas de Ingleses e Santinho</i>	200 <sup>41</sup>	Law 16303, 2015
17	Municipal Park of the Morro da Feiticeira <i>Parque Natural Municipal do Morro da Feiticeira</i>		
18	Morro do Papaquara Wildlife Refuge <sup>42</sup> <i>Refúgio de Vida Silvestre do Morro do Papaquara</i>		
19	Luz Municipal Park (By the Hercílio Luz Bridge) <i>Parque da Luz (Ponte Hercílio Luz)</i>	3.7	Com. Law 051, 1999

Source: FLORAM Department of Conservation Units (DEPUC), Chico Mendes Institute for Biological Conservation (Instituto Chico Mendes de Conservação da Biodiversidade, ICMBio)

ecosystem. The current park was established to protect the Ingleses-Rio Vermelho aquifer that supplies water to the north of the island. One of the oldest *sambaquis* of the island (5,020 years old) is in the park as well as one of the oldest settlements (1831).

<sup>38</sup> The Municipal Park of Peri Lagoon was originally part of a larger area protected by Presidential Decree (No. 30.443) in 1952 as a remnant of native vegetation. In 1976, Municipal Decree (No. 1408) designated the lagoon basin as a Natural Heritage site and in 1981 as a Municipal Park (Law no. 1828/81).

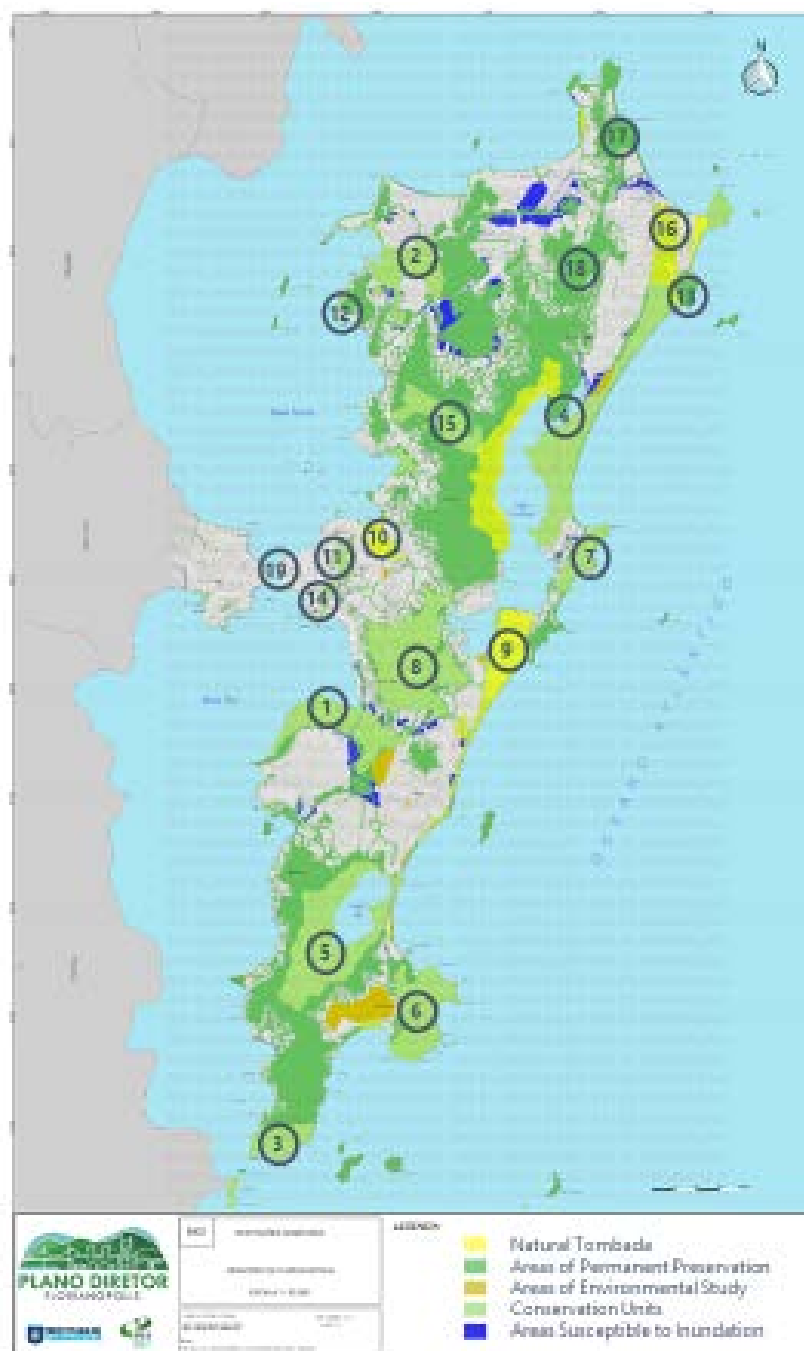
<sup>39</sup> The park is also regulated under Decree No. 231/88, and No. 213/79.

<sup>40</sup> 15,674 m<sup>2</sup> were transferred to Celesc (*Centrais Elétricas de Santa Catarina*) for the installation of the transmission network for the north of the island. Another 1,000 m<sup>2</sup> are reserved for Casan (*Companhia Catarinense de Água e Saneamento*) for aqueduct easement.

<sup>41</sup> Proposed area

<sup>42</sup> Wildlife refuges are one of the types of sustainable-use preservation areas regulated under Federal Law 9985 (2000).

Figure 14. Location of Conservation Units of Florianópolis (numbers correspond to Table 4)



Source: IPUF, Draft Master Plan – still under revision as indicated by the watermark. Areas indicated as “Natural Tombada” refer to a planning instrument for the preservation of natural and cultural heritage through registration of the preservation area on private property deeds.

As noted in Table 4, six of the fifteen conservation units in Florianópolis were established by federal and state authorities. The remaining nine conservation units were

created by municipal law, the motivation behind the creation of these parks and the field of actors involved in the process is elaborated throughout the remainder of this chapter.

APL areas, land that do not support typical types of construction without compromising the natural landscape or ecological balance, are designated based on soil type, slope characteristics, type of vegetation, or vulnerability to natural phenomena. The city allows building in these areas following review and permitting by the municipal environmental office (FLORAM) as they are subject to the laws and regulations of the City Statute.

Building on Permanent Preservation Areas, on the other hand, is strictly prohibited by federal law with some exceptions for buildings that support ecological study. APP, established by federal law, may or may not be covered in native vegetation but serve to preserve water resources, geological features, and biodiversity. The APP areas of Florianópolis are listed below.

Table 5. Areas of Permanent Preservation in Florianópolis

Area	Size (ha)	Law/Date created
Lakes and Lagoons		
Chica Lagoon ( <i>Lagoa da Chica</i> )	4.6	Dec. 135/88
Little Lagoon ( <i>Lagoinha Pequena</i> ) <sup>43</sup>	27.5	Dec. 135/88
Mixed Cultural and Natural Heritage Areas		
Region of Costa da Lagoa ( <i>Região da Costa da Lagoa</i> )	976.8	Dec. 247/86
Antonio Antunes da Cruz Flower Garden	6	Law 2348/85
Dunes ( <i>Dunas</i> )		
Dunes of Barra da Lagoa	6.6	Mun. Law 3711/92
Dunes of Ingleses * Part of the State Park of Rio Vermelho	953.5	Dec. 112/85
Dunes of Santinho	91.5	Dec. 112/85
Dunes of Campeche	121.0	Dec. 112/85
Dunes of Armação	5.9	Dec. 112/85
Dunes of Pântano do Sul	24.2	Dec. 112/85
Restinga		
Restinga of Ponta das Canas	21.5	Dec. 216/85
Restinga of Ponta do Sambaqui	1.3	Dec. 112/85
Mangroves ( <i>Manguezal</i> )		
Mangroves of Rio Tavares * Part of the Pirajubaé Marine Extractive Reserve		

<sup>43</sup> Some APPs, such as Little Lagoa, are regulated under the Florianópolis Master Plan for Seaside Towns (*Plano Diretor dos Balneários*) as Green Leisure Areas (*Área Verde de Lazer*).

Mangroves of Tapera	52.2	Lei 2193/85
Mangroves of Ratoes * Part of the Carijós Ecological Station		
Mangroves of Saco Grande * Part of the Carijós Ecological Station		
Mangroves of Itacorubi	150.0	Mun. Dec. 1529/2002
Slopes ( <i>Encostas</i> )		
Slopes equal to or greater than 25° (or 46.6%), covered or not by vegetation, are protected.	608.4	Laws 2193/85 and 1851/82

Source: FLORAM (2016)

Together these areas of conservation equal approximately 12,815 hectares of land. With the Florianópolis city area encompassing 67,541 hectares, the above listed units currently represent 19% of the area of the city. The inclusion of land under other forms of protection increase this percentage to the previously stated 27%. Other forms of protection are described in Federal Law 12651 of 2012, referred to as the new Forest Code, that sought to make changes and clarifications to the original Forest Code (1965). Regulations governing APPs under the new Forest Code continue the protection of some types of federal land, such as beaches and dunes, estuary systems and some types of land under private ownership. Land owners are required to preserve 20% of their land in the Florianópolis area (80% in the Legal Amazon).<sup>44</sup> In addition, areas of private property that are APP include river banks and other drainage systems. The larger the river, the larger the area of the riverbank that falls under the new regulation (preservation size ranges from 5-200 meters depending on the size of the property and the size of the river) (Lopes & Chiavari, 2015).

The Atlantic Forest Law (Law No. 11428 of 2006) also requires municipalities such as Florianópolis to protect remaining remnants of Atlantic Forest, primarily through

---

<sup>44</sup> The Legal Amazon is a geographical designation that includes all nine states located in the Amazon basin. It includes the seven states of the North Region (Acre, Amapá, Amazonas, Pará, Rondônia, Roraima and Tocantins), part of Mato Grosso (Center-West Region), and part of Maranhão (Northeast Region).



a Municipal Plan for Conservation and Restoration of the Atlantic Forest (PMMA) (SOS Mata Atlântica, 2016). Of the total area of Florianópolis, 98% is regulated under Law 11428. Part of Florianópolis is also included in the Atlantic Forest Biosphere Reserve created in collaboration with the United Nations Educational, Scientific, and Cultural Organization (UNESCO). The biosphere program is intended to find solutions to reconciling conservation with sustainable use (UNESCO, 2016a). The Atlantic Forest Biosphere is one of the largest created through the program and, including areas of full protection and areas of sustainable use, spans across 14 states in Brazil (UNESCO, 2017).

Included in Table 4 are the Private Reserves of Natural Heritage (RPPN) located in the study area. RPPNs are recognized by ICMBio as areas dedicated to the preservation of biodiversity and are categorized as Conservation Areas of Sustainable Use under Federal Law 9985. RPPNs are private reserves established with binding legal authority under Decree 98914 of 1990. Private land owners are poorly incentivized to register their lands as RPPNS as the tax breaks are modest (Pegas & Castley, 2016). Municipalities can earn tax revenue from legally protected land under a program called E-ICMS (Tax on the Circulation of Goods and Services across interstate lines).

Within the primary types of conservation tools discussed above, there may be further elaboration of land use restrictions within municipally managed conservation units. For example, the Municipal Park of Peri Lagoon is zoned for three purposes: a biological reserve area, a leisure area, and a cultural heritage area (Decree No. 091/82). Traditional farmers, descendants of Azorean settlers who were already established in the area at the time the park was created, were allowed to remain with the stipulation there would be no expansion to the area under cultivation. The leisure area includes a water

treatment station built by the Catarinense Company of Water and Sanitation (*Companhia Catarinense de Águas e Saneamento*, CASAN), the company responsible for the supply of water in the south of the Island. The biological reserve area includes some of the island's remaining few remnants of primary Atlantic Forest on the hill slopes and hilltops that were never cleared for agricultural cultivation.

There are also two urban parks, not designated as conservation units, Morro da Cruz (145 ha) and the Ecological Park of Córrego Grande (23 ha). These two urban parks are under the authority of FLORAM while other urban public spaces are under different management structures depending on ownership and purpose. Landscaping, however, of public spaces is the responsibility of FLORAM. The proposed renovation of Luz Municipal Park is a special case as the park is on land used in the building of the Ponte Hercílio Luz Bridge. The bridge, the symbol of the city, is a historical preservation site listed in the historical registry (*tombada*). Although it is now closed and awaiting refurbishment due to safety concerns, it was opened to pedestrians and cyclists between 1986 and 1991. A community association (*Associação Amigos do Parque da Luz – AAPLuz*), organized in 1997, aims to protect the historical site and lobbied the city for the creation of a park at its base near the historical city center. The Luz Municipal Park was created by complementary law in 1999 and is co-managed by FLORAM and AAPLuz.

*Tombamento* is the preservation instrument used by federal, state, or local authorities to preserve cultural heritage through a system of registration (Dec. No. 25, 1937).<sup>45</sup> Cultural heritage is defined as a set of movable and immovable property that it is

---

<sup>45</sup> The word *tombo* used in reference to a system of record keeping dates to 1375 when it was used in the Portuguese National Archive, in the Torre do Tombo. The practice was adopted in Brazil, by royal decree, while under rule of the monarchy (IPHAN, 2017).

in the interest of the public to protect due to certain features such as a connection to memorable events, exceptional archaeological, ethnographic, or artistic value, as well as landscapes with remarkable features (IPHAN, 2017). The registry of cultural heritage sites is administered by the Institute of National Historic and Artistic Heritage (IPHAN) that also inspects and verifies the condition of the sites and authorizes change. Areas designated as natural and cultural heritage reserves are regulated by federal law (Art. 21, Law No. 9985/2000) and are often registered in the real estate certificate of private property owners. Following registration, the land is restricted from alteration without prior approval.

#### **4.2. Multi-Level Review of Environmental and Land Use Laws and Regulations**

This section summarizes the multi-level legal and regulatory framework that applies to environmental protection at the local level. As suggested by McGinnis and Ostrom (2014), governance system variables can be differentiated by (1) rule-making organizations – including public sector organizations, private sector organizations, non-governmental and nonprofit organizations, and community based organizations; and (2) rules-in-use – including operational-choice rules, collective-choice rules, and constitutional-choice rules. This section reviews the primary federal, state, and local laws and institutions that determine how land is protected and under whose authority.

One of the earliest federal laws in Brazil governing the use of natural resources applied to water (Water Code of 1934, Decree No. 24.643/1934), and ensured free access to water as well as an early version of the “polluter pays principal.” Three years later, Decree-Law No. 25 (1937) established the protection of historical and cultural heritage, later upheld and expanded in the 1988 Federal Constitution. In 1965, forests became

federally protected in legal preserves with the introduction of the Forest Code (Law No. 4.771/1965) followed two years later by the Mining Code (Decree-law No. 227/1967). The Forest Code defined areas of environmental interest, either legal reserves or permanent conservation areas, within private property. The legal reserve, an area preserved by law for the protection of ecological processes, can be 80% of private property in the Amazon, 35% of private property in the *cerrado* savannah region, and 20% for other areas. Of Brazil's native vegetation, 53% is preserved on private land through the Forest Code (Soares-Filho et. al, 2014). Articles 2 and 3 of the Forest Code additionally call for permanent conservation of areas that are determined to be critical in the preservation of water resources, biodiversity, soil or well-being of humans and the native flora and fauna.

Although the military regime did not prioritize environmental policy, in the 1960s and early 1970s Brazil experienced an increase in the number of public sector bodies and non-profit organizations that played a role in environmental policy. Hochstetler and Keck (2007) found there were 34 federal level public organs, across nine ministries, who had some form of authority in environmental policy by 1972, in addition to 17 associations dedicated to the environment or animal welfare registered by 1970. The Special Secretariat of the Environment (SEMA) was established in 1973, following the 1972 Stockholm Conference, and the National Environmental Policy was enacted in 1981 (Law No. 6938/1981) to establish institutional authority over specific environmental issues and responsibilities. This law led to the creation of the National Council for the Environment (CONAMA), the establishment of federal level instruments such as environmental standards and zoning, licensing mechanisms, environmental impact

assessments<sup>46</sup> (Article 9 of Law 9638/81), and the creation of the National Environmental System (SISNAMA) which is a multi-level system of public sector organizations responsible for environmental protection. Government organizations with authority in the study area are listed below in Table 6.

Table 6. Public sector environmental organizations

Entity	Level	Responsibilities
Government Council	Federal	Formulation of national policies and guidelines for the environment
National Environmental Council (CONAMA)	Federal	Advises the Government Council and recommends environmental rules and standards
Ministry of the Environment	Federal	Environmental preservation and implementation of international agreements
Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA)	Federal	Execution of federal environmental policies and rules
Chico Mendes Institute for Biodiversity Conservation (ICMBio)	Federal	Creation, management, and monitoring of land conservation units
Environmental Foundation of the State of Santa Catarina (FATMA)	State	Management of state level conservation units, monitoring and licensing, creation of state level environmental programs
State Environmental Council (CONSEMA)	State	Under the authority of the State Secretariat for Sustainable Economic Development, sets guidelines and makes recommendations for State Environmental Policy
Municipal Council for Environmental Defense in Florianópolis (COMDEMA)	Municipal	Under the authority of the Municipal Secretariat for Environment and Urban Development, sets guidelines and recommendations for Municipal Environmental Policy
Municipal Environment Foundation of Florianópolis (FLORAM)	Municipal	Management of municipal level conservation units, monitoring and licensing, creation of municipal level environmental programs

Although the CONAMA and SISNAMA organs are the primary multi-level institutional frameworks addressing environmental protection, federal level environmental institutions experienced several changes beginning in the mid-1980s. To address growing international concern and criticism of the government's handling of

<sup>46</sup> The environmental impact study (EIS) is required by the federal government and calls for a detailed description of a proposed activity or development in terms of its location, technology, impact on the physical and biological environment, and impact on the socio-economic environment in terms of both scope and scale. For more on Environmental Impact Assessments see Wathern (2013).

deforestation in the Amazon, President Sarney created a new environmental agency in 1989. The Brazilian Institute of the Environmental and Natural Resources (IBAMA) was given authority over SEMA, CONAMA, and SISNAMA and was linked to related agencies such as those regulating fishing and forest development (Hochstetler & Keck, 2007). In 1990, President Collor restored SEMA as the lead Environmental Secretariat and designated IBAMA as an implementing agency. The environmental secretariat was reorganized and transferred into a Ministry in 1992, eventually being named the Ministry of the Environment in 1999.

The Federal Constitution of 1988, addressing the environment primarily in Chapter 6 (Art. 225), establishes the right of the people to an ecologically balanced environment and responsibility of the government to preserve the environment. The Constitution also provides the legal basis for prosecuting civil, criminal, and administrative liability regarding environmental crimes. Article 170 of the constitution established a constitutional basis for environmental regulations by specifying environmental protection as one of the principal components of the Brazilian economy (Fernando, Sant'Anna, Rabinovici & Spitzack, 2016). Leite and Awad (2012) suggest that the 1988 Constitution, influenced by the World Charter for Nature (1982) and the Montreal Protocol (1987), implicitly included the precautionary principle in Art. 225 through multiple references to the minimization of risks to human and ecological systems. Additionally, through the ratification of the Rio Declaration in 1992, Brazil upholds Principle 15 that states: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be

used as a reason for postponing cost-effective measures to prevent environmental degradation” (UNEP, 1992). The precautionary principle has been widely used in Brazilian environmental law.

The 1988 Constitution also calls for administrative competency at the federal and state level for protection of the environment by controlling pollution and preserving forests, fauna, and flora (Art. 23). In keeping with this call for administrative competency, Article 24 gives legal and regulatory authority over environmental issues to federal and state level authorities, but not specifically to local level authorities.

Administrative competence, on the other hand, is clearly conferred to all levels of government (federal, state, and local) and grants authority to implement programs for environmental protection. Local level authorities gained greater authority over local environmental legislation with the passing of the City Statute in 2001 (Law 10257). This law required urban areas with populations over 20,000 to establish planning mechanisms that address various social welfare and environmental issues, as discussed in greater detail in Chapter 3.

The Constitution provides the legal basis for the protection of certain natural areas including the Amazon Rainforest, the Serra do Mar mountain range, the Pantanal wetlands, and coastal zones. Particularly important in the study area is the constitutional provision for the coastal zone to be protected as an area of national heritage (*Patrimônio Nacional*). The National Coastal Management Plan (Law No. 7661) was initiated the same year with guidelines established in 1990 (Resolution 01 of the Inter-Ministerial Commission of Marine Resources - CIRM) and a revision in 2005 (CIRM Resolution 07). The system was restructured in 2011 (CIRM Resolution 06/2011) to move toward an

integrated and participative system for managing all marine resources. This management system applies to coastal zones, river basins, and estuary systems under the VIII Sectorial Plan for Marine Resources (Santana & Barroso, 2014).

State environmental authorities define the boundaries of conservation areas, and the purpose, as per the National System of Conservation Units established in 2000 (Law No. 9985). This system also established protocols for defining conservation units as either complete protection units or sustainable-use units. Areas intended for complete protection are either areas for permanent environmental protection, areas of significant ecological interest, national forests, extractive reserves, fauna reserves, sustainable development reserves, or natural heritage reserves (Fernando, Sant'Anna, Rabinovici & Spitzack, 2016). Sustainable-use units, attempting to balance the need for development with land preservation, can be ecological stations, biological reserves, national parks, natural monuments, or wild life refuges.

A key federal law that impacts the way land is governed and protected is the Public Civil Action Law (Law 7347, 1985) that specified procedural instruments for the protection of the environment. As stated by Santos (2008), this law allowed civil associations to have more strength in bringing environmental or social welfare issues to justice in court, together with a public prosecutor from the office of the Public Ministry who has constitutional authority to investigate and initiate proceedings. Criminal penalties for individuals and corporations for environmental crimes were established in 1998 with Law No. 9605. Under this law environmental crimes involve destruction of forest (Art. 38), destroying plants, dune vegetation, or mangroves (Art. 50), and building on preservation areas (Art. 64). Ten years later, this law was elaborated to cover



administrative sanctions for environmental violations and established legal procedures for enforcement of environmental laws and regulations (Decree No. 6.514/2008).

Brazil has been playing an important role in international forums on climate change, and it was the first country to sign the UN Framework Convention on Climate Change on 4 June 1992, which was ratified in 1994 (Legislative Decree No. 01/1994). The Kyoto Protocol was passed in Brazil through Legislative Decree (No. 144/2002). Brazil has not instituted a national cap-and trade system, but does take part in the Clean Development Mechanism on a project basis. There are instances of state or municipal mechanisms for addressing GHG emissions, such as the ecological state sales tax. The Ministry of Science and Technology is responsible for coordinating the implementation of the commitments under the UN Framework Convention on Climate Change and does so through the Inter-Ministerial Commission for Sustainable Development (CIDES) and Climate Change Coordination Office.<sup>47</sup> Federal Law No. 12187, passed in 2009, approved the National Policy on Climate Change and established carbon reduction targets of 36.1 to 38.9 per cent of emissions projected for 2020.

#### **4.3. Civil Participation in Environmental Governance**

Institutions and governance play a critical role in ensuring land will be managed in a way that protects critical ecosystems in the long-term. As the role of institutions is less researched in comparison to technical solutions to sustainability problems, this

---

<sup>47</sup> Although a complete list of Brazilian laws pertaining to environmental issues is beyond the scope of this dissertation, it should be noted that other relevant federal policies not discussed in detail here include the National Policies on Water Resources, Biodiversity, Climate Change, Basic Sanitation, and Solid Waste. Other relevant international treaties that have been ratified by the Government of Brazil include: the UN Convention on Biological Diversity, Vienna Convention for Protection of the Ozone Layer, Montreal Protocol on Substances that Deplete the Ozone Layer, Basel Convention on the Transboundary Movement of Hazardous Wastes- Stockholm Convention on Persistent Organic Pollutants, UN Convention on the Law of the Sea, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

chapter contributes to a growing body of analysis on the role of institutions in sustainability planning (Nagendra & Ostrom, 2014). Urban commons such as public parks have been subject to changing regimes of management, often changing at some point in time from communities engaged in the collective management of common pool resources to management by local government bodies. This section explores the key organizations taking strategic action to influence how areas of preservation are established and maintained. Following the detailed examination of policy programs and jurisdictional relations identified as relevant to land preservation in Florianópolis, a range of organizations were identified as relevant.

In applying the SES framework, McGinnis and Ostrom (2014) suggest policy tools can be understood as being composed of constitutional-choice rules (formal rules such as those discussed in Section 4.2), operational-choice rules (rules followed during implementation at the operational level), and collective-choice rules (rules establishing expectations and allocating responsibilities such as monitoring). This section examines how federal, state, and local institutions (that enact and uphold laws and regulations) provide forums for action while also establishing limits on the degree of influence various interest groups can have over the rule-making process. The following Section 4.4 will examine how the rules are used by collective actors to create change in the study area.

At the national level, Hochstetler and Keck (2007) describe three waves of environmentalism in Brazil, each with distinct tactics and strategies for influencing environmental policy. The first wave, lasting from the 1950s to the 1970s, is described by these authors as a period of developmentalist nationalism that is characterized by the

creation of the first land conservation organizations, federal environmental institutions, and research centers. The second wave, breaking from the formality of these early institutions, embraced activism, and joined forces with numerous other organizations gaining prominence as the public fought for better political representation, civil rights, and improvements in social services. Environmental organizations again changed strategies in the 1990s, ushering in a third wave that continues today. Environmental organizations are increasingly professionalized as they recruit technical staff able to define and articulate a scientific rationale for environmental preservation. Increasing flows of information across borders has also changed the character of environmental organizations as global networks facilitate access to information and best practice. Forums for exchange propel domestic re-articulations of democratic action in defense of the natural environment despite the impact of cyclical periods of economic and political crises at the national level.

In the 1980s, the federal level National Council for the Environmental (CONAMA) provided opportunities for citizen participation, primarily as invitations for prominent environmentalists to attend meetings or ratify decisions. However, environmental institutions were restructured under President Fernando Collor de Mello (1990-1992) who eliminated avenues for the participation of non-state actors. Following outrage from environmental groups, the changes were overturned after his impeachment and the primary method by which environmental groups could participate in decision making was by way of Environmental Councils, established at all levels of government. Viola (1995) differentiates between groups of environmental activists, or “new environmentalists,” by suggesting there were those who were part of the urban reform

movement and expressed concern for urban environmental degradation and those who were more concerned with rural communities or ecosystems. Both groups made headway in influencing public policy through alliances with political parties such as the Workers' Party (PT), by helping to found the Green Party (PV) in 1985, or by identifying candidates for the constituent assembly who were considered "green" (the green list). As noted by several scholars, social and environmental movements around the world began to embrace values that were distinct from the capital-oriented objectives of the industrial era (Mol, 1996; Offe, 1985; Viola, 1987; 1995). Environmental activists, existing in an institutional environment that offered little access to governmental decision-making forums, primarily expressed their desires through protests and demonstrations.

In the 1990s, environmental NGOs and associations in Brazil became increasingly professionalized (Hochstetler & Keck, 2007). With an environmental agenda gaining traction at the international level, both activists and public officials in Brazil were participating in academic and global governance forums. Environmental public interest organizations were founded at this time that engaged in a range of activities such as lobbying, public education, and results-based projects that required greater levels of funding and professionalization than did the demonstration based tactics of the previous decades. One example of an organization that emerged at this time is the SOS Atlantic Forest Foundation (*Fundação SOS Mata Atlântica*). Founded by a group of activists from notable ecological movement organizations such as Union of the Defenders of the Earth (OIKOS) and the Association for the Defense of Juréia, SOS embraced a strategy to populate its ranks with technical personnel to strengthen its position during engagement with local government (Hochstetler & Keck, 2007). SOS is now one of the biggest

environmental organizations in Brazil and works across a range of issues including forest and water monitoring, environmental education, and protection of native flora and fauna.

Overlap between social and environmental movements began during the struggle for democracy under military rule and persisted after the Brazilian return to democracy as the two discourses become more tightly intertwined. While events such as the death of Chico Mendes brought together parallel stories of land and labor struggles with environmental protection in rural areas, increasing language around sustainability in the global arena solidified the convergence of environmental and social objectives by the urban reform movement. The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 (the Earth Summit) brought the international socio-environmental agenda to Brazil in way that had lasting impact. Hochstetler and Keck (2007) write that it was not the impact the Earth Summit had on the government that mattered, but the excitement the event brought to over twelve hundred local NGOs who participated in the accompanying Brazilian NGO Forum. This forum provided funding for participants to travel to other countries in preparation for the UNCED and resulted in the parallel Global Forum held during the Earth Summit, attended by over 17,000 people. Section 4.4 looks specifically at the field of organizations and associations in Florianópolis that are working on environmental issues and the types of strategies employed to achieve their goals.

#### **4.4. Environmental NGOs and Neighborhood Associations in Florianópolis**

This section is a review of the types of neighborhood association and non-profit organizations in the study areas that have collectively influenced land preservation in Florianópolis. Of the 3,759 private foundations and non-profit organizations active in

Florianópolis, this section specifically considers the roughly 20 civil organizations that have been working in the interest of land preservation since the 1980s (IBGE, 2010). In terms of the SES framework this section considers the rules-in-use that govern interactions and the repertoire of norms and strategies embraced by the different models of ecologically-oriented organizations and associations. The two primary types of non-governmental organizations working to preserve land are non-governmental organizations and community associations. The two primary strategies employed by these groups to accomplish goals are in keeping with the previously discussed second and third wave of environmentalism in Brazil – activist strategies and professionalization.

The environmental movement was gaining momentum throughout Brazil in the 1980s, as discussed above, in response to both deforestation and urban environmental degradation. Waste and sanitation became a priority point of debate as urban growth put pressure on the provision of basic services. Curitiba, well known internationally for its innovative urban programs, was among the earliest municipalities in Brazil to embrace a socio-ecological ethic in municipal planning at a large scale. Although Curitiba is notable for the scale of its initiatives, environmental programs were already emerging in other municipalities around the same time. Niterói began recycling programs supported by neighborhood associations in 1985, São Paulo began limited recycling in 1989, and Florianópolis began limited recycling services in 1987 (Kuhnen, 1994).

Trash in Florianópolis, originally dumped on northern beaches, was burned for the first half of the 20<sup>th</sup> century. In the 1950s, the city began dumping trash in the mangroves of Itacorubi. The dump site was poorly managed by municipal authorities and the local community began to organize in 1980 to address health concerns and

deteriorating environmental conditions. As highlighted by Rudel (2013), negative feedbacks from human activity, such as the effects of poorly managed trash dumps and the resulting environmental degradation, can result in a defensive environmentalist response from the local population. The residents of Itacorubi began to organize and through the Residents Association circulated a petition to submit to the local government. Municipal officials were receptive to the concerns of the Itacorubi residents, and together with the Capital Improvements Company (COMCAP) and the Governor's office, developed a plan to improve trash collection in the greater metropolitan area.

Environmental groups and strong neighborhood associations continued to emerge in Florianópolis in the 1980s to address a variety of concerns related to the effects of urban growth. One group active in the cleanup of the Itacorubi mangrove system was the Free Ecological Movement (*Movimento Ecológico Livre – MEL*). Beginning activities between 1983 and 1984, MEL was one of the first social organizations, now a registered non-governmental organization (NGO), working on environmental issues in Florianópolis. MEL has addressed a diversity of challenges such as basic sanitation, ecological tourism, and informal settlements (Silva, 2007).

MEL, initially an activist group, often used tactics that grabbed the attention of the public, such as occupying public spaces. The group was also skillful in gaining an audience with local government representatives who were receptive and eager to create a modern, progressive city in the early 1980s. MEL was successful in working with the city to close the Itacorubi landfill as well as to create the Galheta Municipal Park. These positive collaborations with the municipal government allowed for a new paradigm of cooperation between the local government and civil society towards the management of

collective problems such as waste management. Many of MELs members went on to work in city agencies or state institutions. For example, Itamar Pedro Bevilaqua served as the superintendent of FLORAM, Analúcia Hartmann served as a public prosecutor, André Freyesleben became a city councilman and Rogério Portanova was president of the Foundation for Research Support of the State of Santa Catarina (FAPESC).

Prior to 1981, preservation areas on the Island of Santa Catarina were areas protected by federal and state laws. The newly established Urban Planning Institute (IPUF) was under the leadership of Francisco de Assis Cordeiro, an economist from the University of São Paulo (from 1979-1983). As demonstrated in his public speeches, he fully understood the dangers of unchecked amenity-led development and actively engaged in preservation projects (de Assis, 2000). São Paulo was already taking measures to improve the environmental condition of the city in the 1970s and the influence of the São Paulo preservationist perspective in Cordeiro's planning ethic is well documented. Many of his plans and projects were considered radical to real estate speculators (de Assis, 2000). The Lagoa do Peri Municipal Park, created under Cordeiro's leadership in 1981, is among the earliest models of a municipal park serving the combined objectives of leisure, environmental education, and environmental preservation.

Some Residents Associations, such as in the Campeche and Lagoa de Conceição neighborhoods, also embraced an activist strategy for raising awareness of environmental degradation and gaining the attention of local authorities. The case of Lagoa de Conceição demonstrates the diversity of actors that can have influence over a preservation area and the difficulty in aligning the operational-rules of public sector offices and the collective-choice rules followed by community associations. The Lagoa



de Conceição Municipal Park, a preserved area of restinga created in 1988, was a response to the overwhelming collective strategic action of the residents of Lagoa, one of the most popular tourist destinations on the island.

In the 1990s, the Lagoa Foundation (*Fundação Lagoa*), founded in 1994, was one of the more outspoken critics of urbanization and the environmental degradation that was occurring around Lagoa de Conceição (Peñafiel, 2005). Although the original founders of the organization were unaffiliated with the Lagoa de Conceição Residents Association and aimed to take a scientific approach to environmental issues, the group was eventually populated by members of the Lagoa de Conceição Residents Association who favored activist strategies. The Lagoa network was expanded through partnerships with several other residents' associations of the Lagoa area through a collective forum (*Fórum das Entidades*). The strength of the network of Lagoa associations is reflected in their inclusion in the Management Committee of Lagoa da Conceição, created by State Decree 1808 (2000) to better manage the water resources of the area. The member profile of the Management Committee was 40% composed of civil society groups, many of whom had been active in the Lagoa area since the early 1980s.<sup>48</sup> Although the Lagoa Foundation is

---

<sup>48</sup> The Management Committee of Lagoa da Conceição was composed 40% by water users (Commercial and Industrial Association of Florianópolis - ACIF; Santa Catarina Federation of Surf - FECASURF; Fishermen's Colony Z 11; Companhia Catarinense de Aguas e Saneamento - CASAN; Lagoon Yacht Club - LIC; Marina of Canto da Lagoa; Transportation Cooperative of the Boats of Lagoa da Conceição - COOPERBARCO; Fishermen's Union; Marina Lagoa; Windcenter; the Association of Sailing and Ecological Preservation; Marina Ponta da Areia - AVELISC; Brazilian Association of Restaurants and Enterprises of Entertainment; and the Trade Union of Hotels, Restaurants, Bars and Similar of Florianópolis. Civil society, also 40%, included the Regional Council of Engineering, Architecture and Agronomy - CREA; Association of Lagoon Residents - AMOLA; Association of Residents of Canto dos Araçás - AMA; Community Forum of Barra da Lagoa; Association of the Residents of Rio Vermelho, Association of the Residents of the Costa da Lagoa; Association of the Residents of the Canto da Lagoa - AMO; the Lagoa Foundation; Catarinense Association of Engineers - ACE; Animal Society of Santa Catarina - SASC; Brazilian Association of Sanitary and Environmental Engineering - ABES; Verde Futuro Praia Mole; Actions for the Preservation of Natural Resources and Rational Economic Development - SEIZE; and the Association of Surfers and Friends of Praia Mole – ASAPM. The remaining 20% was composed of representatives of government entities

no longer active, other associations active in the Lagoa area continue to have significant influence.

The late 1980s and early 1990s brought a diversification of environmental organizations and their relationship with land preservation in Florianópolis. The Federal University of Santa Catarina (UFSC) played an important role in the environmental movement as it attracted people from throughout Brazil who helped gestate the ideals of the national environmental movement. UFSC began to fund environmental research in the geography and sanitary engineering departments. Also, the Center for Cultural Studies and Citizenship (CECCA), established in 1990, was one of the most active ecological activist groups in the city (de Assis, 2000). Through a land deed, UFSC was able to secure an area of preserved land under the authority of the municipality, the Desterro Environmental Conservation Unit, for research. Cultural heritage organizations also emerged as this time given the legacy of the Azorean culture on the island and numerous well preserved *sambaquis* and petroglyphs. For example, the Network Environmental Institute (originally *Instituto Ambiental Ratores – IAR*), founded in 1998, works to preserve ecosystems as well as historical and cultural heritage sites through environmental education and sponsored research.

The local environmental movement was influential in establishing an ecological mandate within the operational-rules of some municipal bodies, as seen in COMCAP's city-wide recycling program (*Beija-Flor*) (Peñafiel, 2005). Municipal support for environmental projects in the late 1980s and 1990s was increasingly motivated by the

---

(Federal University of Santa Catarina - UFSC; Brazilian Institute of Environment and Renewable Natural Resources - IBAMA; Secretary of State for Urban Development and Environment - SDM; Foundation of the Environment - FATMA; Municipality of Florianópolis - PMF; Military Police - Environmental Protection Police Company - CPPA; and the City Council of Florianópolis.

desire of local elites to elevate Florianópolis to a premier tourist destination. This motivation to boost the local economy by increasing tourism ushered in an era of strong alignment of interests between local elites and environmentally oriented neighborhood associations and environmental groups, all of whom wanted to preserve local environmental assets, although for different reasons. The alignment was short lived and the inevitable struggle between student and neighborhood associations and pro-growth developers trying to draw luxury tourists became more apparent in the 1990s, particularly during a period of recession that curtailed economic growth in the region.

Some of the organizations that emerged at this time exemplify the professionalized organizational model embraced by some local environmental groups. Actions for the Preservation of Natural Resources and Rational Economic Development (*Ações Para Preservação dos Recursos Naturais e Desenvolvimento Econômico Racional – APRENDER*), founded in 2000, addresses a range of issues including environmental, cultural, and educational outreach. With environmental issues and land conservation a priority, APRENDER has engaged in cooperative projects with several public institutions in Florianópolis, such as COMCAP and FLORAM, and collaborates with local environmental non-profits such as the Catarinense Federation of Surf (*Federação Catarinense de Surf – FECASURF*) and the Lagoa da Conceição network described above (Peñafiel, 2005). APRENDER, which also means “to learn” in Portuguese, exemplifies the professionalization of environmental activists and an emerging willingness to work with private sector partners towards sustainable ends. APRENDER has successfully collaborated with Petrobrás in the management of the federal Arvoredo Marine Biological Reserve located north of the island. As discussed by

Peñafiel (2005), APRENDER fills a managerial need, and effectively addresses an operational void that the municipality was unable to fill. Municipal officials have demonstrated a willingness, in some instances such as in the case of APRENDER, to allow non-governmental organizations to provide what would normally be public services, provided the actions are in keeping with constitutional-rules and are contractually bound to follow established operational-rules. Through these types of public-civic partnerships, the consistency demonstrated by many of the community associations and non-governmental organizations can help fill staff deficits, particularly in monitoring preservation areas to prevent the forms of encroachment described below.

#### **4.5. Amenity-Driven Development**

Tourism was already consolidating as the primary economic activity of the island by the 1970s. Land speculation among local oligarchs targeted certain areas as favored for tourist-oriented development such as beaches in the north (Canasvieiras and Jurerê) and Lagoa da Conceição, accessible by paved roads by the 70s (Konzen, 2013; Lopes, 2015). With tourist accommodation primarily dominated by relatively low-cost, small-scale inns (*pousadas*), developers shifted strategy in the mid-1980s and began to invest in large high-end resorts to cater to a wealthier, international clientele. While some real estate developers, such as banker and industrialist Péricles Druke, were from outside of Florianópolis, other resort developers were wealthy locals who profited from the development of the city center. Although environmental organizations and neighborhood associations fought to maintain the environmental assets of the city for both ecological reasons and to preserve quality of life on the island, the rise in tourism in the 1990s was a needed economic boon to the city leading local officials to prioritize the needs of the

sector. Coastal land, with access to popular beaches, became sites of conflict as many of these areas were federally protected preservation areas, some of which were still occupied by traditional fishing communities (Bueno, 2006; Konzen, 2013; Lopes, 2015).

As this section addresses land preservation in the city, the specific cases that involve construction in areas of permanent preservation are reviewed to assess the handling of the cases by municipal authorities and determine if the actions were in keeping with sustainable outcomes. These cases reflect the fragile state of sustainability and the need for consistent management and upkeep to ensure the procedural mechanisms that uphold states of sustainability are respected and enacted with competency. The variables that have influence over the outcome of interactions between private sector organizations and the government include the socio-economic attributes and their repertoire of norms and strategies. One of the cases demonstrates the way in which a developer can use the flexibility of planning instruments in their favor and the second case demonstrates how developers can bypass constitutional and operational-rules through sometimes unlawful means. Both cases occurred during a pro-growth period, in keeping with movements to privatize and engage the private sector in development projects through vehicles such as public-private partnerships (PPPs). Luis Henrique da Silveira, Governor of the State of Santa Catarina from 2003-2006, openly supported the development of the resorts as did the Mayor of Florianópolis Angela Amin (1996-2003) who approved both resort developments reviewed here.<sup>49</sup>

---

<sup>49</sup> Florianópolis has largely been led by center-right political coalitions. The first mayor of the New Republic was Edison Andrino of the Brazilian Democratic Movement Party (PMDB). He was followed by Espiridião Amin in 1988, from the official party of the dictatorship, the Progressive Party (PP). The Worker's Party (PT) held power briefly with Mayor Sérgio Grando from 1992-1996, but he was defeated by Espiridião Amin's wife, Angela Amin in 1996. She was re-elected in 2000. Dário Berger followed her (2005-2012) switching parties from the Brazilian Social Democracy Party (PSDB) to PMDB (Konzen, 2013).

Costão do Santinho, owned by Fernando Marcondes de Mattos (Costão do Santinho Tourist Properties), exemplifies the ways in which developers can be allowed to develop protected areas under special provisions and through creative manipulation of the jurisdictional authority granted to municipalities in Brazil. City officials in Florianópolis granted permits to the developers to build predominantly in areas zoned for residential development, but also in areas of permanent preservation, primarily *restinga* and dunes in Santinho. Areas were re-zoned, by law approved by the City Council and the Mayor (Complementary Law 133, 2003). The re-zoned area included areas zoned as Rural Exploitation Areas (*Área de Exploração Rural – AER*), a designation that allows some forms of construction after review by FLORAM, SMDU or IPUF.<sup>50</sup> Law 133 also made use of the *outorga onerosa* planning tool by allowing the cable car to use public air space in exchange for the allocation of 10% of the net revenue of the cable car tariffs to be deposited in the account of the Municipal Social Integration Fund (a municipal fund established in 1989 to assist low-income families).<sup>51</sup>

In 2005, the Florianópolis Union of Community Entities (UFECO) prepared a document detailing their concerns primarily related to how the development would

---

César Souza Júnior (2013-2017) followed from the Liberal Front Party (PFL). Gean Loureiro, PMDB, took office in January 2017.

<sup>50</sup> FLORAM handles environmental permitting. SMDU handles construction permits for small-scale buildings and residential developments of less than 50 families. IPUF processes permits for large-scale developments.

<sup>51</sup> *Outorga onerosa*, regulated by the City Statute, is an important tool often used in large-scale real estate developments. This instrument, in use before its regulation by the City Statute, is a concession provided by the Municipality that allows a property owner to pay the city for the right to build above the normally allowable area (usually equal to the area of the land). The instrument was originally conceived to control the possibility of high density areas becoming over-valued while low-density areas, or areas not able to be developed, became under-valued. It can also be used by city authorities to control urban density in line with the objectives of the Master Plan. Although the instrument has been criticized as being vulnerable to abuse by developers, it is supported as a means by which sprawl can be controlled by manipulating land value.

impact the Ingleses aquifer, given the large amount of contaminated runoff that would result from the golf course. The document, submitted to the Department of Consumer Defense (PROCON), was signed by the previously mentioned Lagoa Foundation, the Community Council of Ingleses, the City Forum, the Ilhativa Movement, the Native Alliance, the Caeté Association for Culture and Nature, and the Community Associations of Praia do Forte, Canasvieiras, and Rio Vermelho (Lopes, 2015). In 2012, the Federal Public Ministry (*Ministério Público Federal – MPF*), the court that sees civil and criminal action law suits deemed to be of collective interest, filed a civil suit against the city for its unlawful use of areas of permanent preservation (Justiça Federal, 2013).<sup>52</sup> Claiming the land was not federally protected, but rather in an area jurisdictionally under the authority of state and municipal governments, the city filed an appeal. The city lost the case in 2013, but the resort is continuing to operate while the case is again in appeal in the federal court.

The second case considered here is the Jurerê International development in the north of the island. In the 1950s, a team led by former Governor of Santa Catarina Adherbal Ramos da Silva hired Oscar Niemeyer to help design a planned neighborhood that would allow urban residents to interact with the natural heritage of the region while having access to modern amenities. Elements of Niemeyer's original design for the area, including wide boulevards and zoning for only two story single family homes along the federally preserved mangroves, remain part of the Jurerê International development that is located adjacent to the originally zoned area (*Jurerê Tradicional*) of Niemeyer's design. The area was purchased in 1980 by the Habitasul group, a large business

---

<sup>52</sup> The first public civil action was taken by the MPF in 1996 followed by a second in 2005.

originally formed in the state of Rio Grande do Sul that is active in several sectors including real estate development. Habitasul developed the master plan for Jurerê International retaining the strict environmental zoning and lower occupancy rate, although this is partly because of the limitations of the private water supply and sewer system. There is a strong focus on an integrated security system, environmental monitoring, and a nature reserve. Despite the impact of the recession on the Brazilian real estate market, the development continues to rank among the most expensive real estate in the country in terms of price per m<sup>2</sup> (FipeZap, 2017).

The development has been embroiled in court cases and corruption charges over unlawful construction in federally protected areas of permanent preservation. The initial investigation, undertaken by the Federal Police as directed by the Federal Public Ministry (MPF), involved irregularities observed by the Sanitary Surveillance team of the Secretariat of Urban and Public Services (SUSP). Also, one of the hotels built in Jurerê International, Il Campanario Villaggio Resort, was investigated for environmental concerns regarding the location of the hotel in relation to pre-existing drainage canals and river systems in an area that is federally protected under the Forest Code. After several years of investigation and land surveys, the court ruled the development had violated federal environmental law. In line with Brazilian federal law that allows for equivalent substitution, the Public Ministry of Santa Catarina and Habitasul agreed, through extrajudicial transaction, that Habitasul would pay an indemnification worth R\$ 75 million to the Secretary of Environment, Migration, and Habitation in the City of Palhoça, one of the municipalities of the greater Florianópolis area (Rocha, Filho, &



Cazetta, 2007). The payment supported the creation of a municipally run Ecological Park of Mangroves in Palhoça.

The case brought about a subsequent investigation by the MPF into the clearing of federally protected *restinga* to construct five beachside restaurants in the same area. In keeping with a nation-wide focus on the prevention of illegal deforestation, 19 people, including public officials, businessmen and city councilmen, were temporarily arrested in connection to the case in 2007. The charges alleged that city officials were being paid to permit the construction of buildings in permanent preservation areas. Local papers, calling the case “operation green currency” (*operação moeda verde*) reported on the existence of a “gang” that had also used its influence to negotiate changes in the Master Plan that were viewed as advantageous to real estate developers (SC DG, 2016a). In 2014, the court determined there was sufficient evidence to try 37 people in case. The first hearings in the criminal action began in 2016 in the Federal Regional Court of the 4th Region (TRF4) in Porto Alegre. The case was still underway at the time of writing, but could result in the demolition of the five restaurants in Jurerê that are built in areas of permanent preservation. These venues cater to a high-end clientele and are among the most popular nightclubs in the city. The outcome of the trial will be important in influencing the course of development in the north of the island as Habitasul owns much of the land south of Jurerê, bordering the Ecological Station of Carijós, and jointly owns much of the land stretching east from the Ecological Station into Ratones.

Corruption is expected and commonplace in many developing nations in which public servants are poorly paid and the socio-economic elite is well embedded in the governance structure. While continuing efforts to combat corruption and collusion are

paramount to ensure governance is carried out in keeping with collective interest, it is important to acknowledge that efforts to arrest environmental degradation must be pursued in tandem to these efforts, not in following. The means by which the public can ensure projects are carried out in keeping with the collective interest and with regard to federal, state, and local environmental laws and regulations is via interactions that involve transparent access to information and multi-party deliberations. Tools available in the local institutional environment to facilitate these objectives are publicly available documents such as Environmental Impact Assessments (*Estudo de Impacto Ambiental*, EIA), Environment Impact Reports (*Relatório de Impacto ao Meio Ambiente*, RIMA) and Civil Actions (ACP) filed by the Federal Public Ministry. Public hearings, governed by CONAMA (Ruling 06/1987), are also a means by which interested parties can review the summary of the environmental impact assessment (RIMA) and make suggestions. By Brazilian law, public hearings can either be scheduled by the licensing environmental agency (FLORAM in the study area) or can be requested by a civil organization, the Public Ministry, or by 50 or more concerned citizens (Fernando, Sant'Anna, Rabinovici & Spitzack, 2016). The licensing process is legally required to follow a three-step process<sup>53</sup> (1) issuance of the preliminary license that approves the location and project and assures the environmental feasibility of the project as well as the requirement that must be met during implementation; (2) the installation license that authorizes the activity as per the stated specifications in the approved plans; and (3) the operating license that authorizes operation after verification of compliance. A project without an environmental license may be liable for any environmental degradation and can be punishable by fines

---

<sup>53</sup> Law No. 6938/1981 and CONAMA Resolution No. 237/997

(Article 66, Decree Law No. 6.514), remediation or indemnification, ceasing of detrimental activities, or arrest as allowed for in Law No. 9605 of 1998 (Fernando, Sant'Anna, Rabinovici & Spitzneck, 2016).

These institutional mechanisms that allow for public participation in the permitting process have been used in the Florianópolis area in other cases not covered in detail here. For example, the Portobello Group's Porto da Barra Urban Development Project, owned by Cesar Gomes, was suspended, after receiving environmental licensing, as the MPF judged the port project to be in violation of laws protecting areas of permanent preservation and marine environments. A golf resort, Florianópolis Village Golf Resort, intended to be built in Pântano do Sul was halted for irregularities in land titling. Another case that received media attention was a hotel and marina, Ponta do Coral, that was planned to include a large marina and a land reclamation project for a 22-story hotel. Located near the Itacorubi basin and the federally protected Itacorubi Mangrove, the development was stopped, as of the time of writing, with the MPF specifically stating the plans for the development did not realize the social function of the land that should ensure a just and sustainable city (Lopes, 2015).

#### **4.6. Conservation and Contestation**

As stated by former Mayor Dário Berger, the challenge in developing Florianópolis is “to seek a balance between the development of the city and environmental protection, in order to maintain the quality of life for ourselves and for future generations” (Frayssinet, 2008). While the total area of conservation units in Florianópolis is viewed positively by environmentalists, there is continual pressure to release certain areas to development by various parties. This section considers the

interactions that are taking place between the actors discussed above, paying particular attention to areas of conflict.

Social movements engaging in land reclamation strategies, such as squatter's rights, experienced a period of strong support in the mid-1990s. Before significant urban growth, modest housing for fisherman and some farms dotted the entirety of the island's coastal areas. Growth in the tourist industry in the 1990s resulted in a need for low cost housing for service sector workers who migrated to the island in search of work during the high season. With the steep slopes ringing the city center becoming increasingly populated with hillside *favelas*, these areas of permanent preservation become co-opted by an equally important dimension of urban sustainability: social sustainability and equitable growth. Given the large percentage of municipal land restricted from residential occupation, the city is unable to comprehensively monitor conservation units and prevent the construction of illegal housing leading to a situation in which large capital investments are needed to regularize informal housing on restricted land.

Figure 15. Encroachment in Permanent Preservation Areas (red) and Preservation Areas for Limited Use (yellow).

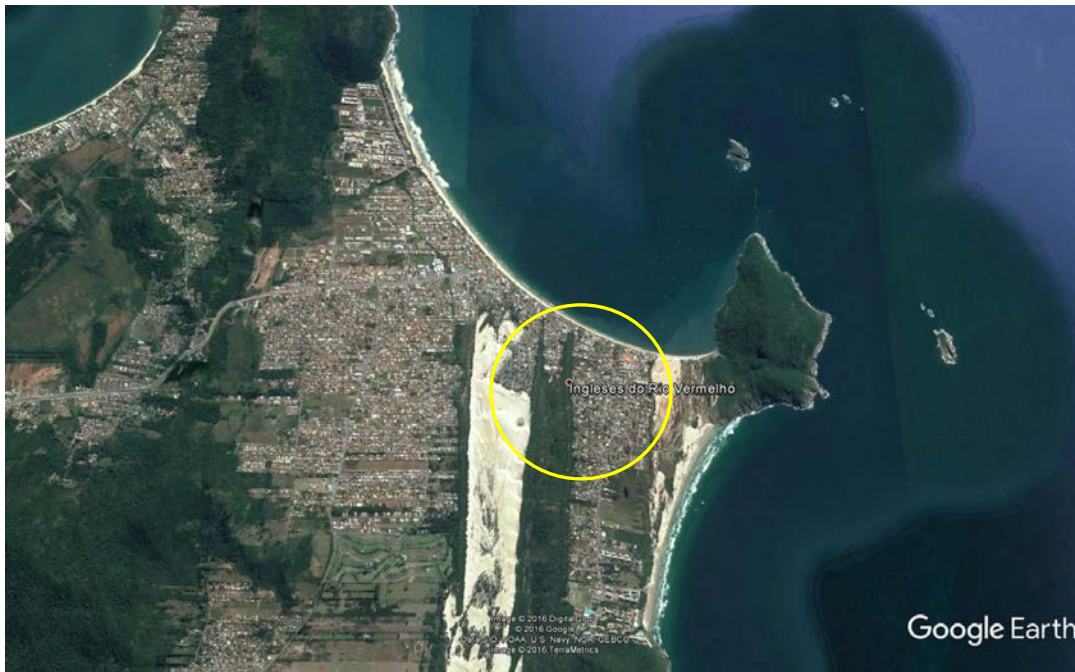


Source: IPUF, Draft Master Plan – still under revision as indicated by the watermark.

Occurrences of informal housing constructed in Permanent Preservation Areas (APP) are increasing as the population of Florianópolis grows. The Municipal Secretariat of Housing estimates that about 12% of residents live in irregular housing. The Municipal Plan for Social Housing (PMHIS), implemented in 2013, has lagged and is expected to fall short in alleviating the projected housing deficit of the city. The PMHIS, discussed in

greater detail in Chapter 6, was designed to identify low-cost housing options and relocation assistance for communities living in high risk areas such as hillside slopes. Federal programs, such as those offered through the government owned Caixa bank (*Caixa Econômica Federal*), are available, but can often become mired in multiple levels of political approval. The nature of the conflict and the actors involved is illustrated here using the struggle of an informal community built in the dunes of Ingleses, a Permanent Preservation Area. The community, growing from 168 houses in 2005 to over 300 in 2016, has been in conflict with city officials since the mid-1990s (G1, 2016; Thomé, 2016).

Figure 16. Location of the Siri community.



Source: Google Earth, 2003 image

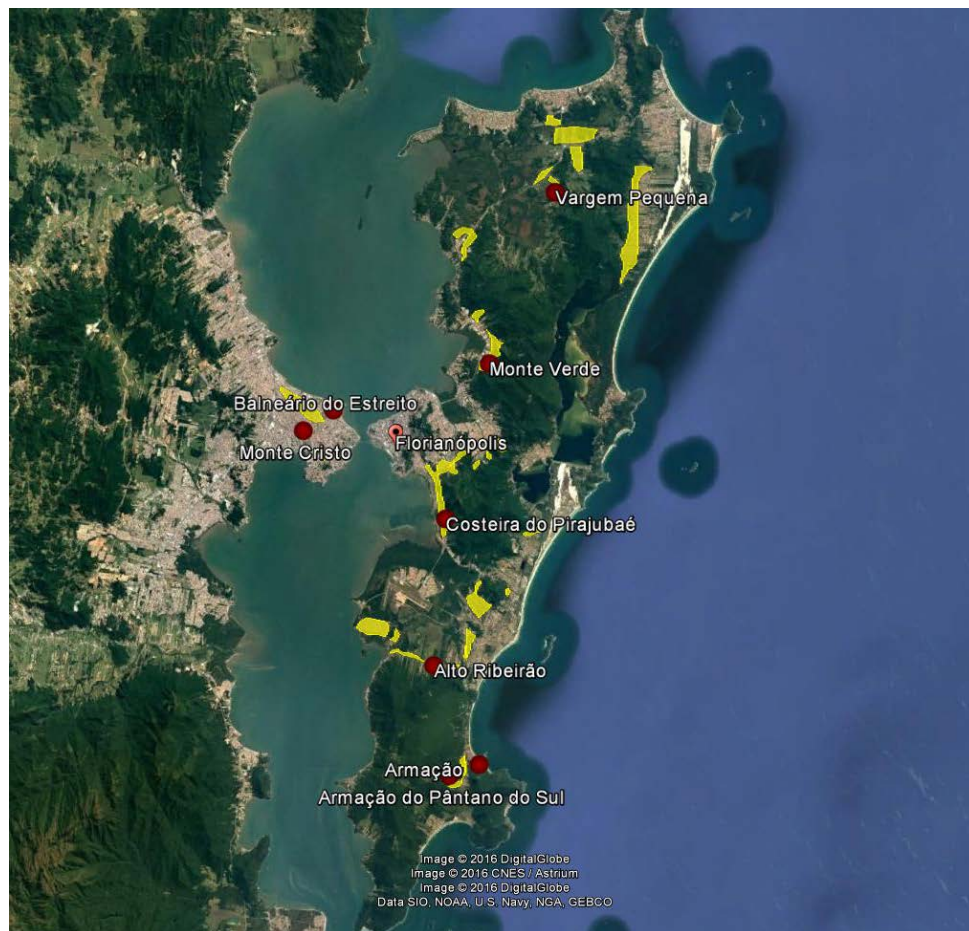
Informal communities, such as Siri, are indicated in the Master Plan as Special Zones of Social Interest (*Zonas Especiais de Interesse Social, ZEIS*), a planning instrument that is regulated by the City Statute (UN-HABITAT, 2002). ZEIS designate

certain areas of the city as either already inhabited by low-income residents, usually in *favelas*, or land intended for the construction of low income housing. In the case of Siri, the land on the northern tip of the dunes, is indicated as ZEIS and therefore the neighborhood can take part in regularization programs. However, the homes built on the dunes themselves were directed by FLORAM to be demolished in April 2016. Following the demolition of the first home by the Military Police, the residents, who later reported police brutality, prevented additional demolition by barricading the area and setting tire fires (Thomé, 2016). Residents of Siri are waiting for relocation assistance through the municipal PMHIS, but the program still requires funding from the federal *Minha Casa, Minha Vida* housing program. In the meantime, houses continue to be built on federally protected dunes.

With informal housing settlements such as Siri increasing in number in the city, there is an urgent need to address the housing deficit now before informal settlements become entrenched communities that can only be unraveled at great social and financial expense. Steadily rising real estate values throughout the island have led to a locked-in socio-spatial development pattern that concentrates favelas and forces encroachment on preservation areas. Socio-economic polarization is becoming more apparent as the gap between the cost of land in affluent neighborhoods and the cost in low-income neighborhoods widens. Current real estate values indicate every neighborhood on the island is increasing in value except for eight neighborhoods. The eight neighborhoods losing value in the municipality of Florianópolis are favela neighborhoods indicated in Figure 17 below (Alto Ribeirão, Armação, Armação do Pântano do Sul, Balneário do Estreito, Costeira do Pirajubaé, Monte Cristo, Monte Verde, and Vargem Pequena) (ZAP

Imóveis, 2016). These neighborhoods are indicated below along with the areas designated on the Master Plan as ZEIS. ZEIS areas are normally *favelas* or areas designated for the construction of low-income housing. The devaluing land of the *favelas* suggests the city has the potential to follow similar patterns of growth that have occurred in larger Brazilian cities such as Rio de Janeiro and São Paulo. Urban land use planning tools and policies that have the potential to offset the polarized pattern of socio-spatial urban form that results from socio-economic disparities in access to real estate will be needed to correct this trend.

Figure 17. Map of the primary ZEIS indicated in the Master Plan (yellow) and the eight neighborhoods losing property value in Florianópolis (red dots).



Source: Google Earth



Areas designated for the preservation of cultural heritage also can face high levels of contestation over land as these areas are designated for sustainable use only and limit the activities permissible on the private property of local land owners. Additionally, city planners have expressed concern that when land is appropriated as a conservation unit, land owners are often left with no means by which to make land profitable as farm expansion, farm rotation, and construction are all prohibited. This constraint on possible livelihood activities can lead to the likelihood that the owner will allow illegal informal housing on the land to collect rent. For example, a local farmer in the Lagoa do Peri Conservation Unit is permitted to plant small crops of sugarcane for use in cachaça production, a local liquor (Frayssinet, 2008). However, he is no longer permitted to follow the traditional practice of crop rotation as no additional land is permitted for cultivation. These private property owners, whose families may have been living on the same plot of land for generations, hold the perception that parties with greater power, influence, or resources are more able to resist instances in which environmental laws and regulations negatively impact livelihood activities.

One example of the way the designation as a cultural heritage preservation can impact local communities in a way that can lead to a positive outcome is found in a fishing village that retains many of the traditional practices of the Azorean culture, Costa da Lagoa. The village is a tourist destination and home to the well-organized Association of Residents of Costa da Lagoa that was part of the environmental movement mentioned earlier. The economy of the area has shifted to accommodate the tourist influx, that primarily occurs between December and March. The village is small and experiences less growth than other neighborhoods as it is only accessible by boat or by walking. Many

residents have built small scale lodging for budget tourists or offer lake and hiking tours for eco-tourists. Through the Association, locals have established collective rules to govern local resources. This form of collective governance has led to agreements to prevent deforestation and limit construction.

The responsibility of monitoring federally protected areas of permanent preservation to ensure conservation units are maintained with the quality and borders intended, can be federal, state, or local. In the case of Florianópolis, there are arrangements in which private parties have subsumed this responsibility on behalf of the municipality. As Olson (2009) suggests “certain small groups can provide themselves with collective goods without relying on coercion or any positive inducements apart from the positive good itself. This is because in some small groups each of the members, or at least one of them, will find that his personal gain from having the collective good exceeds the total cost of providing some amount of that collective good” (p. 34). This observation proved to be the case in several examples across Florianópolis. Although some environmental preservation initiatives did not manage to institute cooperative arrangements that led to long term sustainability, such as the case of the Blue Flag beach summarized in Chapter 3, other community groups have managed public land in keeping with the long-term interests of the collective. The previously mentioned APPLuz community association was instrumental in the development of the municipal park at the base of the Hercílio Luz bridge and continues to co-manage the park with FLORAM.

#### **4.7. Key Findings**

This analysis illustrates how the SES framework can be used to give structure and organization to the analysis of combinations of variables at a particular point in time, or

across time, to map changes in actor relations. Clemens and Clark (1999, p. 459) suggest that “when political entrepreneurs seek to transform the overarching institutions of political life, they face particularly high demands to embed calls for change within accepted models.” In the case of Florianópolis, the specific history of the environmental movement, the representation and implementation of the ideals of the movement in the municipal government, and the alignment of some objectives of resort developers with sustainability goals have led to an urban condition that is positive for sustainability – the preservation of urban green space. Neighborhood associations have found ways to work towards common goals with government bodies that have the resources and technological knowledge to implement larger scale infrastructure projects.

Basurto and Ostrom (2009, p.26) state, “the importance of building appropriate nested enterprises for the sustainability of self-organization cannot be understated. In larger resources with many participants, nested enterprises that range in size from small to large enable participants to solve diverse problems involving different scale economies.” The rise of collective actors, such as environmental groups, and their success in establishing working relationships with various entities of the municipal government has led to sustainable outcomes on a project level. The sustained preservation of land in the Florianópolis area is largely the result of (1) strong federal laws supporting permanent preservation, (2) a brief period in the 1980s that was characterized by the alignment of interests between city officials, community associations, and real estate developers, (3) the persistence of community associations who support land preservation based on both eco-centric rationalities and anthro-centric goals of maintaining a good quality of life. Although, as discussed, the resort developers

play a dual role as they both encroach on land and work to preserve the natural environment as a tourist amenity.

The institutional grafting that occurs in several land management arrangements in the Florianópolis area is a strategy often used by international organizations to try to engender local support and “buy-in.” *Grafting* here is used to describe the institutional change that is neither re-structural or de-structural, but rather the introduction of an institutional arrangement that is designed elsewhere and then connected to local capacities. As seen in Chapter 3, institutional change observed in the city departments under study often followed an evolutionary process that involved the re-arrangement and expansion of existing capacities. The grafting of fully structured projects onto existing or new local public-sector offices requires strategies, such as participatory budgeting in the case of the biosphere project, that foment ownership and strengthen the connection of an international eco-rationality to local roots more steeped in defensive environmental rationalities.

Analysis of the land sector suggests the man-made structures in areas of permanent preservation are the result of both predatory occupation and informal housing. Although capital rich real estate developers find legal and illegal means by which to gain construction permits and capital poor residents build without permits, in-person interviews indicate both groups would act within the bounds of the law if given the opportunity to achieve the same goal by other means. Capital accumulation based on real estate speculation often requires the construction of buildings to be used in increasingly profitable ways, as per the aptly described growth machine (Molotch, 1976). Acquisition of housing by residents who are capital and land poor, requires low-cost housing to be

available. While Brazil introduced the popular *Minha Casa, Minha Vida* program in 2009 to provide public housing throughout Brazil, there remains a housing deficit in many areas. Tax incentives that combine a requirement to build low-cost housing in order to receive permits to construct buildings with higher returns on investment have been, under the right conditions, successful in other locations globally and warrant further research.

The power disparity that can result from inequalities in capital accumulation influences the local development agenda. However, the SES framework is designed to facilitate exploration of cost-benefit decision making taking place by relevant actors. While the real estate speculators value the natural amenities of the island for tourism development, residents value public land for the quality life it affords. The description of development forces portrayed in this chapter highlights the way various logics are used and manipulated to gain influence over the development agenda and inform strategic collective action. The dynamic interactions between various strategic action fields tell both a story of success in preservation as well as contentious embattled power struggles. Instead of looking for answers to competing logics by balancing power, this research suggests that, in this specific case of attempting to foment a transition to environmental sustainability in Florianópolis, solutions may be found in aligning interests.

One institutional forum that is used in the study area to balance power and manage the development process in an equitable, inclusive way, is the participatory planning mechanism used to develop the Master Plan. Interviewees often expressed disappointment that the development of the Master Plan has taken ten years because of an inability to reach consensus on the development agenda. To meet the desires of the various neighborhoods throughout the island, the Master Plan has become a *mélange* of

highly localized development preferences without a unified vision. When attempting to institute practices that safeguard health and human welfare, issues seem on the surface to be unobjectionable, such as clean water or air. However, in practice, environmental issues often become politicized pawns in the factious relations of a much broader basket of political deliberations. The participatory planning process of the Master Plan has become a power play between those who favor a modern integrated city and those who want to restrict vertical growth. Undoubtedly, there are environmental justice challenges for the residents of informal neighborhoods, discussed further in Chapter 6. The institutionalized conflation of social and environmental issues in both non-governmental and public-sector organizations is also a challenge. Some environmental sustainability initiatives may benefit from an operational decoupling of the two challenges.

## **CHAPTER 5: ENERGY, TECHNOLOGICAL CLUSTERING, AND KNOWLEDGE SPILLOVER**

As discussed in Chapters 3 and 4, the amenity-led growth model embraced by the business elite and the municipal government over the past 50 years has resulted in a high concentration of amenities and a robust tourism industry. The subsequent decision on the part of municipal leaders to leverage the amenity-rich city, and the high development ranking, to court technology firms has led to a concentration of technology, energy, and engineering companies. Previous research suggests that clustering or agglomeration is more likely if the location is amenity rich (Florida, 2012; Graves & Linneman, 1979). The clustering, in turn, results in growth as indicated by an increase in job creation over time as well as growth in the technology sector presumably because of knowledge spillover (Florida, 2012; Wedemeier, 2015). This research indicates cross-sectoral knowledge spillover is particularly important as it seems to have resulted in positive sustainability outcomes as local developers and other local firms are increasingly adopting smart growth technologies such as solar hot water heating and solar distributed generation.

In keeping with empirical research referred to as the social construction of technology, this chapter aims to take a historical approach to studying a technological system as a “seamless web of technology and society” (Pinch, Hughes, & Bijker, 2012, p. 4). As sustainability cannot be achieved without transitioning to energy efficient urban systems powered by renewable energy sources, this analysis explores energy sector policies, collective action, and emerging smart growth strategies in the study area. Using the SES framework to explore a social-technical system, this chapter will follow the same

organization as the analysis of public lands in Chapter 4 by beginning with an overview of the resource system in Section 5.1. Following this overview, Section 5.2 is a multi-level overview of the public-sector rule-making institutions and the accompanying constitutional-rules and operational-rules relevant to the case study. The analysis then addresses collective strategic action driving change in the sector in Section 5.3. Section 5.4 considers market forces driving the increase in adoption of distributed generation technologies in the study area and Section 5.5 concludes by briefly summarizing the key findings.

## **5.1. The Electricity System in Florianópolis**

### *5.1.1. Infrastructure*

As the urban subsystem under review in this chapter is the electricity system, an overview of the physical infrastructure (the resource system), as well as the policies and laws that determine the characteristics of the system, are first reviewed. Industrial development based on import substitution began to take hold as a growth strategy in Brazil following the Great Depression and became a fully institutionalized development ideology in the 1950s (Kingstone, 2004). At this time, an acquisition process of small and medium local energy companies, owned mostly by private foreign companies, was undertaken by the central government. Federal ownership was primarily in the areas of generation and transmission while state-level governments dominated distribution. A struggling economy in the 1980s, in part a result of the late 1970s Organization of the Petroleum Exporting Countries (OPEC) oil shocks, led to a poor fiscal condition among the many state-owned companies. The energy sector was restructured as a result of growing skepticism of the state-owned model, inflation, a growing worker's movement,



and electricity shortages. In 1993, tariff rates were allowed to reflect the actual cost of provision (Law 8631), and, in 1995, regulation was passed that allowed private firms to provide public services through concessions (Law 8987). Regulations were passed that established the Brazilian Electricity Regulatory Agency (*Agência Nacional de Energia Elétrica – ANEEL*) and set rules for bidding on concessions. These changes failed to attract adequate investment in the sector leading to another round of reforms in 2004 to attract private investment in generation expansion (Melo, Neves, & Pazzini, 2011).

Today, transmission and distribution are still heavily regulated while generation and commercialization are open markets. The transmission system, the National Interconnected System (SIN), connects 99% of the country with 117,000 km of transmission lines (ONS, 2016). This large interconnected power system brings 146 GW of installed capacity to over 60 million end users (MME, 2016b). Installed capacity has been expanding each year with over 53 GW installed since 2000. Investing heavily in plentiful hydroelectric power, generating capacity in the country is predominately hydroelectric plants (64.7%) followed by natural gas thermal plants (10%) and biomass thermal plants (9.5%) (MME, 2016b). The table below summarizes the currently operating power plants in Brazil by type of plant and installed potential.

Table 7. Installed capacity in Brazil (as of September 2016)

Type	Number of Plants	% of Total	Installed Potential (kW)	% of Total
Hydroelectric Plant <sup>54</sup> <i>Usina Hidrelétrica de Energia (UHE)</i>	220	4.8	90,465,984	61.1
Small Hydroelectric <i>Pequena Central Hidrelétrica (PCH)</i>	446	9.7	4,848,790	3.3
Central Generating Hydroelectric	565	12.3	450,392	0.3

<sup>54</sup> Following ANEEL's classification, Hydroelectric Plants have a generating potential of more than 30MW. Small Hydroelectric plants have an installed potential of between 1-30 MW. Central Generating Hydroelectric includes all stations generating less than 1MW (Micro Hydro is less than 100 kW and Mini Hydro is between 100 and 1000 kW).

<i>Central Geradora Hidrelétrica (CGH)</i>				
Thermal <sup>55</sup> <i>Usina Termelétrica de Energia (UTE)</i>	2,923	63.7	40,660,602	27.5
Nuclear <i>Usina Termonuclear (UTN)</i>	2	0.0	1,990,000	1.3
Wind <i>Central Geradora Eolielétrica (EOL)</i>	389	8.5	9,506,960	6.4
Solar <i>Central Geradora Solar Fotovoltaica (UFV)</i>	42	0.9	23,008	0.02
<b>Total</b>	<b>4,587</b>	<b>100</b>	<b>147,945,737</b>	<b>100</b>

Source: ANEEL Generation Information (2016)

In the period between January and September 2016, 76% of the power generated was from hydroelectric sources (ANEEL, 2016a). A period of drought between 2014-2016 led to an increased reliance on thermal power plants and wind power as the price of power sailed to historic highs. In 2015, there was a 46% increase in installed capacity of wind power. Previous generation patterns indicate thermal plants were used primarily during the dry season when the hydroelectric plants naturally have lower output (ONS, 2017). In 2016, the thermal plants had consistent monthly output indicating their increasing importance in not just solving dry season shortages, but in meeting increasing demand. Large hydroelectric projects, such as the Belo Monte Dam currently under construction in the state of Pará, continues to have political support despite opposition from local groups and environmental organizations. For the period 2016-2030, expansion plans indicate there will be 13,473 MW of new hydroelectric capacity and 10,400 MW of thermal. An additional 8,368 MW are predicted from wind sources, 2,381 MW from small hydro, and 2,953 MW from solar (ANEEL, 2016a). Many of the new hydropower plants will be located far from urban centers, leading to higher transmission and distribution losses (Corrêa da Silva, Neto, & Seifert, 2016).

---

<sup>55</sup> Thermal plants are primarily biomass (10,771,760 kW from sugarcane bagasse) and fossil (12,978,019 kW from natural gas, 4,055,973 kW from fuel oil, 4,692,444 from diesel, and 3,389,465 kW from coal).

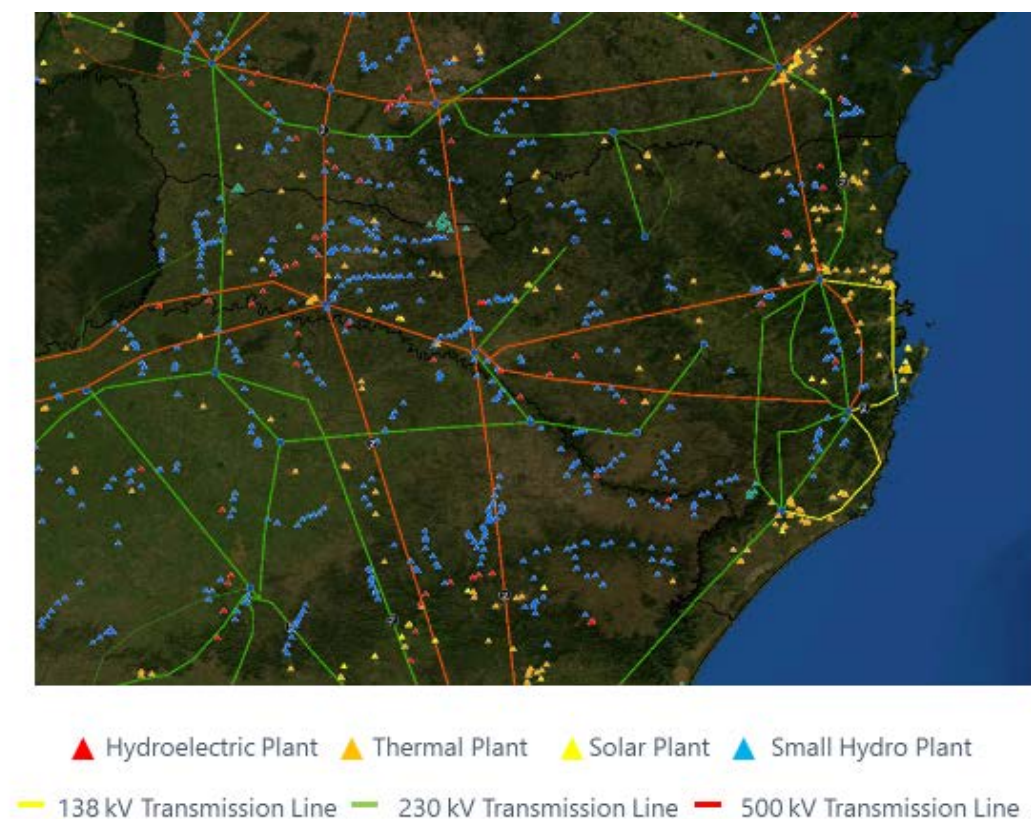
In the late 1950s, small regional energy companies located throughout the State of Santa Catarina began to struggle to meet growing power demand as the population and economy grew. In 1956, the State of Santa Catarina established a state-owned company, Central Electric of Santa Catarina company (*Centrais Elétricas de Santa Catarina – Celesc*), to implement state-wide energy policy, court infrastructure investment, and manage generation, transmission, and distribution of electricity (Celesc, 2017). The combined effect of the construction of large hydroelectric plants in the state in the 1960s with the consolidation of regional subsidiary companies between the 1960s and 1980s, established Celesc as the primary distribution company in the state under the military dictatorship. Strong economic growth between 1968-1973 led to heavy investments in infrastructure and significantly increased electrification in the region (Celesc, 2017). Other regional companies, such as Eletrosul, CEEE, and Copel, continue to hold interconnection contracts with Celesc for the supply of electricity.

As mentioned above, the majority of generating assets remain under state control. With injections of capital from private investment following restructuring, federally owned Eletrobrás is still among the largest power companies in Brazil controlling over 37% of generation capacity and 57% of distribution lines (Eletrobrás, 2017). The State of Santa Catarina has 344 generating plants with 4,587,092 kW of installed capacity (ANEEL, 2017). Of installed capacity, 56% is from 11 hydroelectric plants and 24% is from 112 thermal plants. Celesc (*Celesc Distribuição*) remains the primary distribution company in the State of Santa Catarina and is intensifying efforts to expanded generation capacity. In terms of earnings, it is the sixth largest power company in Brazil with revenue from the supply of power representing 4.5% of the national total (ANEEL,

2017). In terms of energy consumption, Celesc ranks seventh in the nation. Celesc operates throughout the State of Santa Catarina and, following restructuring in 2006, is now established as a holding company with two wholly-owned subsidiaries, one for generation and one for distribution.

Until the 1980s, the Island of Santa Catarina was powered by the nearby Maroim Hydroelectric Plant, a small 69 kV system. Growing energy demand led to the installation of a new transmission cable across the Colombo Salles bridge in the 1980s. The vulnerability of the island's reliance on this single cable for the transmission of electricity was demonstrated in 2003 when the oil-insulated cable was damaged in a fire, leaving the island without power for almost three days. With funding from a federal energy investment program (ENERCAP), the city was connected to mainland power sources including the Jorge Lacerda Thermoelectric Complex. The complex, 130 km to the south in the city of Capivari de Baixo, has a generating capacity of 857 MW. Located near a coal basin, four of the seven plants in the complex are coal-fired. Originally owned by Eletrobras, the plant has been owned by Tractebel, and its parent company Engie, since 1998.

Figure 18. Location of generation plants and transmission lines in Santa Catarina (state lines are indicated in black)



Source: Geoprocessing Portal SIGEL, ANEEL

Although power is primarily provided to the city from plants on the mainland, backup generators are common on the island such as those installed at the airport (720 kW, in operation since 2001) and by telecom operators (Claro, 1798 kW and 180 kW, in operation since 2015 and 2013, respectively), as well as in churches (Igreja Universal do Reino de Deus, 744 kW, in operation since 2004) and malls (Iguatemi, 400 kW, in operation since 2007). Diesel thermoelectric units such as these are registered with the Municipal Government in the Technical Registrar of Potentially Polluting Activities (as per Complementary Law 376, 2010). Florianópolis also has a 1 MW photovoltaic (PV) power plant located at the headquarters of the energy provider Eletrosul, implemented in partnership with the German development agency Deutsche Gesellschaft für

Internationale Zusammenarbeit (GIZ). The plant can generate 1.2 GWh per year, enough to power around 540 homes.

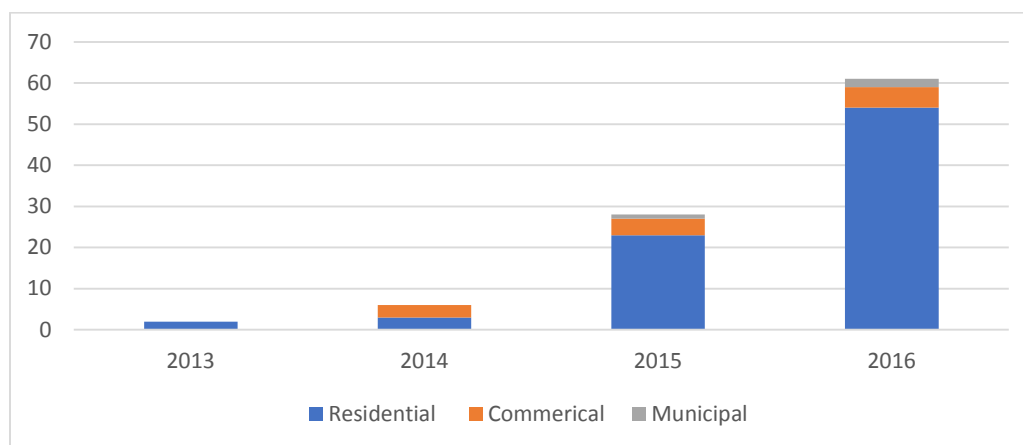
Figure 19. 1 MW solar plant located at the headquarters of Electrosul, Florianópolis



Source: Electrosul and Author

In 2012, federal Law 482, discussed in greater detail below, was passed allowing individuals to sell power to the grid. Since then, there has been a steady increase in registered solar installations in the city of Florianópolis. The table below demonstrates both residential and commercial adoption of solar in the city since 2012.

Figure 20. Number of residential and commercial solar installations in Florianópolis, 2013-2016



Source: ANEEL, Unidades Consumidoras com Geração Distribuída, 2016b

### 5.1.2. *Energy Consumption and Greenhouse Gases*

To advance urban environmental planning that specifically addresses climate change, sustainability indicators and an emissions inventory are necessary to identify key emitting sources. A greenhouse gas inventory for Florianópolis was undertaken in 2013 (IDOM-COBRAPA, 2014a).<sup>56</sup> The results of the 2013 inventory for the greater metropolitan area estimated 2.38 mil tCO<sub>2</sub>e across all sectors with transportation contributing 1.72 mil tCO<sub>2</sub>e (72%) from diesel, traditional gasoline, and jet fuel sources.<sup>57</sup> The large area of preserved land sequestered an estimated 335,000 tCO<sub>2</sub>e, 14% of the total emissions. Industrial processes and product use was the second largest contributor (12.6%), but as the study was conducted for the greater Florianópolis area, it should be noted that the industrial sector is not as large a contributor to GHG emissions in the Municipality of Florianópolis. Industrial energy consumption for Florianópolis was just under 15 mil kW. In comparison, the greater metropolitan municipalities of Biguaçu and Antônio Carlos had industrial energy consumptions of 60 mil kW and 91 mil kW,

---

<sup>56</sup> The inventory was conducted for nine municipalities in the greater metropolitan area: Águas Mornas, Antônio Carlos, Biguaçu, Florianópolis, Governador Celso Ramos, Palhoça, Santo Amaro da Imperatriz, São José and São Pedro de Alcântara. The study followed the Intergovernmental Panel on Climate Change (IPCC) Guidelines for estimating net emissions and used the Global Protocol for Communities (GPC) methodology (GHG Protocol, 2017). The GPC methodology was developed by Local Governments for Sustainability (ICLEI), C40 Cities, and World Resources Institute (WRI). The GPC methodology was established to address the inconsistency among initial urban GHG inventories worldwide. For the Florianópolis inventory, the IDOM-COBRAPA consortium followed both the guidelines of the Brazilian Association of Technical Standards (Associação Brasileira de Normas Técnicas – ABNT) in the Implementation Guide for the Management and Removal of GHG Emissions (NBR ISO 14064) and the methodology for the GPC Pilot Version 1 (2012). According to the GPC methodology, the inventory is carried out with some flexibility in terms of relevance of certain sources and addresses emissions within three scopes: (1) all direct emissions occurring in the study area, (2) indirect emissions related to energy consumption within the study area (meaning the emissions from the energy consumed despite the plant being located outside the city limits), and (3) indirect emissions that may be generated within the jurisdictional limits, but deposited elsewhere such as municipal solid waste.

<sup>57</sup> The sectors reviewed included agriculture, forestry, and other land use (AFOLU), industrial energy consumption, industrial process and product use (IPPU), institutional (such as public lighting), energy consumption for homes and the service sector, solid waste, and wastewater.

respectively. The Municipality of Florianópolis consumed more electricity than neighboring municipalities in terms of public lighting (40 mil kW or 4,566 kWh) and energy for government buildings (85 mil kW) due to its larger population and status as the state capital. Energy consumption in the residential and service sectors in Florianópolis were both approximately 500 mil kW.

As there is not a power plant in the greater Florianópolis area, emissions directly from power generation were not included in the GHG inventory conducted by IDOM-COBRAPA. As stated in Chapter 1, Florianópolis receives electricity from the nearby coal-powered thermoelectric plants not from hydroelectric sources. Unfortunately, the GHG inventory failed to take this point into account. While changing the emission factor for electricity generation in the inventory would not affect estimates for the transportation, solid waste, or sequestration figures, it would significantly alter estimates for emissions from electricity consumption in the residential, municipal, and service sectors. Hydroelectric power has an emission factor of 4 grams of CO<sub>2</sub>/kWh whereas the emission factor for coal power plants (using steam coal) is 318 grams of CO<sub>2</sub>/kWh (IPCC NGGIP, 2017; C2ES, 2017).

## **5.2. Multi-level Review of Energy Laws and Regulations**

### *5.2.1. Federal Level Energy Laws and Regulations*

The primary federal-level government entities responsible for energy policy are the National Council for Energy Policy (CNPE), that sets national energy policies, and the Ministry of Mines and Energy (MME), that sets policies for the electricity sector. Operation and coordination of the generation and transmission system is the responsibility of the National Electrical System Operator (ONS) while regulation of



national energy markets is the responsibility of the Brazilian Electricity Regulatory Agency (ANEEL). The main operator of the electricity market is the Chamber of Commercialization of Electrical Energy (CCEE) that monitors the price for energy distribution.

The National Energy Plan 2030 (*Plano Nacional de Energia 2030- PNE*) is currently the guiding energy policy prepared by the Ministry of Mines and Energy (MME) that outlines the long-term expansion plan as well as energy efficiency targets.<sup>58</sup> Short-term priorities are established in the Ten-year Energy Expansion Plan (*Plano Decenal de Expansão de Energia – PDE*) that is updated annually and sets renewable energy targets. In 2004, amendments made to the first Electricity Law of 2000 allowed for the negotiation of power purchase agreements (PPAs) in both the regulated market and the free market. In the regulated market, there are currently 49 utility companies with distribution concessions who purchase energy through public auctions. These companies sell energy directly to end-users with rates set by ANEEL. Energy auctions result in contracts that require the winning companies to deliver electricity within either three or five-year windows from the date of the auction.<sup>59</sup> In the free market, energy traders and free consumers purchasing more than 500 kW, agree on prices, and set delivery terms (Corrêa da Silva, Neto, & Seifert, 2016).<sup>60</sup>

---

<sup>58</sup> For a complete review of energy laws and regulations of Brazil see *Brazil Energy Policy, Laws and Regulations Handbook Volume 1 Strategic Information and Basic Laws* by IBP (2015).

<sup>59</sup> Regular auctions are held to meet projected growth in demand and reserve auctions provide supplementary energy to increase the reserve margin (Corrêa da Silva, Neto, and Seifert, 2016).

<sup>60</sup> Captive consumers are only allowed to purchase from distribution companies charging regulated rates.

### 5.2.2. *Renewable Energy Laws and Regulations*

Environmental and climate policies passed in the last two decades have initiated a period of ecological modernization. The institutionalization of these ideals has led to increasing numbers of regional and urban level administrative bodies with authority over climate action, energy efficiency, and renewable energy. Energy efficiency is promoted at the federal level through the PNE, the PDE, and the National Energy Efficiency Plan (*Plano Nacional de Eficiência Energética – PNEF*). The energy efficiency target is a 10% reduction in electricity consumption by 2030 compared to business-as-usual (Galiana, 2015). However, the previously mentioned increase in generation from less efficient thermal power plants, in combination with losses in the electricity network (technical and theft), and rising demand for grid expansion, challenge the ability of the country to considerably improve efficiency. Galiana (2015) suggests the most significant improvements in energy efficiency will result from reducing losses from the grid.

Brazil, the first signatory to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, furthered its commitment to climate change legislation by instituting the National Policy on Climate Change (NCCP) (Law No. 12, 187) in 2009, regulated by Executive Order 7390/2010. With a target to reduce emissions by 36.1% - 38.9% by 2020, the National Climate Change Plan (PNMC) strategy includes increasing efficiency and conservation in the use of energy and resources, more renewable energy, and reducing deforestation while supporting reforestation. As reported in the Third National Communication of Brazil to the UNFCCC (2016), there has been an overall decrease in deforestation rates in the Amazon, with some annual variations, since 2005. However, while some public policies have been implemented addressing emissions

from the agricultural and energy sectors, such as the Low Carbon Agriculture Plan, new policies are needed to address rising emissions in these areas. Institutions established to support climate change policy include the National Inter-Ministerial Committee on Climate Change, the Brazilian Research Network on Climate Change, financial institutions such as The Brazilian Development Bank (BNDES) (with credit lines for investment in renewable energy), and the Coordination Committee of Activities in Meteorology, Climatology and Hydrology.

In 2002, Brazil launched the Program to Incentivize Alternative Energy Sources (*Programa de Incentivo a Fontes Alternativas de Energia Elétrica – PROINFA*) (Law 10438, regulated by Decree 4541, 2002 and Decree 5025, 2004). This program aimed to develop 3,300 MW of wind, biomass, and small hydroelectric plants. With few local manufacturers, PROINFA has been hampered by the 60% local content requirement.<sup>61</sup> The Energy Development Fund (CDE) was created the same year to finance PROINFA projects and is funded by a tax on electricity. Brazil has experimented with policy incentives such as feed-in-tariffs in the wind sector (the wind program PROEOLICA of 2001). However, following a drop in the cost of wind energy, reverse auctions have had more success (IRENA, 2015).<sup>62</sup>

Regulations incentivize utility-scale solar parks by offering a discount on fees for plants that use existing transmission and distribution infrastructure. According to the Brazilian Atlas of Solar Energy, the area of the country with the best solar irradiation is the northeast (Pereira, Martins, de Abreu, & Rüther, 2006). As a result, the majority of planned solar park projects are in the state of Bahia including the Ituverava project,

---

<sup>61</sup> There are solar manufacturing plants nearing completion at the time of writing.

<sup>62</sup> Participating developers are chosen based on the lowest tariff rates.

which will be the largest solar plant in Latin America with a 254 MW capacity. The first solar auction was held in the northeastern state of Pernambuco in 2013 during which five projects were contracted. These projects represented 122 MW of solar. The second federal solar auction, held the following year, awarded power purchase agreements (PPAs) to 31 projects to supply 890 MW. The most recent auction in 2015 awarded another 833 MW. Reserve auctions for solar and wind in 2016 were cancelled due to an oversupply of power. As seen below in Table 8, the clearing price is in keeping with prices globally. The below list of investment companies investing in Brazil's solar market illustrate both the strong international presence in the utility-scale market and the range in the capacity of planned solar plants. Many of these awarded projects have failed to reach financial close due to the recession.

Table 8. Companies awarded contracts in the August 2015 Solar Auction

Company	MW Awarded	Price/MWh <sup>63</sup>	Location
Enel Green Power (EGP) of Italy	410	R\$301.83 - R\$304.83	Bahia and Piauí
SunEdison/Renova of the U.S.	59	R\$305.51	Bahia
Conergy of Germany	54	R\$296.00	Paraíba
Sun Premier of Spain/China	5	R\$297.00	Tocantins
Solatio of Spain/Brazil	150	R\$296.45 - R\$302.00	Minas Gerais
Gransolar of Spain	60	R\$302.50 - R\$304.50	Piauí
Vale Verde Energia/Inversiones Solares	15	R\$302.92	Bahia
CESP of Brazil	30	R\$301.88	São Paulo

Source: ANEEL, 2016

In addition to utility scale solar, distributed generation (DG) from technologies such as roof top solar, combined heat and power, microturbines, and fuel cells have been supported through recent legislation. DG is defined in Brazil as generation units that are connected directly to the distribution grid and have low voltage levels (up to 138 kV) (Vieira, 2011). ANEEL introduced a system for compensating the owners of DG units (net-metering) through Regulation 482 in 2012 and further approved changes in the

<sup>63</sup> The exchange rate for August 1, 2015 was 3.41 BRL to 1 USD.

national net metering scheme in 2015 that established an Electricity Compensation System and simplified registration procedures. According to ANEEL, distributed generation installations quadrupled between 2014 and 2016 from 424 to 7,844 connections (ANEEL, 2016b). The regulatory body estimates that by 2024 there will be 4.5 GW of installed capacity owned by 1.2 million consumers.

Table 9. Key Electricity Laws and Regulations in Brazil

Law	Description
Law No. 9 427/96	Established the National Power Agency
Law No. 9 648/98	Defined rules for market entrance and tariff structures
Law 10 848/04	Governs the trading of energy and establishes unbundling rules
Decree 5 081/04	Regulates the trading of energy and concessions in the electric power sector
Res. N° 482/2012	Established rules for micro and mini-generation of electricity, allows for connected photovoltaic systems up to 1 MW
Order N° 44/2015	Incentivizes self-generation

Solar systems are the most commonly deployed form of distributed generation (DG) in the country and the net metering system applies to both micro-generation of less than 75 kW and mini-generation of between 75 kW and 5 MW. The National Energy Plan of the MME projects 18% of residences will be powered by solar by the year 2050 meeting 13% of the country's electricity demand (EPE, 2017). The energy producers of these installations receive credits for excess electricity that are then used to reduce future power bills. The MME launched the Distributed Generation Development Program for Energy (ProGD) in 2015 to support the development of distributed generation in Brazil by providing credit lines, supporting domestic manufacturing of equipment, attracting international investment, and training workers.

### 5.2.3. *Municipal Laws and Regulations*

As described in Section 5.1, the provision of electricity still has strong central oversight by federal-level government bodies and the National Electrical System Operator (ONS) that cooperates with state-level offices and energy companies to ensure the provision of electricity. However, municipalities in Brazil are supported by the City Statute that grants cities authority over setting local development priorities such as the provision, regulation, and promotion of an ecologically modernized electricity service. Cities in Brazil tend to engage with energy efficiency programs, or limited renewable energy installations, by serving public buildings such as schools. There are, however, examples of Brazil's urban governments embracing innovative strategies for sustainability planning as well as climate action plans that include, to varying degrees, greater engagement with the energy sector. Municipal authorities can promote energy efficiency and renewable energy initiatives through ordinances. For example, the São Paulo Solar Ordinance requires solar hot water heaters to be used for 40% of the electricity needed to heat water in commercial, residential, or industrial buildings (IRENA, 2012).<sup>64</sup> Electric shower heaters for hot water are common in Brazil with approximately 20 billion kWh of electricity used annually to heat water (Corrêa da Silva, Neto, and Seifert, 2016). The market for solar hot water heating equipment has been growing in Brazil for the past 15 years and there is financing available for solar hot water projects from the Brazilian Development Bank (BNDES). Municipal authorities use building code to institutionalize the requirement and can revoke building permits or

---

<sup>64</sup> Residential buildings with fewer than four bathrooms are exempt. Municipal authorities took part in training sessions that were part of the national Solar Cities campaign initiated by the Brazilian Association of Solar Thermal Industry and the international network Vitae Civilis (IRENA, 2012).

occupancy permits if the solar hot water heating requirement is not met. City authorities are also able to incentivize solar hot water heating by discounting the federal tax on urban property (*Imposto sobre a propriedade predial e territorial urbana – ITPU*) for those meeting the requirement. Since 1998, standards and certifications for solar heating equipment have been administered by the National Institute of Meteorology, Standardization, and Industrial Quality (INMETRO) (IRENA, 2015).

Municipalities support the NCCP in the implementation of climate change initiatives in line with the national-level Brazilian Forum on Climate Change and the Global Climate Change State Forums. The City Council is responsible for promoting specific themes such as climate action plan and sustainability plans. Municipal level climate action plans in Brazil have resulted from both supporting federal laws, as discussed above, and through increasing engagement with global urban networks. Various cities in Brazil have joined initiatives such as Local Governments for Sustainability (ICLEI), the C40 Cities Climate Leadership Group, and the 100 Resilient Cities network. These networks facilitate cities working together in the development of effective strategies for low-carbon growth, sustainable urban planning, and planning for climate change mitigation and adaptation. São Paulo is one of 24 Brazilian cities that are members of the ICLEI global network. Also a member of the global C40 Cities network, São Paulo developed a Climate Change Action Plan which supports the city's goal to cut carbon emissions by 30%. Law 14933 was passed in 2009 in support of the city's efforts to meet the goals of the United Nations Framework Convention on Climate Change. At this time, the Committee for Climate Change and Eco-economy was established (and

linked to the Municipal Secretariat for the Environment established in 2005) that has authority over actions related to energy consumption and fuels.

Other cities participating in the ICLEI initiative include Rio de Janeiro and the often-cited leader in sustainability planning, Curitiba. In 2005, ICLEI launched the Local Renewables Initiative under which Betim, Brazil became the first Model Community in Latin America and the Caribbean. Betim, also participating in the Cities for Climate Protection Campaign, established the municipal Renewable Energy Reference Center that works to bring together various stakeholders from the public and private sector to develop local renewable energy initiatives (Kemp & Stephani, 2013).

Municipal solar projects in Brazil have been implemented through partnerships with regional and international development banks, non-governmental organizations (NGOs), and with private sector partners through public private partnerships (PPPs). While Brazil has a 99% electrification rate (World Bank, 2016), some urban neighborhoods, such as *favelas*, have high numbers of illegal connections. Illegal connections in informal low-income settlements increase the risk of electric shock and fires. Solar installations in these areas can help in regularizing settlements, improving basic services and safety as well as contributing to the reduction of carbon emissions. Several solar companies and non-governmental organizations (NGOs) have been investing in solar installation in low-income areas, such as Revolusolar and Insolar, working in Rio de Janeiro. In other cases, federal programs, through the state-owned Caixa bank, have financed solar power for low income housing under the *Minha Casa, Minha Vida* program. For example, in the Praia do Rodeadouro and Morada do Salitre neighborhoods of Juazeiro, Bahia, 2 MW of solar PV were installed on low-income



housing, enough to power 3,600 households (Portal Solar, 2017). Residents were also trained in installation and maintenance of the facility providing jobs to the community.

### **5.3. Energy Sector Actors and Governance in Florianópolis**

The technical systems that provide electricity operate within a socio-political environment that provides resources to the system. The primary actors in an energy system include (1) the energy companies that generate and distribute energy, (2) industrial, commercial, and household energy users, and (3) multi-level government institutions engaged in the development or enforcement of policies, laws and regulations. In considering the energy system as a social-technical system, Foxon (2012) suggests different actors execute fundamentally different logics in solving energy challenges. This section considers the governance system, of the SES framework, and the co-evolution of urban level regulations, institutions, and private sector innovation and investment that together impact governance of the energy system in the study area.

#### *5.3.1. Municipal Government Engagement with the Energy Sector*

In keeping with global trends, city level action in the energy sector in Florianópolis often falls into one of three categories: buildings and efficiency, transportation, and land use, and to a limited degree renewable power (NREL, 2016). During the period of modernization in the 1950s, the city began to explore ways to electrify the island. In 1955, the city passed municipal Law No. 238 to contract a French company, Compagnie Générale de Construction de Fours, to build an industrial waste treatment plant that would produce electricity and fertilizer. The city, through the municipal office Light and Power Services of Florianópolis (*Serviço de Luz e Força de Florianópolis*), was required to coordinate with state-level authorities for distribution and

with the federal-level National Council on Electric Energy (*Conselho de Energia Elétrica Nacional*) for the license to produce electricity. Four years later, in 1959, the city authorized the purchase of generators, by the Municipal Electric Energy Committee (*Comissão de Energia Elétrica*) to electrify the interior of the island.

This early endeavor to manage the electricity system locally was halted by increasing regional consolidation of energy companies and the military dictatorship (1964-1985) that worked to centralize control of basic services. Most city-level laws and regulations during this period involved the granting of concessions for the construction of the expanding electricity grid under the authority of national and state-level energy companies. Of references to electricity in city laws since 1964, the majority address the provision of land for energy infrastructure and other energy related concessions and public service expenses. The New Forest Code allows use of Areas of Permanent Preservation (APP), for some exceptional cases, in which there is a need for land to be used by public utilities or for social interest projects (CONAMA Resolution No. 369, 2006). In keeping with the CONAMA resolution, the city stipulates protected land in the municipality can be used for public service infrastructure, such as the electricity grid. One exception is the Lagoa do Peri Municipal Park that strictly forbids the installation of electricity lines. In the Master Plan, there is a zoning category for the designation of areas for use by sanitation and energy systems (*Área de Saneamento e Energia*), such as substations and transmission lines.

The city is required to manage public lighting by collecting tariffs on behalf of the Ministry of Mines and Energy (beginning in the 1980s), planning for expansion, and enacting energy efficiency measures. The local government is allowed to tax municipal

residents for public lighting – the Contribution for the Cost of Public Lighting tax (*Contribuição para Custeio do Serviço de Iluminação Pública – COSIP*). Florianópolis instituted this tax in 2002 following rising electricity costs that resulted from nationwide droughts and power rationing in 2001 (Complementary Law No. 109, 2002). Public lighting in Florianópolis has been the target of a series of energy efficiency measures such as the installation of light-emitting diode (LED) public lighting along Avenue Beira-Mar Norte in 2012. Florianópolis was then the first city in Brazil to install LED lighting on two city bridges in 2013 (Figure 21), a project conducted through the Secretariat of Public Works. The Mayor's office also supported energy efficiency initiatives such as the replacement of the city clocks with 120 LED clocks. In 2015, the city replaced traffic lights with LED lights, an estimated energy saving of 90% over the previous ones (De Olho na Ilha, 2015). This work was undertaken as a collaboration between the Secretariat of Security and Defense and the Institute of Urban Planning (IPUF). All municipal secretariats were authorized to reduce spending in 2013, including expenses on electric energy. In response, municipal buildings began to switch to energy efficient LED bulbs.

The installation of electricity in urban buildings is the responsibility of the contractor who secures project approval from the licensing and permitting offices (SMDU or IPUF) under the supervision of City Hall. This permitting process has required new capabilities and procedures in other municipalities globally that are experiencing an increase in DG adoption. In Florianópolis, it is the responsibility of the contractors to ensure they meet city building codes in using sustainable building materials and equipment installations for renewable energy. The city also approves the supply of electricity to informal settlements during the process of regularization. The city is

responsible for identifying areas of informal settlements that will be targeted for intervention and for authorizing new residential connections, setting residential connection standards, and monitoring the electrification process. Take for example the case of Morro da Cruz that began a regularization program in 2007. The Secretariat of Housing and Environmental Sanitation and Celesc coordinated in the provision of electricity to the area.

Developing local level climate action plans, emissions targets, and energy plans often requires new capacities and institutional structures that support new municipal functions and new energy infrastructure such as micro-grids. Mention of energy in reference to sustainability in Florianópolis began in 2010 with the establishment of administrative rules in support of sustainable city development (Decree 8057). References to energy in the past six years reflect an increase in activities related to zoning and the placement of electricity infrastructure, the regularization of informal settlements (discussed in greater detail in Chapter 6), and electricity safety regulations.

There has also been recent interest in waste to energy facilities as reflected in budget provided for the Secretariat of Science, Technology and Sustainable Development and for COMCAP for biodigesters between 2014 and 2015. In a study conducted by the International Development Bank (IDB) in the development of the Florianópolis Action Plan (MPF & IDB, 2015), waste to energy plants were recommended as a possible option for the city and a comprehensive cost-benefit analysis was recommended. COMCAP has a small scale biodigester facility and plans to expand into the Sapiens Parque technological park in the future to conduct more research in collaboration with UFSC (COMCAP, 2014). Although the waste treatment center in Bigauçu was nearing capacity

in 2016, expansion plans have temporarily relieved the need to find alternatives for the processing of trash in the city in the immediate future.

As a participating city in the Inter-American Development Bank's (IDB) Emerging and Sustainable Cities (ESC) initiative, Florianópolis is one of eight cities in Brazil that received technical assistance to establish a GHG inventory, summarized in Section 5.1, and a methodology for analyzing sustainability indicators. Municipal authorities in Florianópolis included energy efficiency measures and greater adoption of renewable technologies as one of the cross-cutting strategic priorities in the Florianópolis Action Plan developed as part of the IDB initiative (PMF & IDB, 2015). Energy-use at the city level is a cross cutting issue that is relevant to numerous city services such as health care, waste management and water. Energy projects that emerged from engagement with the ESC initiative included the construction of a sustainable solar powered municipal nursery as well as the implementation of energy efficiency measures. The Action Plan also sets an agenda for the creation of an urban administrative body for energy management to address energy efficiency, bill management, and promotion of renewable energy. New administrative forms such as this are a global trend emerging in response to the increase in market activity and demand for energy products such energy efficiency upgrades, solar panels, and solar hot water heating, in high density areas (Graham & Marvin, 2001).

The sustainable day care (*creche*) mentioned above, the Municipal Nursery Hassis in Costeira do Pirajubaé, is a solar powered building equipped with solar hot water and a rainwater catchment system. It is also constructed with Forest Stewardship Council (FSC) certified wood and was the first municipal nursery in Brazil to receive Leadership in

Energy and Design Environmental (LEED) certification (SustentArqui, 2016).

Unfortunately, the nursery cost the city R\$ 4.5 million to construct, ten times the cost of a typical municipal nursery, and has not been followed by subsequent nurseries at the time of writing (personal communication, 2015).

Figure 21. Municipal Nursery Hassis (left) and LED bridge lighting (right)



Source: Municipality of Florianópolis and GE

### 5.3.2. *Non-profit Organizations and Research Centers*

Considering think tanks, academic centers, and other non-governmental organizations from a strategic action field approach reveals how actors are reproducing and transforming the fields in which they work. Local level energy organizations and individuals are challenging the incumbent as an emergent field of actors working collectively to socially construct a new paradigm for the provision of electricity. The non-profit Ideal Institute (*Instituto para o Desenvolvimento de Energias Alternativas na América Latina – IDEAL*), promoting renewable energy and energy policy development in Latin America, is located in Florianópolis and works in partnership with the Center for Solar Energy Research and Training of the Federal University of Santa Catarina (UFSC). Located in the Sapiens Parque technological park in Canasvieiras, the Solar Energy Research and Training Center has a 5 kW solar unit. UFSC also has solar panels installed

on the main campus in the Trindade neighborhood at the University Hospital (2 kW), the Center for Culture and Events (10 kW), the College of Application (2 kW), and the Center of Coexistence (1 kW). A 2 kW unit in the Department of Mechanical Engineering was Brazil's first building-integrated PV system connected to the public grid. The Strategic Solar Energy Research Group installed the unit in 1997 with funding from the Alexander von Humboldt-Stiftung/Foundation. An UFSC Professor, Ricardo Rüther, brought the equipment back from postdoctoral studies in Solar Photovoltaic Systems at the Fraunhofer Institute for Solar Energy Systems in Germany. Rüther is now Director of the Ideal Institute and oversees several initiatives to promote solar education, training, and networking such as the Eco Lógicas Research Competition, the annual Energy + Clean (*Energia + Limpa*) Seminar, the América do Sol project (that offers tools such a solar simulator as well as solar financing and a solar seal certification program), and the 50 Roofs program that aims to install 50 micro or small PV units.

As a technology hub, there are also technology research centers working in the energy sector that promote clean technologies through education and outreach. The Regional Center for Information Technology (CERTI Foundation) emerged from the university to foster better relationships between the university and IT companies. In 1987, CERTI founded a technological business park, the Technology Business Incubator. The same year, the Industrial Condominium for Computer Science was established under the administration of the Santa Catarina Association of Technology Companies (ACATE) to support local technology entrepreneurs (Kanitz, 1999). The CERTI foundation has been continuously influential in establishing Florianópolis as a center for technology by establishing a council for the promotion of the first technology incubators (CONTEC),

working with state authorities to establish tax benefits for IT companies, and in the construction of ParqTec Alpha in 1991. CELTA, one of the original occupants of the Alpha incubator and the current administrator, has been a strong supporter of technology based regional development and promotes the strategy through the network of entities for technological development (RECEPET). The CERTI Foundation's Business Center for Advanced Technologies (CELTA), with their own solar installation, is a business incubator in Florianópolis fostering innovative technology solutions. CarbonoBrazil, a local technology company, promotes solar DG through their affiliated non-profit, CarbonoBrasil Institute for Scientific and Technological Development, that seeks to identify technological solutions to anthropogenic sources of environmental degradation.

Distributed solar has also been installed in several social and environmental non-profit community buildings and education facilities in Florianópolis. Environmental organizations actively pursue green technologies in order support nascent industries and promote environmental sustainability. The Projeto TAMAR turtle research center and the Rio-Vermelho State Park both have solar installations. Projeto TAMAR works to protect sea turtles and runs a visitor's center that is a popular tourist site. Ideal Institute collaborated with the center to raise environmental awareness by installing a 3kW solar system. The panels were funded by the university and the previously mentioned Tractobel power company (regionally headquartered in Florianópolis). The Ekko Brazil Institute also partnered with the UFSC Strategic Research Center on Solar Energy to build a quite solar powered boat that could be used to conduct research on otters in Florianópolis. Religious centers such as the Antônio Vieira Association and the Dom



Orione de Capoeiras social assistance NGO have also installed PV systems in recent years.

### 5.3.3. *Private-sector organizations*

As found by Florida (1996), private sector organizations are active in the renewable energy arena with energy service companies (ESCOs), utility-scale energy companies, and real estate developers being the primary early adopters and drivers of the shifting energy landscape. Established energy companies in the area who have long dominated generation, transmission, and distribution of electricity are at the forefront of sustainability planning in some respects. Celesc, who holds the distribution concession for Florianópolis, has adopted a triple bottom line approach to strategic planning that includes social and environment considerations in addition to economic. The company appears to be initiating sustainability initiatives where the cost or commitment does not impact the traditional business model, but at the same time the extensive embrace of renewable energy and social outreach conveys a positive message that is in keeping with the highest global standards. Social outreach includes youth programs and rural assistance programs while environmental priorities include the Declaration of Climate Change, published in 2015, that outlines Celesc's activities to minimize the environmental impact of their facilities and expansion plans. Additional environmental programs include rehabilitation of degraded land, using equipment and products that have environmental certifications (when applicable), environmental education programs, and the provision of GHG emissions data through the Public Register of Emissions platform developed by the Brazilian GHG Protocol.

Celesc owns primarily small hydroelectric generation plants located throughout the State of Santa Catarina. The company has installed solar power generation in small isolated regions in the state, such as Arvoredo Archipelago, Campeche Island, and Guará Island, in order to substitute oil generators in community and tourist facilities. The solar system on Arvoredo Island was inaugurated in 2007 to supply electricity to the lighthouse. This installation was a multi-stakeholder collaboration between Celesc, Eletrosul, the Solar Energy Laboratory of the Federal University of Santa Catarina and the Navy of Brazil, with funding from the Ministry of Mines and Energy. In 2016, Celesc, in partnership with Governor Raimundo Colombo and the international energy company Engie, launched the Efficient Bonus Project (*Projeto Bônus Eficiente*) with the goal to install one thousand PV panels in homes throughout the state. The initiative is funded by the Celesc Energy Efficiency Program and aims to install 2.6 kW systems in residential units providing an estimated 60% discount in comparison to current market prices (Governo de Santa Catarina, 2016). Engie will be responsible for installing the photovoltaic system, monitoring performance, and providing specialized technical assistance. Engie is the parent company of Tractebel and has a regional office in Florianópolis. Owning the second largest solar photovoltaic park in Brazil, located in the nearby city of Tubarão, Tractebel acquired Araxá Energia Solar, founded in Florianópolis in 2011. Engie now owns 50% of Brazil's solar distributed generation capacity and plans to invest another R\$ 24 million in the sector.

Eletrosul, a subsidiary of Eletrobras founded in 1968, is headquartered in Florianópolis although their generation, transmission and commercialization activities are primarily located in the states of Mato Grosso do Sul, Mato Grosso, Pará and Rondônia.

The 1 MW solar plant of the Eletrosul headquarters sells power to the grid, but Celesc manages distribution. Eletrosul, owning wind, hydro and biomass facilities, conducts extensive research and development in the renewables sector and is active in forums and workshops related to renewable energy in the city. As suggested by Sovacool (2014), one pathway by which cooperative change can occur is through the consistent action of “niche” players who challenge incumbents, allowing change to emerge in the broader landscape level. In tandem with the increased adoption rate of DG is an accompanying growth in registered energy companies providing PV installation services. Locally headquartered energy service companies and sustainable construction companies in Florianópolis, all with their own solar units, include ECOMarchi, Quantum, PENSYS Tecnologia, and CarbonoBrasil. There are now over 1,500 companies working in the solar sector throughout Brazil with the Santa Catarina region registering the third highest concentration as seen in Figure 22 below (América do Sol, 2017).

Figure 22. Distribution and number of solar companies in Brazil (as of February 2017)

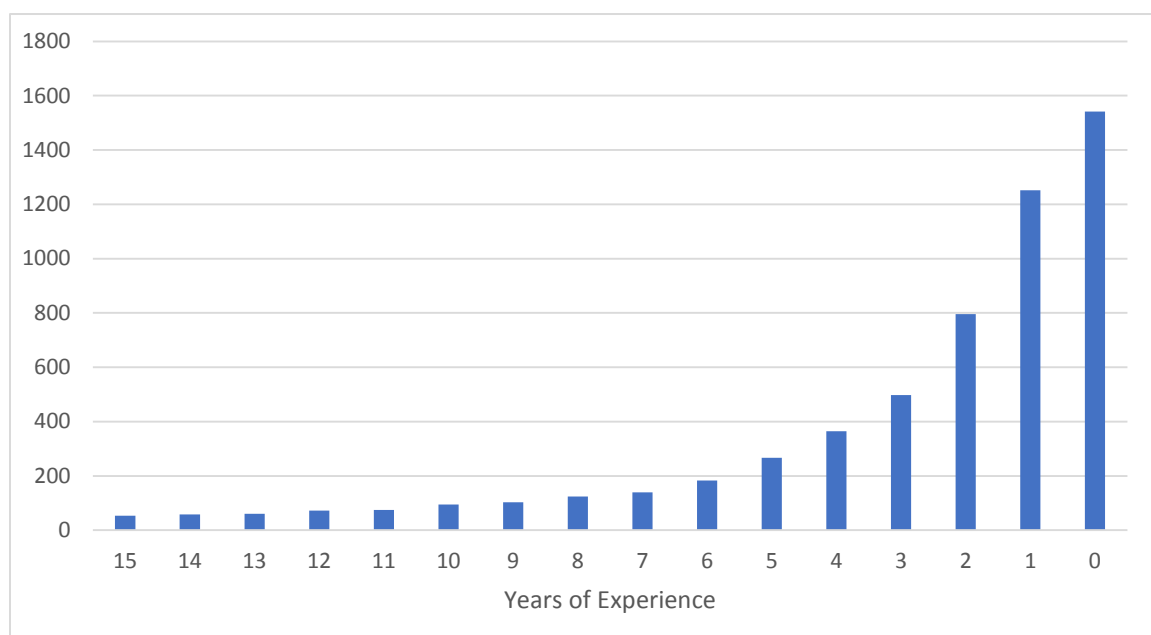


Source: América do Sol

The majority of these companies in the PV sector were founded following the passing of Law 482 in 2012 that established net-metering. Net-metering allows owners of

distributed generation units, usually solar, to be connected to the public power grid. By selling power to the grid, the owner of the DG unit can offset electricity drawn from the grid when the DG unit is not generating. In 2015, the companies represented all aspects of the value chain from manufacturers/retailers of PV modules and inverters (18%), designers (35%), and installers (47%) (Ideal Institute, 2016). Of the 1,541 registered solar companies, 1,274 were established within the last five years (82%). Companies established before the net-metering regulation were primarily servicing the market for solar hot water systems.

Figure 23. Number of registered solar companies in Brazil by number of years of experience (as of February 2017)



Source: América do Sol

New constellations of interaction and cooperation among various stakeholders are at the initial stages of emerging in the study area following changes in national level policies that establish net-metering. Although the legacy of the state utility company appears path dependent owing to established institutional patterns of electricity system

management and large sunken investments, the policy change that preceded the passing of Law 482 contributes to the erosion of the reproduction of the existing centralized power system and the emergence of novel arrangements. The regulation introduced by ANEEL in 2015 also allowed for shared generation encouraging communities to develop micro or mini-generation initiatives. Gated condominiums, a popular urban and suburban building style in Brazil, can now organize multiple investors to jointly own a shared DG unit. In 2016, GND Incorporadora, in Florianópolis, constructed several residential complexes with sustainability features, including solar power. GND's six-unit LeChamp Résidence, in Novo Campeche, and the ten-unit Sunset Cacupé Garden Residence in Cacupé are both solar powered. Hotels have also shown interest in solar distributed generation such as the Belluno Apart Hotel. Developers such as Habitasul, CFL, and Grupo Real Negócios Imobiliários have all either installed or sought proposals for large scale solar installations in Florianópolis (ANEEL, 2016; personnel communication, 2016).

#### 5.3.4. *Finance Institutions*

Exploration of social-technical systems requires an understanding of the role of financial investments and how such investments interact with governance variables. Of barriers to growth in the distributed generation and renewables markets, availability of necessary financing mechanisms is among the most important. Local governments around the world are implementing creative financing instruments to make progress toward sustainability targets. This section will address some of the financing challenges in the Brazilian market to identify policy solutions available to urban governments.

The National Bank for Economic and Social Development (BNDES) of Brazil has several lines of credit available from the Climate Fund that supports sustainable cities, climate change and renewable energy programs. Specifically, BNDES has offered financing for installations in hospitals, grade schools, and universities under the ProGD program. The ProGD program is part of the federal program to lower GHG emissions and meet global obligations by 2030. Following the passing of the net-metering regulation, the national government launched the program in 2015 to offer tax incentives and lines of credit (MME, 2015). Loans for residential solar were largely unavailable until 2015, leading many of the early adopters to self-finance. Loans are now available through several banks including Santander, Caixa, and Banco do Nordeste. Another federal program, the INNOVA ENERGIA program, provides subsidies for renewable energy or smart grid projects, as well as some low-carbon transportation initiatives. Tax incentives include exemptions from import taxes or state taxes such as the ICMS sales and services tax (*Imposto Sobre Operações Relativas à Circulação de Mercadorias e Serviços de Transporte Interestadual de Intermunicipal e de Comunicações*), although Santa Catarina is not one of the states that is exempting solar energy from the ICMS.

Another challenge to solar adoption in Brazil is the 14% import tax on PV installation equipment. Some tax exemptions for solar equipment imports were passed (ranging from 2% - 10%) for equipment that is not manufactured domestically. Although there is political support for lowering the tax to 2%, there is no projected timeline for approval of the reduction. BNDES financing, under the Climate Fund, is determined in part by the degree to which locally manufactured equipment is used. Loans that cover up to 65% of project costs can be increased to 80% of project cost with the use of local

content.<sup>65</sup> While new manufacturing companies for solar components are beginning to emerge, there is still an inadequate solar value chain infrastructure to support the projected market growth. The expense of imported equipment and delays in the opening of local manufacturing companies contributed to the inability of many of solar contracts from solar auctions to reach financial close. The MME may cancel solar power purchase agreements, representing 670 MW, after six companies have requested more time to develop the projects (Spatuzza, 2016).

The net-metering law, revised in 2015, now allows for the sale of electricity to the grid in exchange for credits that can be used to pay for future electricity bills (within a five-year limit) or for payment of electricity charges at another property belonging to the same person or community that earned the credits. While the law does not provide cash payments for energy sold to the grid, Caixa Bank has initiated an innovative means by which low income families can earn cash instead of credits. For example, in the Praia do Rodeadouro and Morada do Salitre neighborhoods of Juazeiro, Bahia, the energy generated by the residents is purchased by Caixa Econômica Federal for use in its agencies allowing residents to use cash to meet other needs beyond the cost of electricity (Greenpeace, 2014). Caixa is itself transitioning to solar power in 168 of its locations nationwide.

In the case of the statewide solar PV initiative of Celesc, the one thousand PV systems, requiring a total investment of R\$ 17 million, will be 66% funded (R\$ 11.3 million) from Celesc's Energy Efficiency Program. The remaining R\$ 6.7 million will be

---

<sup>65</sup> For PV, the BNDES methodology lists components that are required, optional and premium for meeting the local content requirement. BNDES also has an accreditation system for local suppliers (IRENA, 2015).

invested by customers who purchase the system, either self-financing or by taking advantage of the above-mentioned financing sources. Each consumer will be required to invest R\$ 6,680 thousand with the balance of the R\$ 20,000 unit subsidized by Celesc.<sup>66</sup> The return on investment, for customers, is three to four years for a unit that provides 280 kWh per month (based on a cost of R\$ 0.60/kWh) (Governo de Santa Catarina, 2016).<sup>67</sup> As mentioned previously, unused electricity is sold to the grid for credits. The credits can be applied to future power bills, within a five-year period, either at the residence the power was produced or another residence under the same ownership.

Development finance institutions (DFIs) are an important variable in unlocking needed capital and accelerating adoption of new technologies. In Florianópolis, at the headquarters of the energy company Electrosul, the previously mentioned utility-scale solar pilot project was constructed with support from GIZ. GIZ continues to support the renewable sector in the area through technical assistance and funding for collaborative forums. The diversity of actors in the distributed generation sector was demonstrated in the 6<sup>th</sup> Energy + Clean Seminar, held in 2015, that was organized by the Ideal Institute with support from GIZ, the Regional Development Bank of the South (BRDE), Araxá Energia Solar, Solar Energy of Brasil, Celesc, Caixa, Eletrobras, Eletrosul and Tractebel. Other institutions that were involved in the Seminar included Environmental Energy (*Ambiente Energia*), the Electric Energy Trading Chamber (CCEE), the Brazilian Wind

---

<sup>66</sup> The average price installers charge for a system (less than 5kW) was R\$ 8.58/Wp in 2015 (Institute Ideal, 2016).

<sup>67</sup> Program participants must have a minimum area of 20m<sup>2</sup> unshaded area available on the roof for installation, have a north facing roof (with a +/- 30° deviation allowed), have a roof slope of 15° to 25°, and have an average consumption of more than 350 kWh in the last 12 months.



Energy Association (ABEEólica), the Brazilian Association of Energy Marketers (Abraceel) and the Brazilian Council of Sustainable Construction (CBCS).

The above review identifies the strategic action field of local firms in the study area that has initiated a trend toward selecting smart growth technologies and an environment that fosters interest in locally generated energy. The review also highlights emerging trends towards distributed forms of energy generation and the challenger/incumbent dynamic between DG companies and the regional distribution company. Increased adoption of distributed forms of renewable energy will require changes in the physical infrastructure as well as the co-evolution of related regulations, policies, business practices and behaviors of a new class of producer/consumers. Evaluation of strategic action fields over time provides critical insight into the ways in which the governing structures in the energy sector may or may not be yielding to increasingly polycentric forms of action in Florianópolis.

While the above description of the field of actors engaging in the energy sector in Florianópolis is not exhaustive, it is illustrative of a rising trend. The individuals and organizations influencing the energy sector are catalyzing the creation of a very different energy management structure for the local system that is a significant departure from the centralized form of energy provision that dominated the past century. Actors engaging in the pursuit of a common goal across multiple levels of governance, across international borders, and across public and private spheres highlight the need for a unifying management body at the local level to provide oversight of energy infrastructure as the position of the incumbent begins to erode. The actors with influence over urban strategic energy planning, in the case of Brazil, have a compelling mix of motivations and

tolerance for long term planning, both in ability to finance sustainability programs at lower return thresholds and with longer time horizons. In the case of Florianópolis, locally headquartered energy companies, technology companies, and private individuals are collectively acting to dynamically change the municipal energy market and diversify the local energy mix.

#### **5.4. The Market: System, State and Social**

The SES framework is useful in its ability to organize critical variables that relate to ecological, social, and environmental linkages and to capture issues of scale and behavioral logic. Important variables identified in this research that impact the ability of actors to influence the action situation toward sustainable outcomes include their past experiences (and exposure to national and international currents of norm diffusion), leadership qualities (to engage the public in information sharing, networking, and lobbying), and access to new technologies and technological competence. However, one weakness of the SES framework in the analysis of social-technical systems is the need to account for market interactions and outcomes. In Chapter 4, the SES framework was applied to public lands, and therefore land that is, through legal means, resisting commodification. The electricity system provides a commodity and facilitates the interactions of producers and consumers via the market. Actors engage with each other according to the guiding principles and logic of the market and the institutions they represent. These interactions determine the emergent properties of the system, as well as the co-evolutionary dynamic of the market and the state, as aptly described by Polanyi (2001). This section addresses the role of each of the first-tier variables of the SES framework (governance system, resource system, and actors) and the key second-tier

variables that influence decision-making on the adoption of renewable distributed generation technologies in the study area. The concluding section considers the implications of these findings on the institutional environment.

#### *5.4.1. Local Regulations and Energy Tariffs*

For the past century, energy companies in Brazil have been subject to path-dependent behavior and lock-in given the long-life span of hydroelectric and thermal electricity plants. This pattern is beginning to change as national level policies on renewable energy have helped new technologies reach grid parity and smaller distributed generation units enter the market. The traditional energy system paradigm includes the four subsystems of generation, transmission, distribution, and utilization. The emerging paradigm is characterized by increasing numbers of producer-consumers who own and operate small sized renewable generators, either single units or in the form of mini- or micro-grids. The resulting bidirectional power flows shift the historical organization of the subsystem in which generation is dominated by a small number of large-sized regional power plants. This new arrangement requires greater local level governance oversight regarding market formation and an emerging decentralized decision-making network.

In formulating a conceptual framework for the evaluation of regulatory systems in the provision of water and electricity services, Jarvis and Sovacool (2011) suggest the design of a regulatory system should mitigate political risk and opportunistic behavior by the government as well as decrease uncertainties for the investor and establish administrative procedures for review of disputes or unforeseen externalities. These authors suggest credible regulatory governance requires capacity, accountability,

transparency, and participation. The local government in Florianópolis will need to craft an institutional response to new federal energy policies and changes in the DG market. The current rate of DG adoption is outpacing the ability of the local government to establish efficient and effective governance oversight and support. As discussed above, local authorities have some authority over laws and regulations in support of municipal level energy initiatives. For example, local control over taxes and incentive structures play a key role in local adoption patterns. In addition, the co-evolution of local level municipal capacity is necessary to avoid some of the problems faced by other markets during the adoption phase such as permitting and inspection guidelines and safety standards.

Despite the rise in adoption rates of DG, grid based power will remain a predominant source of electricity for much of the population for years to come as hydroelectric plants have 50 to 100-year life spans. As a result, rates will likely continue to be controlled at the federal or state level. Electricity rates are one of the primary considerations in the adoption of distributed generation as the cost of power determines the payback period and the return on investment. Electricity rates are set by the Brazilian Electricity Regulatory Agency (ANEEL) that is responsible for setting fair prices based on the cost of generation, transmission, and distribution as well as taxes and other electricity charges. Hydroelectric power generation is one of the most cost competitive generating options, however, tariff rates in Brazil are among the highest in the world (FIRJAN, 2016). The price of electricity is set by the auction price and by the variable costs of generation. Average tariffs by consumer class and region are summarized in Table 10.

Table 10. Average tariff rate by consumer class and region (as of September, 2016)<sup>68</sup>

<b>Consumer Class/Region<sup>69</sup> (R\$/MWh)</b>	<b>Brazil</b>	<b>Central-West</b>	<b>Northeast</b>	<b>North</b>	<b>Southeast</b>	<b>South</b>
Commercial, Services, and Other	449.36	535.43	413.03	466.57	452.48	422.37
Own Consumption	464.02	464.02	464.02	464.02	464.02	464.02
Public Lighting	265.30	314.11	246.86	282.25	270.35	239.24
Industrial	392.63	450.26	344.53	390.48	413.32	372.89
Government	455.84	503.69	423.01	453.78	465.85	442.99
Residential	459.06	568.26	408.44	470.52	467.47	431.90
Rural	328.01	392.44	317.81	352.42	338.70	284.02
Rural Aquaculture	234.37	199.07	229.80	367.99	351.47	265.44
Rural Irrigation	261.59	295.72	194.22	237.03	307.07	360.94
Public Services (Water and Sanitation)	346.61	419.06	300.72	357.75	364.79	319.41
Public Services (Electric Grid)	375.38	422.85	306.94	0.00	377.26	410.98
Total	499.40	373.88	439.87	435.46	390.68	390.68

Source: ANEEL Generation Information (2016)

Between 2010 and 2016, the tariff rate increased 38.8% on average for the country while the Consumer Price Index increased 48.3% and the minimum salary 72.5% (ANEEL, 2016a). Tariff rates for the industrial sector in 2015 were dominated by the cost of generation (56%), followed by taxes (27%) and sector charges (4.5%) (FIRJAN, 2016). Sector charges are allowable by law for the remuneration of sector initiatives such as the Electric Energy Services Inspection Fee, the Alternative Sources of Electric Energy (PROINFA) program, research and development, energy efficiency initiatives, and the National System Operator (ONS). The federal and state taxes are the cost of the Social Integration Program (PIS), the Contribution for Social Security Financing

<sup>68</sup> The exchange rate on September 1, 2016 was 3.25 BRL to 1 USD.

<sup>69</sup> The 26 states of Brazil and the Federal District are divided into five regions: Central-West (the states of Goiás, Mato Grosso, Mato Grosso do Sul, and Distrito Federal), the Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe), the North (Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, and Tocantins), the Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo), and the South (Paraná, Rio Grande do Sul, Santa Catarina).

(COFINS), and a state tax on sales and services (ICMS), which varies by state. Electricity tariffs were raised in recent years in response to a drought that occurred between 2012 and 2014. With reservoirs at all-time lows, tariffs increased as much as 40% as operationally expensive thermoelectric plants were used to meet demand. Above average rainfall in 2015 refilled reservoirs. Distributors, who normally operate according to long-term projections based on power purchase agreements, were selling surplus electricity in the spot market, which experienced a crash as a result of the surplus electricity. Brazilian regulation allows distributors to pass-through power purchase costs to consumers, which has kept power bills high despite the return to hydroelectric generation.

The cost of utility-scale solar is considerably less than the rates listed above making the inclusion of solar in the portfolios of energy companies an attractive option. For residential and commercial distributed generation units, taxes can be charged on the electricity generated. Brazilian states adopted the ICMS Agreement (16/2015) of the National Finance Policy Council (*Conselho Nacional de Política Fazendária - CONFAZ*) that exempts the power generated from DG systems from the ICMS tax. At the time of writing the State of Santa Catarina was not among the 21 states that were already party to the agreement. Additionally, according to Law 13169/2015, the Contribution to the Social Integration Program and Civil Service Asset Formation Program (PIS/PASEP) tax and the Contribution for Social Security Financing (COFINS) are not levied on DG. The federal level Brazilian Revenue Service as well as State Finance Departments determine the fees and taxes to be levied on DG.

#### 5.4.2. *Strategic Action Fields and Social Capital in the Energy Sector*

Urban areas around the world are experiencing shifts in the provision of electricity that appear to be trending toward increased adoption of decentralized generation and an accompanying moderate loss of revenue for centralized or monopolistic energy providers (CEEESA, 2016). In the strategic action field of the energy sector, the incumbent is the state-level distributor who acts in accordance with federal laws and regulations that structure the sector. This arrangement has created a relatively stable energy sector for much of the past 50 years. Actors interacting in the energy system are influenced by institutional rules, regulations and tariffs described in this chapter, as well as by social and cultural norms. New technologies and innovations in the sector present new opportunities and create a dynamic environment with continually changing patterns of interaction. Local level effects of federal laws and regulations, such as net-metering laws, should be considered in terms of the effect such actions have on constellations of relations between political leadership, energy firms, non-governmental organizations and the public at large. The passing of laws favorable to renewable technologies, such as Law 482, works to destabilize the dominant player as well as disrupt established socio-economic loyalties and political alliances among the business elite. The procurement process for local infrastructure projects often lacks transparency and energy projects tend to be awarded to those energy sector actors with established socio-political alliances. The combination of access to off-grid technologies, with laws that offer financial incentives for adoption, effectively devolves system control to the public. This devolution, especially when combined with the creation of enabling financial products, can hasten adoption of new technologies.

An under-represented factor in the process of energy sector transition is the role of collective action. Fligstein and McAdam (2012, p. 20) suggest “the hallmark of a true episode of contention is heightened interaction involving the use of innovation and previously prohibited forms of collective action (e.g. *innovative action*) [emphasis in original].” Transition is dependent on a population of people willing to take advantage of the devolution of system control. As described in the previous chapters, Florianópolis is a dynamic city seeking to leverage its cultural, natural, and human capital to grow the local economy. As written by the FloripAmanhã association:

“In the knowledge society, artistic, cultural and other productive activities linked to the vocations of Florianópolis, such as tourism and technology, are gaining importance. To optimize this DNA, FloripAmanhã seeks to stimulate the creative economy and culture of cooperation between government, corporations and organized civil society, the foundation of a creative city (FloripAmanhã, 2017).

In promoting sustainable growth in the city, FloripAmanhã works to bring firms working in sustainability, tourism, and technology together in support of key strategic actions such as the consolidation of support for the Municipal Law of Innovation (17/04/2012). This section considers the origin of the social capital that was a key component in the adoption of energy innovation in Florianópolis.

Clemens (2007, p. 542), writes “the appearance of new locations of intensified social relations and new cultural and organizational technologies of collective action signal possibilities—if far from certainties—of significant social reorderings.” As discussed in Chapter 3, locations of “intensified social relations” included the newly emerging technological parks in Florianópolis in the 1980s that were supported by state level politicians and non-profit organizations emerging from the Federal University of Santa Catarina. The Government of Santa Catarina supported technological development at the state level through programs such as Invest SC, innovation centers managed by the



State's Secretary of Sustainable Economic Development (SDS), the Innovation Program (including Generation TEC and Sinapse of Innovation), as well as through financial support from the Regional Bank for the Development of the Extreme South (*Banco Regional de Desenvolvimento do Extremo Sul - BRDE*). The state government also continues to provide tax incentives for technology companies that manufacture hardware. The previously mentioned CERTI Foundation and ACATE have been pivotal in laying the foundation for the development of Florianópolis as a technological hub. Both organizations include energy among their strategic focus areas and the CERTI Foundation additionally has technological competencies in the areas of sustainable energy and the green economy (CERTI Foundation, 2017). The newest technological park, Sapiens Park, is located in the north of the island and encompasses 435 hectares able to accommodate over 200 companies and is already home to the previously mentioned UFSC Center for Solar Energy Research and Training.

As summarized by Schneiberg and Clemens (2006, p. 205), Davis and Greve (1997), in their study on the rise of new communities of practice, found “new practices and standards crystallized and diffused among *socially proximate* [emphasis in original] subgroups of firms linked by interlocking directorates or geographical propinquity.” Florianópolis, with its historically robust environmental movement and density of technology companies developing innovative products and seeking new ways to deploy products in the local market, is proving to be an ideal environment for experimentation in sustainability. As stated by Bulkeley and Broto (2013, p. 363), analysis of climate governance

needs to consider how, why and with what implications projects and measures undertaken in the name of climate change may intervene in the city. We suggest that such interventions might fruitfully be considered in terms of experiments, partly in order to

signify their potential but more significantly to recognise their often tentative nature, the sense of testing or establishing (best) practice that frequently accompanies their development, and the ways in which they are used as a means of supporting or contesting knowledge claims and discursive positions (see also Evans 2011; McFarlane 2011). Here, we do not use experiment in the formal scientific sense of the term but rather to signify purposive interventions in which there is a more or less explicit attempt to innovate, learn or gain experience.

Sustainability is intrinsically a transition away from certain aspects of the status quo, that have come to be understood as problematic, towards something new. As such, innovation, creativity, and a tolerance for experimentation is a requirement of transition. The technology sector in Florianópolis represents one strategic action field that is characterized by actors responding to regulatory and financial incentives to develop innovative products. Green energy technologies and services emerging from the sector are being embraced by technology innovators eager to modernize, environmentalists looking for new ways to act on philosophical and political ideologies, and real estate developers seeking reliable and cost-efficient energy sources and green marketing. As suggested by Clemens (2007, p. 535), “the existence of multiple, overlapping networks also constitutes a space for strategic action.” As discussed in the preceding sections, the national and state governments regulate and structure the energy market. However, collective action should be underscored as a key factor in market formation.

In studying the growth of the distributed solar market in Germany, Dewald and Truffer (2012) found differential market growth patterns were only partially attributable to geophysical conditions and national incentive structures. These authors write:

We argue that the local market formation processes supported by local citizen associations provided the necessary background for a successful market formation process to occur...The ability to mobilize such a broad social movement and to overcome the different innovation problems was highly dependent on their focus on the local context. This focus enabled the formation processes to benefit from specific institutional structures (including cultural and cognitive institutions), networks and actors. In summary, we claim that local market formation processes not only provide an “additional” explanatory factor, but also that they represent the “very basis” on which the

more formal incentive structures depended in order to deploy their effectiveness (Dewald & Truffer, 2012, p. 416).

The role of strategic action fields, and the social networks they represent, is increasingly understood to be a critical element in achieving sustainable development outcomes

(Adger, 2003; Dillard, Dujon, & King, 2008; Macbeth, Carson, & Northcote, 2004).

Although the methodology applied in this dissertation does not include the measurement of quantitative or cultural factors, careful review of discursive output in the period under review (including municipal records, media interviews, and first-hand accounts) helped to develop a picture of the dominate institutional and cognitive logics driving local decision making in the energy sector. The implications of the growing local market for distributed generation in Florianópolis are summarized below.

### **5.5. Key Findings**

Transitioning an urban environment toward sustainability requires: (1) technological innovation (such as energy conservation, emission reduction, and direct improvement on environmental quality), (2) institutional innovation in terms of formal government organizations and social norms, and (3) green business model innovation such as green production and consumption innovation, green managerial innovation (Fei, Wang, Yang, Chen, & Zhi, 2016). The preceding sections explored higher-order factors, such as government laws and regulations as well as financing, that influence the field of strategic actors in the study area, both those with a legacy of energy sector engagement and newly emerging actors. Given the specific institutional practices that both propel and constrain energy sector innovation, the challenge for cities such as Florianópolis is in identifying a coherent development pathway that allows for the reproduction of

sustainable outcomes given the growing level of heterogeneity among energy sector actors.

As stated by Schneiberg and Clemens (2006, p. 196), “institutional theory requires more direct investigation of how alternatives are culturally constituted, how choices among alternatives are contested or justified, and the processes by which the range of ‘thinkable alternatives expands and contracts over time and across settings.’” A historical institutional approach to understanding sustainability outcomes in the energy sector allowed for a deeper understanding of how demographic sub-groups come to share social, political, or cultural orientations over time in a way that shapes the growth trajectory. The choice of the local government to pursue a dual strategy that leveraged technology and amenity-led growth gave rise to specific conjunctures and the emergence of a distinctive development trajectory that opened the possibility for certain outcomes that are today synonymous with sustainability.

#### *5.5.1. Market Implications*

The recent crisis and corruption investigation involving Petrobras, that holds a monopoly on natural gas, has led to an interest in promoting greater competition in the market to protect against price volatility. Additionally, the drought highlighted the need to diversify electricity generation and expand the share of renewables in the energy mix. Considering the increase in interest in residential and commercial solar installations at the local level, Florianópolis is pursuing energy efficiency upgrades and using renewable sources to meet current demand. As demand grows, Florianópolis will need new capacity. The formation of a local market for DG has given rise to new possibilities for the city to meet growing demand in innovative ways. By meeting growing demand using residential

solar and community micro-grids, the carbon footprint of the city (that is high primarily because of the power consumed from the nearby thermoelectric complex) could be lowered.

This shift in the local supply of electricity has several market implications. In paraphrasing Adams (1996), Clemens and Cook (1999, p. 458) write “new opportunities for economic exchange among actors at the periphery erode the capacity of central brokers to exercise control through their monopoly on trade.” As the ability of the utility companies to control the market begins to erode, there is an opening for other organized actors to gain control. As found by Fligstein and McAdam (2012) in their review of the savings and loan industry in the United States, the dominate market player structures the strategic action field through the strategies and tactics they employ. Real estate developers are well positioned to take advantage of the market opening given their position of political privilege and ownership of the infrastructure and land needed for the installation of DG technologies. The linking of real estate markets and solar power generation is just beginning to be explored globally as distributed generation assets become more widespread. Compelling aspects of the real estate/energy generation market linkage that require additional research include the capitalization value of green real estate holdings and the impact land and energy market convergence will have on long term development in terms of sustainability.

Although the local distributor, Celesc, is initiating state-wide solar PV programs, electric utilities globally have largely refrained from investing in distributed generation as standard business models generally view the investment as having low returns and higher risk (DOE, 2007). With incentives for customer-owned distributed generation more

compelling than utility-owned distributed generation, individuals, and community solar initiatives (either developer owned or through co-operative arrangements) have become the dominate pathway to adoption. With the number of contractors specializing in sustainable construction increasing in Florianópolis, the availability of solar distributed generation units and energy efficiency amenities at the building stage (rather than as a retrofit) will likely continue to propel local adoption. Financing is available for new energy efficient construction through various programs of Caixa Bank, such as ProGrid and Casa Azul, enhancing the ability of a residential consumer to self-finance.

There are several compelling financial benefits for commercial and residential DG adopters in Florianópolis. For example, buildings often increase electricity consumption in the high season summer months when daytime use of air conditioners is more common. In analyzing the local distribution feeder connected to the building integrated PV system located at UFSC, Rebechi (2008) concluded that not only did the unit provide peak-shaving capability, but that similar units on the houses connected to the distribution feeder would be able to provide between 12% and 40% of total demand. The balance of the demand would fall to the utility owing to the diurnal fluctuations of solar PV without storage. Globally, utility companies have taken the position that traditional grid networks are not well equipped to manage the dramatic increase in demand in the evenings when generation switches from solar PV to baseload generation (California ISO, 2016). Options available to municipalities to assist utilities in grid management include requiring solar storage capacity in tandem with solar installations (provided market penetration of storage technologies follows projections for the coming years),

solar hot water system ordinances such as passed in São Paulo, and support for energy efficiency programs that target peak load times.

In addition to savings in electricity costs, residential and commercial purchasers of DG technologies may increase the value of their properties (Bloom, Nobe, & Nobe, 2011; Dastrup, Zivin, Costa, & Kahn, 2011). Owner-financed distributed solar units are an attractive option for real estate developers who have sufficient up-front financing and value long-term energy independence. Solar hot water and solar power in residential developments, given the predominance of gated communities and secure condominiums in Brazil, is an attractive amenity. The developer of Jurerê International, Habitasul, invested in a privately managed water and sanitation system after the Governor denied service expansion to the area. The private system has proven to be a sought-after amenity for the development. The water quality is higher and the coastal water rarely tests positive for contaminants indicating the privately managed vacuum sewer collection system is performing better than the municipal service operated by CASAN.

#### *5.5.2. Implications for Local Energy Planning*

Increasing the share of locally generated power has the potential to reduce transmission costs, lower the urban carbon footprint, help meet growing energy demand, protect from volatile international energy markets, offer peak shaving sources, serve as redundant power sources for critical infrastructure, and serve as emergency power units. However, transitioning urban energy systems face challenges in the adoption and integration of new modes of energy generation, distribution, management, and regulation. As described in this chapter, the local energy system is characterized by competing market logics, traditionally centralized decision making, and competing development

priorities. These factors impede the ability of decision makers to clearly identify problem areas and articulate a local level energy sector development agenda.

As federal net-metering laws have significantly increased both the adoption of residential and commercial solar distributed generation technologies as well as solar energy service companies, municipal authorities can build on this momentum and use ordinances and financial incentives to encourage programs related to air quality, solar hot water heating, and distributed generation. The electric rate structure is favorable to DG and regulatory incentives, such as tax exemptions, are in place to incentivize the market. However, despite the opening of the solar market as a result of federal laws and regulations, the current economic recession has limited available sources of financing and contracted the pool of individuals and companies willing to invest in equipment with a large upfront cost.

Previous studies have found that cities that lead in implementation of energy plans are characterized by clearly defined linkages between GHG inventories and climate action plans and that indicators are routinely measured and reported (NREL, 2016). The Municipality of Florianópolis has an underdeveloped practice of tracking sustainability indicators although the practice has been adopted in some sectors because of the previously mentioned IDB Emerging and Sustainable Cities (ESC) initiative. Globally, several initiatives have been implemented to assist local level decision makers in establishing a set of indicators that can help in setting goals, prioritizing focal areas, implementing programs, and evaluating outcomes. For example, the Cities-LEAP program of the National Renewable Energy Laboratory (NREL) promotes standardization and analysis of local energy data using a basket of tools such as metrics



mapping and guides for the development of local energy infrastructure. The IDB ESC initiative identified a similar need among mid-sized cities in Latin American and Caribbean nations. The technological and engineering challenges that are emerging as a consequence of generation and scale diversification are beyond the scope of this research except to note that co-evolving systems do require costly technological innovation in grid management as emerging factors such as equipment compatibility, weather patterns, smart grids, and cyber security become more critical.

#### *5.5.3. Institutional Implications*

As stated by Fligstein and McAdam (2012, p. 22), “In rare instances... oppositional logics may carry the day as challengers successfully sustain mobilization and slowly begin to institutionalize new practices and rules.” Energy systems are composed of infrastructure and accompanying management systems that are characterized by relative stability with punctuated periods of dynamic adaption of new technologies over the long term. This research suggests the ability of a municipality to transition to systems that are more sustainable will depend in part on the capacity of institutions to foster effective cooperation between the energy stakeholders described in this chapter, to develop effective management strategies, and to regulate an energy market that is increasingly linked to the real estate sector.

Institutionalists have found that during periods of emergence, there can arise skilled social actors who become “institutional entrepreneurs” (Fligstein & McAdam 2012; Swidler, 1986). New forms of collaboration in the energy sector, as described throughout this chapter, are driven by such entrepreneurs. For example, the Ideal Institute works to foster collaboration between municipal authorities, energy firms and NGOs and,

in doing so, is driving institutional innovation toward forms of polycentric management. There are numerous examples of the ways international organizations, municipal networks, and local actors interact in support of local level energy initiatives. These collaborations resulted from the high concentration of research centers and energy companies located in the study area combined with a response from the real estate sector to explore solar distributed generation following the passing of Law 482. This knowledge spillover continues to influence the way in which local developers and residential consumers view innovation in the electricity sector.

While having personal or community based electrical power sources can support sustainable growth, there remains a need for a governing body to safeguard and ensure the competence of the overall system on behalf of the collective interest and to evaluate initiatives over time to ensure goals are being met and any potential negative externalities are minimized. In this regard, municipal governments are well served by creating institutional capacity for evaluation of energy and sustainability indicators and for establishing governing councils for strategic energy planning in collaboration with public and private stakeholders.

As the electricity system in Brazil is regulated at the federal level, there are no established oversight entities such as the Board of Utilities found in the United States. Institutional interaction and co-dependency across multiple levels and between linked systems will challenge effective governance both during the transition to low carbon energy systems and in the management of a diverse energy mix, distribution innovations, and smart city platforms. Municipal authorities have a role to play in the standardization and rationalization of the sector by establishing standards oriented to meet the specific

needs of generator/consumers such as clarity on interconnection standards, installation guidelines, feasibility reports, and inspection of installed systems. According to the Distribution Procedures (PRODIST) linked to Law 482, distributors must process grid access applications, inspect the installation, submit inspection reports, approve the connection, and establish the connection within 34 days (Ideal Institute, 2016). Many distribution companies are still adjusting to the requirements of the DG market and average time for connections to be established in 2015 was three months and three weeks. Globally, local level governments have rationalized DG technology by supporting procedural support in terms of building codes and permitting as well as identifying financial solutions for distributed solar installations through programs that tax residents in support of renewable energy projects (NREL, 2016). More research is needed on the effectiveness of such programs as well as the ability of plans to reach implementation and maintain political support despite changes in local leadership.

Establishing institutional structures for collaboration, as well as mechanisms for conflict resolution, will help safeguard the public from market based decision-making that undermines the unique status of a social-technical system that serves a public good. New use-values that emerge from integrating energy services in urban buildings, such as peak shaving or reserve resources, warrant further research. Micro-grids additionally offer greater resilience to storm, and other weather, events given the vulnerability of coastal areas. Risk and vulnerability considerations, and climate change adaptation planning in the energy sector, are discussed in greater detail in Chapter 6.

## CHAPTER 6: EQUALITY, SUSTAINABILITY, AND RESILIENCY

This dissertation is an exploration of the urban growth trajectory in Florianópolis and the mechanisms by which certain sustainable practices emerged and became institutionalized. The urban processes that have been identified as sustainable in Florianópolis suggests that the amenity-led growth model can work toward sustainable outcomes in the short-term. In considering the theoretical interest in institutional reproduction and duration, Clemens (2007, p. 533) writes “rather less attention is directed to explaining duration than change or novelty.” This chapter considers the question of institutional durability in the reproduction of sustainable urban form as increasing migration into Florianópolis is resulting in an increase in demand for housing and growing *favelas*. Public land in the city is under pressure from both pro-growth developers and the landless poor who encroach on its borders. As described in Chapter 4, one means by which land preservation was accomplished in Florianópolis was by aligning the interests of a range of different strategic action fields (private, non-governmental, and governmental). This chapter takes a deeper look at the nested variables at play with-in the second-tier variable *socioeconomic attributes* in the SES framework. The systemic housing deficit is a threat to equality, sustainability, and safety. This chapter also considers how aligning municipal initiatives can help consolidate strategic action to meet multiple interdependent goals toward greater housing equality, land preservation, and disaster preparedness.

Section 6.1 begins with an overview of the impact of the housing deficit and the efforts to regularize informal settlements built in high risk areas of permanent preservation. The importance of addressing the issue of informal settlements in terms of

safety and disaster planning is reviewed in Section 6.2 as well as the current capacity for disaster response in the study area. The sensitivity and vulnerability of the island's residents to storm and flooding events, and the integration of an adaptation agenda as a part of strategic sustainability planning, are considered in Section 6.3.

## **6.1. Housing, Equality, and Environmental Justice**

### *6.1.1. Neighborhood Regularization*

The housing deficit for Florianópolis was estimated to be 14,428 in 2010 (Ministerio das Cidades (MC), 2013). Although the city made strides in addressing the deficit between 1976 and 1986, investing heavily in the construction of over 7,000 low-cost housing units, the recession of the early 1990s reduced funding in the sector. Renewed investment between 2000 and 2007 resulted in over 2,000 new low-income units. Despite funding constraints, municipal authorities are taking steps to regularize both informal settlements and unregistered property and buildings. A program was launched in 2014 to regularize more than 50,000 properties in the city with buildings constructed outside of the normal permitting and approval process (Noticias do Dia (ND), 2014). Regularization of informal settlements is the responsibility of the Municipal Secretariat of Housing and Environmental Sanitation (SMHSA). The National System for Special Interest Housing (SNHIS) was instituted in 2005 to implement the federal low-income housing policy. The SNHIS centralizes low-income housing programs previously administered by several federal-level departments including the Ministry of Cities, the National Social Housing Fund, Caixa Bank, and the Council of Cities. Financing is provided by the National Social Interest Housing Fund (FNHIS) as well as by state-level housing funds (FEHIS) and municipal-level housing funds (FMHIS). The FMHIS

renovates and constructs low-cost housing, either as part of the federal Residential Lease Program (PAR) or with city funding. Publicly financed housing already built in Florianópolis has been funded through various federal and state programs such as the First State Housing Plan (created in 1979) as well as the State Fund for Popular Housing and Sanitation (1993) and the State Popular Housing Fund (1995), both created following the closure of the National Housing Bank in 1986. The state-owned Housing Company (*Companhia de Habitação – COHAB*) was also a source of financing, but may close in 2017.

In 1999, the Center for Metropolitan Studies (CEM) of the Brazilian Center for Analysis and Planning (CEBRAP) ranked the municipal authorities in Florianópolis as a three, on a scale from 1 to 10, in terms of municipal capacity to implement housing policy. Following this ranking, municipal authorities established the SMHSA in 2005 that then oversaw local level legal and institutional changes. The city has, overall, made significant advancements in the past decade in addressing the social and environmental issue of informal housing. There are currently 25 regularization programs underway, primarily in the central district in the Morro do Cruz area. Specific examples include the initiation of a housing initiative in the Serrinha neighborhood (Morro do Cruz) in which municipal staff surveyed land and registered over 400 households in an area at high-risk for landslides. Another area prioritized by the SMHSA is the Siri favela described in Chapter 4. The community has been in negotiations with the city regarding relocation since the 1990s.

Figure 24. The Siri neighborhood built on dunes (left) and the Serrinha neighborhood after landslides in 2015 (right).



Source: Cristiano Estrela / Agencia RBS (Siri photo), Neighborhood Association of Serrinha Facebook page

The SMHSA Municipal Plan for Social Interest Housing (2011) is a housing plan targeting individuals who make up to three times the monthly minimum wage (R\$ 937 as of January 1, 2017 – US\$ 288). With CONAMA Resolution 369 (2006) allowing for areas of permanent preservation (APP) to be used for the purpose of low-income housing, the Municipality of Florianópolis has rezoned certain areas to be Areas of Social Interest (*Áreas Especiais de Interesse Social – AEIS*) in the Master Plan. AEIS are often areas in which low-income residents live in informal settlements on protected land. The first area to be regularized under the new regulation for AEIS (Complementary Law 195, 2005) was the Chico Mendes neighborhood. The neighborhoods of Panaia, Fabiano de Cristo, and Boa Vista followed in 2007. Another planning tool, the Special Social Interest Zone (*Zonas Especiais de Interesse Social – ZEIS*) was used to begin regularization of Morro do Cruz, just east of the city center, in 2005. Under the ZEIS program residents living in APP areas cannot be forced to move and city officials have the authority to re-zone land

so that residents are afforded the minimum 250 m<sup>2</sup> lot on which to live, although no land title is granted. The AEIS and ZEIS are the primary instruments by which city officials have control over the balancing of social and environmental rights with economically beneficial urban growth.

In Florianópolis, the Municipal Fund for Social Integration, established in 1989, is linked to the Municipal Council for Housing and the SMHSA. It was established primarily to fund low-cost housing. The budget of the Municipality of Florianópolis receives its revenue primarily from city service taxes (*Imposto sobre Serviços – ISS*) and real estate taxes (*Imposto sobre a Propriedade Predial e Territorial Urbana – IPTU*) (42%) as well as from transfers from sources such as the state sales and service tax (ICMS) (10%), and the federal Municipalities Participation Fund (FPM) (9%) (SMHSA, 2011). These revenue streams are mostly allocated in fixed allotments to existing programs. Investment in the housing sector has, however, been steadily increasing since the establishment of the SMHSA in 2005 with 52% of housing investment coming from municipal sources and 48% from federal sources such as the programs of federally-owned Caixa bank (SMHSA, 2011). As a partner in the development of the Florianópolis Action Plan, Caixa bank has indicated assistance is available to the Municipality to reduce environmental vulnerability. Caixa supports national housing programs such as the Guarantee Fund for Time of Service (*Fundo de Garantia por Tempo de Serviço – FGTS*), the Residential Lease Fund (*Fundo de Arrendamento Residencial – FAR*), the Worker Support Fund (*Fundo de Amparo ao Trabalhador – FAT*), and the Social Housing Subsidy Program (*Subsídio à Habitação de Interesse Social – PSH*) (Caixa, 2016). Families reporting a gross monthly income of one minimum wage are given



priority for these programs. Also, the Habitar Brasil (BID) program of Caixa has already helped over 500 families in Florianópolis finance low-cost housing.

Partnerships with the private sector for the construction of low-cost housing has taken place in Brazil through various programs. Partnerships usually involve the allocation of land by the city for small housing estates and the preparation of concessions for utility services. Private developers then provide the resources for construction and low-income purchasers take advantage of available financing to purchase the units. One program, in existence since the 1970s is Solo Criado, also known as *outorga onerosa*. The tool separates development rights from property rights allowing developers to build higher if they purchase land elsewhere or provide needed amenities. This is an important tool that could be better leveraged in meeting sustainability goals and reducing inequality in the housing market in the realization of the social function of property. Construction of housing estates can also be undertaken by cooperatives and community associations who pool resources in the construction of housing. The *Minha Casa, Minha Vida* program also has collaborated with private developers in some case under agreements that call for developers to leverage private investment funds to construct housing, then low-income residents purchase the housing with federal funding.

#### 6.1.2. *Housing Inequality and Environmental Justice*

The above described condition of housing in the study area is indicative of larger development trends throughout Brazil. Rural-urban, and increasingly urban-urban, migration continues to pressure cities to find solutions to the low-income housing deficit. As described in Chapter 4, the devaluation of land near *favela* neighborhoods is leading to the entrenchment of this development pattern and infrastructure lock-in. Migrants often

settle in areas of permanent preservation or further up steep hill sides. These areas are less monitored and they border similar communities that can facilitate the procurement of materials for small wooden homes that can be improved over time. Previous housing policies in Brazil financed the construction of public housing on the periphery of cities in peri-urban areas (Macedo, 2000). With the most potential for employment in the city center, long commute times dissuaded beneficiaries from relocating.

Often lacking formal land titles, occupants of informal settlements have no security of tenure. Operating largely outside of formal land markets, residents are left with few options but to fight for control over land following invasion (the act of taking possession of unoccupied land by individuals or groups) or the purchase of so-called clandestine lots in which the occupant pays to live on the lot without formal property rights (De Soto, 1989). In Brazil, the granting of tenure to informal settlements in protected areas is less common than the decision to provide services and de facto rights of occupation without the provision of land titles.

Disasters such as flooding and landslides leave residents without tenure vulnerable to catastrophic loss and few options but to rely on public aid programs and reestablish themselves again through a subsequent process of invasion. The compounding effect of having little option but to live in areas more vulnerable to natural disasters and having no recourse in terms of compensation following disaster denies low-income earners the basic right to a decent quality of life. As an issue of justice, the social function of land, as afforded to all citizens in the 1988 Constitution discussed in Chapter 4, is not being met. Some activists and scholars approach the housing deficit, and the resulting illegal invasion of land, as an environmental justice issue due to the disproportionate

vulnerability of *favela* dwellers to climate related storm and flooding events (Cohen, 2013; Da Costa Silva, 2010; Dominelli, 2012; Souza, 2008). The rights based framing allows for a legal basis on which to pursue urban policies that identify vulnerable groups and ensure protective measures are taken during the course of development and in strategic adaptation planning. The vulnerability and risk associated with informal housing in flood or landslide prone areas is reviewed below in section 6.2.

## **6.2. Vulnerability and Risk in Florianópolis**

This section addresses how the settlement pattern of the city has created certain vulnerabilities to hydroclimatic events and the institutional capacity for reducing vulnerability and responding to disasters. As discussed, the housing deficit in the study city has led to the growth of informal housing settlements to accommodate the growing population, especially among migrant workers who come to the area in search of high-season employment. The aim of this section is to evaluate informal housing settlements on steep hill sides that result in (1) land-use conflicts, (2) a reduction in areas of permanent preservation, and (3) increased vulnerability to storm events. Traditional vulnerability assessments do not often address social and institutional variables that are of interest in this research. While models often focus explicitly on exposure and sensitivity to stressors, they are limited in their ability to provide insight into “(i) the ways in which the systems in question amplify or attenuate the impacts of the hazard; (ii) the distinctions among exposed subsystems and components that lead to significant variations in the consequences of the hazards; and (iii) the role of political economy, especially social structures and institutions, in shaping differential exposure and consequences” (Turner et. al., 2003, p. 8074). As these aspects are critical in sustainability studies, Turner et. al.

(2003) present a framework for vulnerability analysis that comprehensively considers human-environment systems in terms of their primary components and linkages. Based on this framework, a narrow field of sub-sections is used in the analysis below to unpackage vulnerability in terms of exposure (characteristics and components of exposure), sensitivity (human conditions and environmental conditions), and resilience (disaster response, impact, and adaptation).

#### *6.2.1. Exposure and Sensitivity to Flooding*

Several quantitative analyses of vulnerability and risk in the Florianópolis area have been completed (IDOM-COBRAPE, 2014b; SMHSA, 2011; CEPED, 2007). A technical report conducted by the IDOM-COBRAPE (2014b) consortium, supported by the Inter-American Development Bank (IDB), determined the primary natural disaster events that occurred in the Florianópolis metropolitan area between 1990-2010 were flash floods, mass movements, tornados, and marine erosion.<sup>70</sup> In addition to the analysis of natural hazards, the study estimated associated disaster risks by measuring the probability of event occurrence and the projected economic and human impact.

Rivers prone to flooding, and the possible variations in rainfall and temperature changes that may occur in different climate change scenarios, were identified using a digital terrain model (DTM) with a spatial resolution of one meter. In order to study coastal flooding in Florianópolis the statistical model Delft3D and the RFSM-EDA (Rapid Flood Spreading Method - Explicit Diffusion wave with Acceleration) models were used. The maps below represent the results for two scenarios: the least expected impact over a 10-year period with current climate conditions and the greatest projected

---

<sup>70</sup> The category *mass movements* includes all forms of landslides that result from geological, climatic, and hydrological soil transformations in both urban and rural areas.

impact over a 200-year period with an average sea level rise of one meter. Results indicate that current urbanization trends are affecting watershed hydrology and leading to an increase in impervious areas thereby hindering the infiltration of rain water. Estimates suggest more than 150,000 people in the city are vulnerable to flood events in the areas indicated in the figures below (IDOM-COBRAPE, 2014b).

Figure 25. Inundation projections for 10-year period (left) and 200-year period (right).<sup>71</sup>



Source: IDOM-COBRAPE (2014)

When the above images are compared to urban growth trends projected in a study conducted by the same group, it is clear there is overlap between the projected pattern of urbanization and the areas vulnerable to flooding (IDOM-COBRAPE, 2014b). Although

<sup>71</sup> The map on the left indicates the likely areas of inundation under current climatic conditions over a 10-year period and the map on the right indicates the projected inundation with a one meter rise in sea level over a 200-year period.

this is expected as construction on flat floodplains is less costly, these images still highlight the vulnerability of coastal cities and the importance of improving local level institutional capacity for managing flooding and erosion.

Beaches in the study area most vulnerable to shoreline erosion are: Naufragados, Pântano do Sul, Armação, Barra da Lagoa, Canasvieiras, and Ingleses. Coastal vegetative belts, such as mangroves and *restinga*, mitigate the impact of flooding and erosion by reducing the effects of storm surges (wind, waves, and tsunamis) as well as by stabilizing shorelines and facilitating sediment deposition (Wetlands International (WI), 2014). The clearing of these ecosystems affects soil permeability and increases the likelihood of shoreline erosion (Pekelman & Schuch, 2012). Although mangroves are naturally prone to flooding and characterized by soil that is problematic for construction, the demand for beachside real estate continues to threaten shoreline vegetation (Magris & Barreto, 2010). Protection of these ecosystems is a low-cost coastal defense strategy that can easily complement other adaptation strategies, particularly in areas rich in mangrove and *restinga* ecosystems such as Florianópolis. Given that federal, state, and local laws protect the mangroves and much of the *restinga* in the city, municipal authorities in Florianópolis have been largely successful in both protecting existing mangroves and restoring degraded ones, such as the Itacorubí mangrove that was damaged by waste dumping. The establishment of formalized partnerships with civil action groups could be part of a coastal zone management plan that would assist the Municipal Environmental Foundation (FLORAM) in monitoring and maintenance of shoreline vegetation.

In addition to preserving natural flood protection such as mangroves, the Department of Geosciences at the Federal University of Santa Catarina is installing

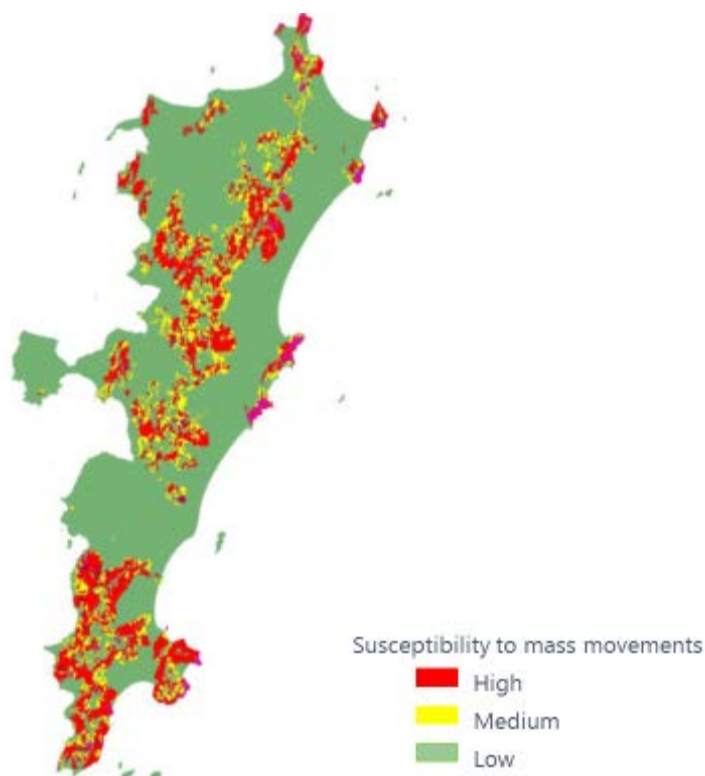
monitoring equipment with assistance from the National Scientific and Technological Development Council (CNPq) and the Inter-Ministerial Commission for Marine Resources (CIRM). Monitoring coastal dynamics is a common tool for reducing the impact of natural disasters. Continuous measurements of tidal changes, as well as morphological changes in the shoreline, assist researchers in cataloging the magnitude of changes and indicate when there is a need for mitigation measures. In addition to the progress made by UFSC, the number of monitoring sites could be increased and clear channels of communication established with municipal institutions to ensure city managers benefit from collected data (IDOM-COBRAPE, 2014b).

In terms of economic loss related to disaster risk, the risk analysis conducted by IDOM-COBRAPE (2014b) found the expected maximum loss from river flooding alone ranged between R\$ 11 and R\$ 79 million (US\$ 3 to 22 million) over a period of 2 to 500 years under the current climate scenario. The expected maximum loss from marine flooding ranged from R\$ 38 to R\$ 51 million (US\$ 10 to 14 million) over a 10 to 200-year period under the current climate scenario. If a 0.5-meter rise in sea level is also considered, the total increases to R\$ 81 million (US\$ 22.5 million). As called for in the Florianópolis Action Plan, development of a register of land ownership and land use in areas identified as vulnerable to flooding would assist outreach activities and decrease discrepancies in knowledge about disaster risks.

#### *6.2.2. Exposure and Sensitivity to Landslides*

According to the IDOM-COBRAPE (2014b) assessment the locations indicated in the map below are the most prone to landslides in the study area.

Figure 26. Areas susceptible to mass movements in Florianópolis



Source: IDOM-COBRAPE (2014)

The Institute for Technological Research (IPT) conducted a vulnerability assessment in 2013 in accordance with the standards of the Mineral Resources Research Company (*Companhia de Pesquisa de Recursos Minerais – CPRM*), a state-owned company that carries out the Geological Survey in Brazil. This study found the primary populations vulnerable to landslide risk in the Florianópolis area were informal settlements built on slopes and hills. These settlements typically have inadequate access to basic services and urban infrastructure. Poorly managed sewer water, particularly during periods of inundation, can trigger landslides. In addition to greater vulnerability because of topographical characteristics, these settlements are often poorly constructed, making the potential for damage greater. The IPT report suggests there are 120,000 people living on landslide prone slopes in the Florianópolis area (IDOM-COBRAPE,



2014b). Although construction on steep slopes is completely prohibited (as areas of permanent preservation), and construction is restricted on slopes with a 20° incline, there is poor enforcement and monitoring of these regulations.

The Program for Urbanization, Regularization, and Integration of Precarious Settlements of the federal-level Ministry of Cities provides financial and technical support to municipalities seeking to reduce vulnerability by regularizing hillside settlements. Under this program, the UFSC Center for Disaster Studies and Research of the Department of Civil Engineering, in collaboration with technicians from the Municipal Secretariat of Housing and Environmental Sanitation, prepared a Municipal Plan for Risk Reduction (*Plano Municipal de Redução de Risco – PMRR*) for Florianópolis in 2007. This report was also prepared in consultation with local community leaders and neighborhood associations. Parameters for risk evaluation included slope, vegetation, soil typology, water drainage patterns, position and orientation of the occupancy, and quality of the structure (wood or masonry). Neighborhoods were subdivided into sectors that were then prioritized for regularization based on the degree of risk. Priority areas were identified as: Coqueiros (one sector characterized as very high risk, and two sectors as high risk), Maciço da Costeira do Pirajubaé (three high risk sectors), Continente (three high risk sectors), Maciço do Morro da Cruz – South 1 (two very high risk sectors and eight high risk sectors), Maciço do Morro da Cruz – South 2 (two very high risk sectors and five high risk sectors), Maciço do Morro da Cruz – West (four high risk sectors), Maciço do Morro da Cruz – North (four very high risk sectors and six high risk sectors), and Saco Grand (three high risk sectors). Using the instruments provided in the City Statute, the city has the authority to

relocate the most vulnerable homes in the high-risk areas. At the time the report was written in 2007, the cost of relocation per home was R\$ 30,800, making the cost of relocating all 119 homes R\$ 3,665,200.<sup>72</sup>

Although the report was completed nine years ago, the areas identified in the study as high risk have remained in the same condition. The first area chosen to take part in the regularization program was the densely-populated Morro da Cruz neighborhood bordering the city center. The PMRR study indicated the area had the greatest number of high and very high-risk sectors.

Figure 27. Map of North Morro do Cruz (middle photo) and South Morro do Cruz (far right) indicating sectors that are at low risk of landslides (light yellow), medium risk (light orange), high risk (dark orange) and very high risk (red).



Source: Municipal Plan for Risk Reduction, 2007

### 6.3. Integrating Disaster Preparedness and Adaptation Planning

Urban environmental sustainability involves identifying ways to lower the carbon intensity of a city and to establish growth patterns that maintain the health of the social-ecological system. Ensuring the material and physical form of the city is not established in a way that increases the vulnerability of the population is a critical element of long-

<sup>72</sup> The average exchange rate for 2007 was 1.94 BRL to 1 USD.

term sustainable urban planning. The key risks that humans face as a result of climate change related hazards interacting with social-ecological systems, as identified by the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) (2014), are summarized in the chart below.

Table 11. Key risks associated with anthropogenic interference with the climate system (IPCC, 2014)

	<b>Risk</b>	<b>Applicable to Florianópolis</b>
1	Risk of death, injury, ill-health, or disrupted livelihoods in low-lying coastal zones and small island developing states and other small islands, due to storm surges, coastal flooding, and sea level rise.	Yes
2	Risk of severe ill-health and disrupted livelihoods for large urban populations due to inland flooding in some regions.	Yes
3	Systemic risks due to extreme weather events leading to breakdown of infrastructure networks and critical services such as electricity, water supply, and health and emergency services.	Yes
4	Risk of mortality and morbidity during periods of extreme heat, particularly for vulnerable urban populations and those working outdoors in urban or rural areas.	
5	Risk of food insecurity and the breakdown of food systems linked to warming, drought, flooding, and precipitation variability and extremes, particularly for poorer populations in urban and rural settings.	Yes
6	Risk of loss of rural livelihoods and income due to insufficient access to drinking and irrigation water and reduced agricultural productivity, particularly for farmers and pastoralists with minimal capital in semi-arid regions.	
7	Risk of loss of marine and coastal ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for coastal livelihoods, especially for fishing communities in the tropics and the Arctic.	Yes
8	Risk of loss of terrestrial and inland water ecosystems, biodiversity, and the ecosystem goods, functions, and services they provide for livelihoods.	

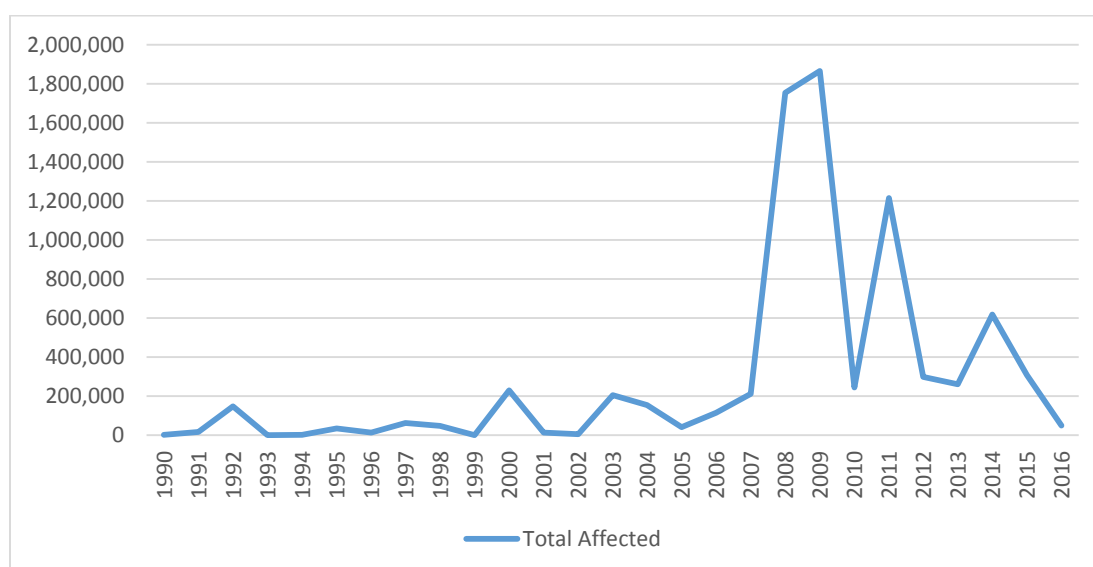
Adaptation planning is increasingly conducted in tandem with mitigation strategies as changing climatic conditions are challenging the ability of response teams to quickly meet emergency needs. As discussed in Chapter 1, the Sustainable Development Goals (SDGs) reflect a development ethos that seeks to correct what has come to be viewed as unsustainable development that tends to favor an economic imperative over social and environmental protections (Hedigar, 1999; International Union for Conservation of Nature (IUCN), 1980; Mazmanian & Kraft, 2009; Neumayer, 2013;

WCED, 1987). Under the banner of sustainability and sustainable development, climate change is stressed as a threat and one of the greatest challenges in achieving the SDGs (UN, 2016b). As the frequency of natural disasters is predicted to increase in response to climate change, resiliency is already being embraced by municipalities around the world as a critical aspect of the overall sustainability agenda (IPCC, 2012).

While climate scientists do not know with certainty what the effects of climate change will be, research suggests coastal cities will experience hazards such as inundation and shoreline erosion, increased incidences of storm events, and degradation of sources of freshwater and marine ecosystems (IPCC, 2014). Southeastern South America has been experiencing an increase in average annual rainfall (1950-2008) as well as more frequent episodes of extreme rainfall resulting in flash floods and landslides. According to the Brazilian National Center for Risk and Disaster Management (*Centro Nacional de Gerenciamento de Riscos e Desastres – Cenad*), the occurrence of natural disasters increased by 268% in the 2000s compared to the decade of the 1990s (Spitzcovsky, 2013). The Brazilian Atlas of Natural Disasters, prepared by the National Secretariat of Civil Defense and the Center for Studies and Research on Disasters (CEPED) of the Federal University of Santa Catarina (UFSC), indicates that floods and mass movements (usually landslides) have the greatest incidence and are most common in the southeast region of Brazil (CEPED, 2014). Mass movements, in particular, increased at an alarming rate with 94% of the total occurrences between 1990 and 2010 occurring between 2000 and 2010. The total impact of natural disasters from flooding, landslides, and storms, in terms of number of people affected since 1990, is summarized

in Figure 28 below.<sup>73</sup> Since 2007, there has been a sustained annual pattern of people affected by floods, landslides, and storms, in part attributable to urban growth and an increase in the number of hill side settlements. Natural disasters occurring prior to 1990 were more commonly punctuated events with a large impact followed by a period of less impactful storm events (Centre for Research on the Epidemiology of Disasters (CRED), 2017).

Figure 28. Number of people affected by floods, landslides, and storms in Brazil (1990-2016)



Source: EM-DAT, The International Disaster Database, Centre for Research on the Epidemiology of Disasters (CRED)

Climate vulnerability refers to the likelihood a climate hazard will occur, the severity of the hazard, and the resources a person has available to them to cope with the effect (Schensul, 2014). According to the UNFCCC, climate change is already contributing to the erosion of coastal zones and increasing the incidence and intensity of natural disasters in addition to threatening food security and increasing the spread of

<sup>73</sup> CRED (2017) defines affected people as “people requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance.”

vector-borne illness (UNFCCC, 2007). The Economic Commission for Latin America and the Caribbean (ECLAC) suggests the cumulative cost of extreme climate events in the Latin American and Caribbean region could reach USD 250 billion by 2100 (ECLAC, 2009).

Local level governance institutions, particularly in rapidly growing mid-sized cities, can improve resilience to natural disasters by identifying vulnerabilities and developing long term action plans and policies that can guide the trajectory of urban development in ways that mitigate potential social and economic impacts. The operationalization of resiliency requires the ability to anticipate hazards, reduce vulnerability of the population to hazard events, prepare disaster response protocols for efficient emergency response, and put in place mechanisms for supporting medium and long-term recovery (Colten, Kates, & Laska, 2008).

#### *6.3.1. Existing Disaster Response Protocols*

In Brazil, the National Secretariat of Civil Defense (SEDEC) is the central office of the National Civil Defense System (SINDEC) and is responsible for coordinating action to mitigate and respond to disaster events. In 2005, by official decree (Decree 5376/2005), there was a re-structuring that established SINDEC as an entity composed of representatives of government ministries in the National Council of Civil Defense (CONDEC) as well as regional coordination bodies (CORDEC), state level coordination offices (CEDEC), and municipal coordination offices (COMDEC). SINDEC has helped establish small community-based groups to foster public awareness and train individuals in disaster reduction. Managerial restructuring of urban governance at the local level in Florianópolis resulted in part from changes in the above SINDEC system that introduced

new quantitative and technical methods of disaster risk evaluation. In the case of Florianópolis, there was coincidentally extreme flooding in the State of Santa Catarina in 2008 that required coordinated disaster response from all levels of government. Approximately 1.5 million people were affected by heavy rains with over 50,000 people displaced, over 27,000 people left homeless, and 135 lives lost, mostly because of landslides (Center for International Earth Science Information Network & Earth Institute, 2015). Although the flooding occurred inland from the study area in the Itajaí River Basin, the extremity of the event served as a focusing event that led state and local level authorities to implement better disaster planning. There was an observable increase in local level planning for such events after 2008. The Florianópolis COMDEC, although in existence since 1973, was re-organized in 2010 (Complementary Law 370/2010). The Municipality of Florianópolis created the Directorate of Civil Defense in the same year with the aim to guarantee the right to life, health, public security and safety of persons and property during disasters.

Well organized disaster response protocols and institutional capacity for disaster planning is critical for Florianópolis, a coastal island city that currently experiences storm events at regular intervals and may be subject to increasing frequency of extreme events in the future. The Florianópolis Action Plan (PMF & IDB, 2015) identified a need for increasing resilience to disasters in the urban region and for promoting adaptation. The plan, promoting synergies between strategic lines, identifies the following objectives: develop and implement projects defined in the revised Municipal Plan for Risk Reduction (SMHSA, 2011), identify strategic segments of the power grid that are vulnerable to windstorms and transition to an underground distribution network, develop and

implement an institutional development plan for the municipal civil defense system, develop a plan for sustainable management of floodplains, and implement a coastal ocean monitoring system. In addition to the Directorate of Civil Defense, municipal bodies involved in meeting the above objectives are listed below.

Table 12. Primary municipal entities responsible for disaster preparedness and risk mitigation

	<b>Name</b>	<b>Function</b>
1	Civil Defense	Develop and implement an institutional development plan for the municipal civil defense system
2	Municipal Department of Housing and Environmental Sanitation (SMHSA)	Develop and implement projects defined in the revised Municipal Plan for Risk Reduction
3	CELESC	Identify strategic segments of the power grid that are vulnerable to windstorms and transition to an underground distribution network
4	Institute for Urban Planning of Florianópolis (IPUF)	Develop a plan for sustainable management of floodplains
5	Municipal Foundation for the Environment (FLORAM) (in coordination with IPUF)	Implement a coastal ocean monitoring system

The municipal government of Florianópolis has sought to mitigate vulnerability through various means such as previously discussed risk assessments, regulations to control urban development in high risk areas, monitoring and enforcement of zoning restrictions, development of anticipatory planning, and development of disaster response protocols. When the City Statute was enacted in 2001, municipal authorities were given a legal means to address social and environmental problems in accordance with local priorities. Of the 36 municipal bodies (secretariats and other offices), ten have authority related to the various facets of disaster preparedness, land use regulations, or response to hazardous events. The five municipal bodies listed above have the largest role in enhancing preparedness and mitigating risks and were identified in the Action Plan as critical for their role in improving the resiliency of urban systems.



The previously mentioned re-structuring of the Civil Defense System in 2005 and the subsequent passing of laws for the establishment of local level offices in Florianópolis in 2010 is clearly an incidence in which the passing of federal laws led to changes in support of sustainability at the local level. As a result of this restructuring, local authorities, in partnership with UFSC, prepared the previously discussed Municipal Plan for Risk Reduction (*Plano Municipal de Reducao de Riscos – PMRR*) in 2007 that identified structural and non-structural interventions to reduce vulnerability in high-risk areas. The National Secretariat of Civil Defense (SEDEC), together with the University Center for Disaster Studies at the Federal University of Santa Catarina (CEPED, UFSC), has trained over 2,000 people in the Florianópolis area in Basic Training for Civil Defense (CEPED, 2012).

In 2012, the Federal Government launched the National Plan for Risk Management and Disaster Response. The plan involves the coordination of various government agencies to produce risk maps and geotechnical research, support prevention planning, and install monitoring equipment. Because of the PMRR study, the scope of work of the Florianópolis Civil Defense office was expanded (Law No. 12608/2012) to provide greater financial resources for personnel and equipment necessary for planned containment projects. Funding for risk reduction projects is also available through the Municipal Emergency Fund for Civil Defense in Florianópolis (FUMDEC), established in accordance with Federal Law 4320 (1964), that is linked to the Municipal Secretariat for Security and Traffic Management.

### 6.3.2. *Resilience Planning*

According to available surveys across a range of respondents in Florianópolis, climate change is not a planning priority. Public opinion surveys conducted during the preparation of the Florianópolis Action Plan asked participants to rank urban problems according to impact on their quality of life. In the greater Florianópolis area, 1,200 participants from 30 microregions took part in the survey. Choosing between 22 problems, 60% of participants ranked security as their biggest problem. The second and third highest ranked problems were health (60%) and traffic (47%). The lowest ranked problem was air quality (3%), followed by participation in decision making (4%), tourist activities (4%), and climatic events (4%) (PMF & IDB, 2015). Similarly, a survey conducted by Celesc that received 595 responses from various energy sector stakeholders including public agencies, private companies, employees, and civic associations, indicated the most important priorities for Celesc (according to those who responded) should be: investment in infrastructure and services, risk management, strategic planning and budgeting, transparency, corruption, and human development (Celesc, 2015). Respondents did not indicate climate change or stakeholder engagement to be important at the time of the survey.<sup>74</sup> As evidenced in the planning priorities for the city, greenhouse gas mitigation and adaptation planning are not stated priorities. Given the low level of public support for the allocation of funding for specifically climate adaptation measures, the discussion below focuses on how currently ongoing work, particularly in the housing sector, can be integrated with adaptation planning. Financing options that can meet multiple aligned goals are also reviewed.

---

<sup>74</sup> Employee responses taken separately ranked *sustainability and environmental preservation* just under *corporate governance* as the most important challenges for the coming year.

The enforcement of zoning restrictions in territories determined to be high risk for flooding or landslides is critical. Low-income households in urban areas, being more sensitive to natural hazards and less resilient, will face disproportionate hardships. Municipal institutions can take structural and managerial actions to direct coherent growth based on geological rationalities to minimize risk by using the zoning tools provided in the City Statute. Tools include zoning and regulations that restrict development in flood plains, the use of flood walls, and structural improvements in areas with low-flow capacity. The risk and vulnerability assessments conducted for the study area have resulted in the generation of a rich data set and maps that can facilitate territorial planning and reduce vulnerability in the city. Technologically advanced monitoring systems using satellite imagery have been beneficial to municipal authorities and UFSC research centers in both observing the areas of permanent preservation and monitoring coastal changes. Further improvements are still needed to develop early warning systems for storm events.

Electricity is vital during disaster relief as response teams require power for critical urban functions such as health services, water and sanitation infrastructure, and public safety. As discussed in Chapter 5, Florianópolis currently receives the bulk of the island's electricity from the Jorge Lacerda Complex that has four coal-fired thermal electric plants. At the same time, the city is rich with local universities, non-profit organizations, and energy companies that are currently driving the adoption of locally produced power from distributed generation. The high concentration of energy companies, technology companies, and research centers on the island provides an

invaluable resource for the city and one that may be able to establish a diverse, flexible, power system that is able to withstand climate related disturbances.

Florianópolis, being on a coastal island, receives power primarily from a cable running across a bridge to the mainland. There are two substations that provide electricity to the island: Desterro, located on the island (27°40'14"S 48°30'49"W), and one operated by Electrosul in Palhoça (on the mainland) (27°38'32"S 48°41'27"W). The primary points of vulnerability for the existing electricity infrastructure are (1) the potential impact of changes in water availability on hydroelectric and thermoelectric power plants, (2) the lack of redundant electricity systems supplying the island, and (3) the susceptibility to damage from storm events.

Global climate change is likely to impact the availability of water. Florianópolis is dependent on thermoelectric plants that require a large amount of water for cooling. Alternative power sources available to the substations connecting Florianópolis include small and large hydroelectric plants whose capacity may be impacted by changes in streamflow. Globally, van Vliet et al. (2016) project climate change will result in reductions in usable capacity of 81–86% of thermoelectric power plants and 61–74% of hydropower plants between 2040–2069. The IPCC assessment report (2014) also indicates changes in stream flows in South America may affect hydroelectric power sources in the region. In the event the power generating assets providing electricity to the island are compromised, the island lacks access to multiple substations that manage incoming electricity from redundant high voltage lines running from a diverse set of generating plants.

In reference to the vulnerability of existing energy infrastructure to storm events, the Florianópolis Action Plan recommends the installation of underground distribution lines to reduce the impact of storm events and falling trees and vegetation onto overhead lines. As burial of electricity lines is costly, this work has not yet been undertaken by Celesc. Its importance, however, was demonstrated during a 2016 storm event in which a cyclone with 118 km/h winds resulted in power loss throughout the island (Diário Catarinense (DC), 2016). Although most areas regained power within 24 hours, neighborhoods with poor access by road were without power for as long as a week. A less costly option is structural reinforcement of overhead lines.

Current strategies being employed globally to address electrical system vulnerability include redundant distributed generation systems at substations that can provide power to first responders during disasters, plug-in electric vehicles as alternative home power sources, and the installation of microgrids (Clean Energy Group, 2016). Microgrids, being established in places such as Hoboken, NJ following hurricane Sandy, can offer a combination of distributed generation and energy storage. While a microgrid that is completely city or state funded is cost-prohibitive for a city like Florianópolis, partnerships with the stakeholders described in Chapter 5, through a variety of private and public funds, could help meet multiple development goals. For example, a low-income housing project, similar to the one financed by the federal *Minha Casa Minha Vida* program discussed in Chapter 5, could offer residents solar power. The solar power units could be connected to nearby first responder units providing reserve power during crises. Likewise, federal financing for energy efficiency offered to energy distributors such as Celesc, could serve a joint purpose in providing reserve distributed generation to

key public buildings (a provision allowed under the conditions of the financing). Lastly, municipal governments can incentivize private developers to install distributed generation or energy storage units that could be used during outages through public-private partnerships.

While restricting growth in high risk areas with a low population concentration is a low-cost planning instrument that can result in considerable savings over the long term, the regularization of existing households in high risk areas must be addressed to prevent further encroachment and reduce vulnerability to natural disasters. Strengthening coordination between the municipal institutions reviewed above will be a critical piece in strategic sustainability planning that overlaps an adaptation agenda when appropriate and feasible. The above evaluation of municipal bodies involved in disaster prevention, disaster preparedness, response, and recovery helps to identify cross-departmental synergies. Enhancing cross-departmental coordination might improve efficiency in reducing illegal occupation of areas of permanent preservation, mitigating vulnerability to disasters, and improving access to housing. Institutions will play an important role in coordinating adaptive systems in response to changing climatic conditions. This review suggests federal and state level Civil Defense efforts are heavily dependent on municipalities to both reduce vulnerability and provide support following hazard events. Building institutional mechanisms that easily deploy support from multiple municipal organs will be critical in the success of timely, life-saving response strategies.

The lack of low-cost housing alternatives has hampered strong enforcement of zoning restrictions which is further exacerbated by insufficient monitoring of informal settlements in high risk areas. This research sought to identify the mechanisms by which

decision making in municipal level institutions has resulted in an apparent increase in support of evaluation and establishment of institutions responsible for disaster response. While there is an apparent increase in support for mitigating risks and vulnerabilities to natural disasters, there is still a need for a robust monitoring system, restrictions on growth in high risk areas, and establishment of effective coordination protocols for emergency response and recovery logistics.

## **CHAPTER 7: THE SUSTAINABILITY SLIPSTREAM AND THE CHALLENGE OF DURABILITY**

As stated in Chapter 1, the goal of this dissertation is to explore the city in terms of its historical engagement with environmentally sustainable growth strategies asking the question *why have some rationalities of sustainable development been institutionalized and others have not?* In answering this question, the heavy focus on structural change that dominated “old institutional” analysis dampened the possibility of identifying the cultural shifts that served to catalyze institutional change in Florianópolis. Neoinstitutional theorists, moving beyond the study of institutional reproduction, recognized the need to better explain institutional change in social or cultural terms and began to draw from social movement theory (Armstrong, 2002). In introducing the concept of organizational fields, DiMaggio and Powell (1983) advanced neoinstitutional theory by conceptualizing fields of players interacting within politically and culturally constituted arenas. These arenas are at the center of the SES framework as spaces in which institutional logics, identities, and limitations on strategies of action play out in the pursuit of power and transformation. This chapter summarizes the theoretical considerations that emerged from this case study, analyzes the implications of the findings, and offers suggestions on how this case could inform policies for sustainable urban development.

### **7.1. Culturally Constituting Institutions for Sustainability**

Strategic action in the study area has taken many forms including interest group politics, identity politics, social rights movements, and the social construction of new



pathways for technological advancement. As described by Bimber, Flanagin, and Stohl (2012),

the central points of contact between collective action theory and organization theory are related to organizational boundaries. Where classical collective action theory places formal organization at the center of organizing, organization theory traditionally differentiates the concept of formal organization and social organization...social organization refers to the patterned network of social relations and shared values and orientations that emerge as people interact (p.79-80).

Both formal organization and social organization was explored in the case of Florianópolis by integrating the SES framework and the theoretical framework of strategic action fields. The integrated approach allowed the research to benefit from a rich body of institutional and collective action research while at the same time allowing for the possibility that change may originate in social or cultural shifts in cognitive framing.

Olson (2009), in keeping with traditional rational choice theory, suggested rational actors do not act collectively in pursuit of public goods unless they are individually incentivized. Fligstein and McAdam (2012), however, find

a flaw in the rational choice argument, an empirical disconnect between the theory and the reality of emergent movements. The theory depicts the challenge to movement organizers as one of inducing outsiders to join an emerging movement. In point of fact, however, most movements develop within established communities (Gould, 1991, 1995; McAdam, 1999; Morris, 1984; Osa, 1997; Zhao, 1998, 2004). They do so by effectively 'appropriating' the shared meanings and identities that bind the community together in the service of the movement (p. 138).

While much social movement scholarship focuses heavily on political outcomes, approaching collective action from a field perspective allows for causal explanations to emerge from resource-rationalist, political, or cultural values. Understanding collective action from a social constructivist approach, Armstrong (2002) suggests framing and collective identity theories

treat interests and identities as politically constructed, define social movements broadly, see the state as one among many possible targets for social movement action, see the instrumentality of cultural strategies and the culturally constituted character of

instrumental action, attend to the cultural creativity of movements, and understand that while movement action is ‘meaningful,’ it is not always ‘rational’ (p. 8).

The structural determinist view of institutional change that has dominated new institutional theory presents a dualistic construction of the durable self-reproducing institution versus the diligent actions of newly emergent organizational fields. As commented by Fligstein and McAdam (2012, p. 180), this lack of attention to agency misses the ways in which “groups and individuals are confronted with opportunities and constraints all of the time.” While the SES framework provides terms and concepts that can be used to construct causal explanations regarding the agency of groups of actors, it does not posit specific causal relationships among variables. The framework allowed theoretical freedom regarding the role of cultural and institutional change in support of sustainable outcomes over time, but the theory of strategic action fields was needed to develop an explanation of the role of culture, identity, and meaning in the process of appropriation and institutional change.

Although the concept of social capital is closely associated with resource mobilization approaches to social movement theory, in the context of this dissertation social capital is used to capture all forms of capital gained from networks of associations, whether social, economic, or cultural. Social networks carry flows of information and influence and are the fields in which the processes and practices of social reproduction are staged (Bourdieu, 1977; Fligstein & McAdam, 2012; Lin, 2002). Collective action can leverage cultural sea change that arises within social networks to achieve systemic change that is reproducible by society. Rules-in-use that are employed in the strategies and tactics of collective action are in keeping with social and cultural expectations. These everyday rules can be leveraged in the cultivation of institutional capital that is necessary

for institutionalization and the accompanying establishment and reproduction of formal rules.

The deeper exploration of the cultural and cognitive dimensions of institutional change, and the importance of trust and shared norms of reciprocity, allowed for the development of a theory of sustainable development that considers how the interaction between formal laws and regulations and social capital can, in some instances, result in sustainable growth trajectories. The case of Florianópolis highlights the ways in which the transitional horizons between fields are important areas in which overlapping social networks give rise to innovation. In Florianópolis, sustainable outcomes were hastened as a result of the overlapping objectives of actors occupying different fields of strategic action. In the land sector, the social capital cultivated by the neighborhood associations in support of environmental sustainability propelled the institutionalization of government protection of land and effectively crystalized a growth strategy that was dependent on the capitalization of natural amenities. Although an environmental logic was institutionalized over time in the creation of FLORAM, the dominate institutional logic of the local government remained firmly in support of amenity-led economic growth. As stated by Fligstein and McAdam (2012),

those groups that challenge incumbents occupy less privileged niches within the field and ordinarily wield little influence over its operation. While they recognize the nature of the field and the dominant logic of incumbent actors, they can usually articulate an alternative vision and their position in it. This does not, however, mean that challengers are normally in open revolt against the inequalities of the field or the aggressive purveyors of oppositional logics. On the contrary, most of the time challengers can be expected to conform to the prevailing order, although they often do so grudgingly, taking what the system gives them and awaiting new opportunities to challenge the structure and logic of the system (p. 13).

Over time, the emergence of green technology products and services, such as solar installations, from the local tech sector presented the environmentally oriented

organizational fields of Florianópolis new opportunities to challenge the system. In reference to the effect of overlap of fields of strategic actors, Clemens (2007) writes:

Once the multiplicity of orderings, networks, and cultural categories is recognized, then explanations of disruption and change can build on a theoretical imagery of linking, transposing, fusing, competing, and cross-fertilizing (Clemens, 1997; Heimer, 1999; Sewell, 1992). Processes of recombination—whether inadvertent or explicitly entrepreneurial—create new patterns of mobilization and novel modes of collective action (p. 540).

Although Florida, Cushing, and Gates (2002) found cities with high levels of social capital correlated with low levels of innovation and cities with low levels of social capital had higher levels of innovation (such as San Francisco Bay area and Boulder, CO), the authors suggest perhaps a more nuanced approach to quantifying social capital would result in different conclusions. One potential weakness in quantifying social capital is that traditional indicators often reference groups that are formal and socially homogenous (Putnam, 2001). Social networks that are diverse and inclusive, or that are characterized by weak ties over strong ties, may play a critical role in the cultivation and adoption of innovations for sustainable development.

Florida (2012), in analyzing occupations, degree of technological clustering, and tolerance indicators (such as a gay or bohemian index) found that the presence of a robust “creative class” may boost economic growth. While the exclusionary tendency of tight knit communities may work against innovation, more research is needed to explore the combined effect of certain types of social capital with the “creative class” characteristics identified by Florida (2012). The federal university, technological clustering, and the environmental sub-culture have all played a role in defining the conditions necessary for the possibility of sustainable outcomes in Florianópolis. Innovation in combination with the traits associated with social capital—trust, reciprocity, collective action toward a

common good—are critical in transitioning urban systems. This research suggests not only formal, but informal social networks may engender the trust and reciprocity required to enact agency over the course of development. Florida (2012) spends a significant discursive effort in accounting for the role of casual encounters in innovation in keeping with Jane Jacobs—using the term social capital in her own work—who emphasized the importance of street-level, face to face interactions.

Blau and Scott (1962) describe informal interaction, or unofficial practices, as guides for decision-making that precede the creation of formal rules. Organizational networks can be strengthened through socialization and communicative mechanisms, such as nested structures of informality. Informal structures can arise within formal organizations or within any arena in which actors are socially proximate. This informality, and the role it can play in fostering creativity, was identified by Jacobs (2016) on the streets of New York and by Florida (2012) in the out-of-office events organized by tech sector staff in some firms in Silicon Valley. In reflecting on the growth of green technology firms in Burlington, VT, in an article titled “A ‘Smart’ Green Tech Hub in Vermont Reimagines the Status Quo,” the head of a local start-up states “when you put in the right building blocks, you get a collision of ideas, which can become self-generating. It’s attitude and infrastructure” (Gustke, 2016). Similarly, technological parks, as seen in the case of Florianópolis, foster informal networks that, in turn, allow for knowledge spillover.

Some cities are able to leverage social capital to build institutional capital, either within existing institutions by catalyzing institutional restructuring or by forming new institutional collaborations, as seen in Florianópolis. Fligstein and McAdam (2012, p.

139) “urge analyst to attend more closely to the issues of meaning, membership, and identity that shape fields but all too often get ignored in favor of conventional accounts stressing only the narrow analytic concepts of power and interests.” By using an open analytical framework and looking more closely at the social skills and networks of actors that drive meso-level organizational change, the case of Florianópolis provides a rich example of how social movements, overlap of fields of strategic actors, and innovation can result in institutional change in support of sustainable outcomes.

## **7.2. Social Capital and Sustainable Development: Empirical Evidence**

As suggested by Fligstein and McAdam (2012, p. 32), “to truly understand a field and its dynamics, we must begin by systematically situating it in the complex network of ‘external’ fields—state and nonstate—to which it is tied.” For these authors, it is the interplay between the internal and external that determines field emergence, stability, and transformation. The conditions that gave rise to sustainable outcomes in Florianópolis were the result of attempts to rescue a forgotten and flagging local economy, the promotion of tourism and technology, and the cultivation of networks of sub-groups that sought out green solutions and innovation. Without a historical dependence on either industry or manufacturing, city leaders in Florianópolis focused on amenity-led growth beginning as early as the 1950s. As local elites and municipal authorities sought to boost the local economy in the 1960s and 1970s, they came to endorse tourism, and later technology, as the most logical industries for the island. The combination of the unique natural and cultural heritage sites, such as archeological sites and charming Azorean fishing villages, with the land preservation objectives of community associations and environmental organizations, led to the establishment of new land management practices

in the early to mid-1980s. The environmental movement, in combination with like-minded government officials and the business elite seeking to capitalize the island's natural amenities, hastened municipally-led actions to protect the local environment. The combined effect of government willingness, environmental collective action, and an economic growth strategy that favored land preservation resulted in a sustainability slipstream of multiple positive outcomes that have had lasting impact over the past three decades.

Considering the role of formal multi-level rules, and in keeping with political process theory (Tarrow, 1998), it is clear the political opportunity presented by the return to democracy in Brazil in the 1980s opened possibilities for the national environmental movement to influence federal policy. Although the national movement was most active in larger Brazilian cities, such as São Paulo, Florianópolis experienced a high rate of growth at this time and significant urban-urban migration from Brazil's larger cities. These migrants facilitated norm diffusion and built on the environmental social capital developed through the work of local neighborhood associations to protect the island's natural amenities. Although the neighborhood associations did not self-identify as environmental groups, they were galvanized by territorial power struggles and, in turn, enacted defensive environmentalist tactics in order to gain influence over certain urban processes.

The strategic action field formed by the collaboration of neighborhood associations and environmental NGOs brought together at least two distinct logics that, over time, contributed to the strength and reach of the field as it exists today. The political logic driving the NGOs complemented the identity logic and the community

building activities of the neighborhood associations to form a lasting, although heterogenous, strategic action field. Local government employees and appointees within the Urban Planning Institute of Florianópolis (IPUF) were responsive, and in some cases sympathetic to, the growing call for an ecological rationality in urban planning. This field of actors has worked to increase land preservation in the city and continues to contribute to creative management solutions for establishing, and monitoring, public land. The field of neighborhood associations and environmental NGOs also continue to have adequate power to block unwanted development pathways and safeguard their preferences as demonstrated in the contentious debates over the new Master Plan.

As described in Chapter 3, the logic of promoting tourism for economic growth was institutionalized (by the creation of the Secretariat of Tourism, Culture and Sports) a decade before the institutionalization of an environmental ethic at the local level. And although institutionalized, the Environmental Foundation of Florianópolis (FLORAM) is not empowered to have significant influence over the design of local land management policy, a task left largely to IPUF. When Jorge Augusto of the Institute for Sustainable Development of Santa Catarina (INDESSC) was asked to reflect on the role of FLORAM, he commented it is “an agency of merely licensing activities, almost never sustainability programs” (personal communication, 2016). In effect, developers are given an arena (the tourism secretariat) within which alliances with local government officials can be cultivated whereas environmentalists are largely denied such access. Relying on public forums held in support of various development plans or the Master Plan of the city, local environmentalists are always searching for new opportunities to act in accordance with their ideals.



Previous research suggests amenity-led growth can be linked to either natural endowments (Gosnell & Abrams, 2011) or to the migration of highly skilled labor to drive the creation of additional man-made or cultural amenities (Clark et al., 2002; Florida, 2002). Taken together with the high municipal human development ranking and local pro-technology growth strategies, the natural and man-made amenities attracted technology firms and led to the clustering of highly skilled residents working in innovative industries (Lucas, 1993; Florida & Gates, 2004). Promoting technological parks beginning in the late 1980s, Florianópolis now attracts an estimated 40 new or migrating technology companies to the area every year (Novais, 2013). Aiming to be one of the “Silicon Valley” clusters of Brazil, the city has fostered the creation of a field of technological entrepreneurs and businesses that have linkages to the well-established environmental field through various green technology companies and research institutes. The clustering of technological innovators and solar energy service providers, with environmental activists and neighborhood associations, created an environment in which there is a high concentration of actors likely to be early adopters of distributed generation technologies.

As Marshall (1997) and Porter (1996) noted, benefits can be gained from industrial or technological clustering such as productive efficiencies, spillover effects, and face-to-face interactions. While the role of human capital in economic growth has been well researched by scholars such as Glaeser (1992), Florida (2002) extends this research to explore why talented people cluster. Florida (2002) found that people do not just follow jobs, but they make decisions regarding where to move based on lifestyle as well as employment, and they seek out particular types of amenities. According to the

Santa Catarina Association of Technology Companies (ACATE), the technology sector in the state is growing at twice the pace of the average growth rate for Brazil. With over 700 technology companies in the Florianópolis region alone, the city has benefitted from the push to intensify growth in the technology sector. The CEO of ACATE, Guilherme Bernard, stated “the main appeal of the region of Santa Catarina is not the tax incentives, but the qualified workforce and high quality of life” (Rosa, 2016).

Exploring the possibility that there can be a “smart growth machine,” Nielsen (2014) found the combined effect of regulation with entrepreneurial action and technological expertise can foster ecological modernization in urban development. Technology firms provide developers easy access to environmental add-ons such as solar panels or green building techniques. While it is not new to suggest human capital, and the accompanying knowledge, innovation and creativity, is an important aspect of the urban economy (Clark et al. 2003; Florida, 2002; Jacobs, 2016), knowledge spillover between specialized firms as well as between industries can be a particularly important factor not only in innovation and employment growth, but also sustainability (Glaeser et. al, 1992; Porter, 2011).

In summarizing the work of Gorski (2003) on the rise of the Dutch Republic, Clemens (2007, p. 535) writes that religion “created new orientations among believers who then constructed disciplinary technologies that could elicit believer-like behavior.” A similar effect is observed in Florianópolis as businesses, seeking to capture the market of environmentally motivated buyers, either adopt technologies for ecological modernization or engage in the practice of “green-washing.” Local real estate developers, seeking new ways to market to an international clientele while minimizing the cost of

providing tourist amenities, seek out environmental add-ons, such as solar distributed generation. Such technologies are a small cost to condominium or resort developers who benefit from the additional use-value as well as the green image. If businesses are purchasing green products and services, even if just for marketing purposes, there exists new opportunities for the establishment of sustainable practices. Noting a similar trend in manufacturing, Florida (1996, p. 80) writes “adoption of advanced manufacturing systems creates substantial opportunity for adoption of green design and production strategies since both draw upon the same underlying principles—a dedication to productivity improvement, quality, cost reduction, continuous improvement, and technological innovation.”

An additional conclusion of Florida’s (1996) review of green manufacturing strategies was that “close relationships across the production chain—and between end-users and suppliers in particular—facilitate the adoption of advanced manufacturing practices, creating new opportunities for joint improvements in productivity and environmental outcomes” (p. 100). Joint efforts to reduce the environmental impact of tourist amenities, such as partnerships with renewable energy service companies, has the potential to significantly improve the carbon footprint of the city. Overlapping fields of strategic actors in the energy sector has resulted in a slipstream effect in which sustainability outcomes are hastened as the institutional status quo is challenged. Although the energy incumbent has significant resources to withstand market disruption for extended periods of time—access to financial support from federal and state governments, and skilled strategic actors to help maintain a position of power and influence—its privileged position is being threatened given the uncertainty in the energy

sector. The crystallization of an environmentally-minded sub-cultural in the city created loyalties and bonds that persisted over time to impact the current possibilities of action among the urban population today. The role of innovation in sustainability outcomes is highlighted in the case of Florianópolis to underscore the importance of the overlapping technology and energy sector networks. These organizational fields prioritize innovation and are tolerant of experimentation, two qualities often exhibited during periods of emergence.

While a thorough analysis of the degree to which the dual amenity/technology-led growth strategy can contribute to sustainable outcomes in general is beyond the scope of this dissertation, there are notable parallels between Florianópolis and urban experiences outside of Brazil. As seen in Figure 29 below, the San Francisco Bay Area, Seattle, and New York are the top three largest markets in North America according to competitive advantages and appeal to tech employers and tech talent (CBRE, 2017).<sup>75</sup>

---

<sup>75</sup> Tech Talent refers to “software developers and programmers; computer support, database and systems; technology and engineering related; and computer and information system managers” (CBRE, 2017, p. 6).

Figure 29. Technology Hub, Creative City, and Sustainability rankings for U.S. cities



These rankings are in keeping with Florida's (2015) ranking of Creative Class Cities that included in the top 20 creative cities: four cities in the San Francisco Bay Area, seven cities in the Washington area, four in the Boston area, and two Seattle suburbs. Although there are numerous rankings for green or sustainable cities, the often referenced Arcadis Sustainable Cities Index (2016) ranks global cities in terms of people, planet, and profit.<sup>76</sup> Of the top 50 cities globally, New York ranks 26, Boston 34, San Francisco 39, Seattle 43, Washington 44, Denver 49, and Los Angeles 50.

Like Florianópolis, many of the above-mentioned cities have a long history of activism. In writing on the San Francisco progressive movement, Domhoff (2011)

<sup>76</sup> The People sub-index includes health, education, income inequality, work-life balance, the dependency ratio, crime, and housing and living costs. The Planet sub-index ranks cities on energy consumption and renewable energy share, green space within cities, recycling and composting rates, greenhouse gas emissions, natural catastrophe risk, drinking water, sanitation, and air pollution. Profit sub-index includes transportation infrastructure, ease of doing business, tourism, GDP per capita, the city's importance in global economic networks, connectivity in terms of mobile and broadband access and employment rates (Arcadis, 2016).

suggests “the activists did not defeat the growth coalition, but they fought it to a standstill from the early 1970s into the early 21st century on issues that concerned the livability of neighborhoods and the preservation of urban amenities.” Boulder, CO, and Austin, TX, also exhibit similarities to the growth trajectory found in Florianópolis. With a population similar to Florianópolis, Austin has pursued a growth strategy that protected natural amenities in much the same way. As recounted by Swearingen (2010) in *Environmental City: People, Place, Politics, and the Meaning of Modern Austin*, the city began pursuing strategies for environmental protection in the 1960s. Austin, a member of the Local Governments for Sustainability (ICLEI) network, established an Office of Sustainability to address climate change, promote green business, and support the local food system. Ranked fifth in the EPA’s list of Top 30 Local Governments with the largest population of green power users, Austin Energy is consistently ranked among the top green public power utilities in the United States by the National Renewable Energy Laboratory (NREL, 2016). A Time magazine article titled “Red State, Green City: How Austin Has Become America's Clean-Tech Hub” (Walsh, 2012) writes the following about the solar energy company HelioVolt:

It’s not just the how of HelioVolt that makes it unusual in the solar space; it’s also the where. The company isn’t based in southern San Francisco or Boulder, Colo., or the Boston area — the bright green regions that tend to lead the national conversation on clean tech. HelioVolt calls the Texas state capital of Austin home. B.J. Stanbery, the solar veteran who founded HelioVolt in 2001, is a native Texan who got his bachelor’s degree at the University of Texas just down the road from the company’s factory, but he kept his business in Austin for more practical reasons. “The manufacturing skills that workers have here are directly transferable to a thin-film solar company like us,” he says. “And the business culture is attractive here because people are used to taking risks in the energy space.”

This excerpt summarizes many of the key findings presented in this dissertation that were identified in Florianópolis: the benefits of technology clustering, the role of the university

as captured in Florida's Creative City Index, and the role of experimentation and innovation in sustainable outcomes.

Home to a smaller population than Florianópolis, Boulder also displays many of the same growth trajectories described in this dissertation. While the Denver-Boulder corridor is home to numerous technology companies, Boulder itself has the highest density of tech start-ups in the United States and was ranked the second most innovative tech hub in the country (Miller, 2015). As Helm (2013) writes in an article titled "How Boulder Became America's Startup Capital,"

it's beautiful not because the city forefathers had some nifty pro-start-up policy—but because they had the foresight to plant lots of trees, welcome a university and federal science labs, buy up lots of parkland, and then stay disciplined about preserving the beauty they had created. The idea was simple: Make a city a great place to live, and people figure out how to make a living there.

Voting on a city tax to purchase and maintain open space in 1967, the City of Boulder now maintains over 43,000 acres of parkland that ring the city in the mountainous greenbelt and in green corridors that provide a multi-modal transportation network throughout the city (City of Boulder, 2017). As in Florianópolis, the large percentage of preserved land has resulted in a steady increase in the cost of housing. According to the Metropolitan Statistical Areas (MSA) Rankings (2016), Boulder experienced the second highest percent change in the cost of housing among all metropolitan areas in the United States in 2016 (Federal Housing Finance Agency (FHFA), 2017). With a 14% change in one year, and a 41% change over the previous five years, the city is struggling to provide affordable housing, discussed in greater detail below.

### **7.3. Migration, Housing, and Durability in Sustainable Urban Form**

Leveraging the amenity-led growth model for sustainability is a little explored topic that warrants additional research to determine how policy can be designed to maximize potential synergies while safeguarding against the inevitable challenges that emerge from population growth. Previous research indicates amenity led growth results in an initial period of job growth and high wages only to be followed by overcrowding, high housing costs, and lower wages (Gosnell & Abrams, 2011). Drawing from existing literature exploring how environmental amenities impact land use, the valuation of areas of preservation as sought-after amenities can have a positive impact on preservation, but a negative impact on housing, both in terms of cost and availability (Brueckner, Thisse, & Zenou, 1999; Green, Deller, & Marcouiller, 2005; Wu & Plantinga, 2003). City officials will need to take action to safeguard against the tendency for both amenity-led growth and sectoral clustering, such as in the technology sector, to result in inequality.

As mentioned in Chapter 2, cities such as Florianópolis, with a long history of following an amenity-rich techno-industrial growth strategy, serve as both a model for achievement in sustainable outcomes as well as a warning. Comparing the above rankings to median rents in the United States, the same cities appear with San Francisco, New York, Boston, Oakland, and San Jose being the top five most expensive rents in the United States (Avakian, 2016). With Washington, Los Angeles and Seattle also making the top ten, there is again an apparent overlap between the rankings for technology hubs, sustainable cities, creative cities, and a steadily increasing price of real estate. The San Francisco Bay Area led in technology sector job growth as well as in increases in business costs and rent between 2010 and 2015 (CBRE, 2017).



Economic growth has not been without its social costs in the San Francisco Bay Area. In writing about the history of development in Silicon Valley, Pellow and Park (2002) describe a smog-covered, sprawling district with significant environmental challenges in manufacturing and occupational health. Additionally, “skyrocketing housing costs made this area even less desirable for many workers pursuing a high quality of life, and less attainable for most lower-, middle- and working-class families (Pellow & Park, 2002, p. 79). In terms of millionaires per capita, San Francisco is among the top twenty cities globally and San Jose is the highest priced home market in the U.S. with the median price for a home passing the one million mark in 2016 (Wallace, 2014; Young, 2016). In reference to wage inequality in metropolitan areas of the United States, Florida (2012) writes that metropolitan areas that rank high in the Creativity Index also have high levels of inequality. However, as Florida (2012, p. 365) writes in *The Rise of the Creative Class, Revisited*,

What it boils down to is this: although the broad structural transformation of our economy splits the labor market and increases the wage gap between major classes, it has only a modest effect on income inequality broadly. In fact, the least-skilled and lowest-paid workers—the members of the Working and Service Classes—are actually economically better off in more affluent and knowledge-based regions with higher concentrations of the Creative Class, even if the wage gap is wider.

Additional research is needed to understand the long-term impact of wage and income inequality. Looking only at smaller towns with large service sectors, such as resort towns, there is often a mismatch between wages and the cost of housing. Increasing housing costs is a chronic problem for tourist destinations with geographical constraints such as Aspen, CO, Santa Cruz, CA, Hilton Head, SC, and Key West, FL. Mid-sized cities such as Florianópolis with a robust service sector and a growing technology sector face even greater challenges in the provision of affordable housing as discussed in

Chapter 6. Affordable housing has been financed using various strategies such as public-private partnerships (Key West), infill development (Santa Cruz), and partnerships for housing in area towns (Lafayette-Boulder). In the case of Aspen, builders are required to pay for one affordable housing unit for every 1,000 square feet of commercial development or every 6,500 square feet of market-rate residential. This strategy has also been adopted in Boulder and Telluride, CO. There is no consensus as to whether housing solutions such as these will alleviate inequality over long planning horizons. As stated by Pellow and Park (2002, p. 205),

Two fundamental and irremediable flaws are embedded within most policy-driven and academic proposals for sustainability. The first is that they fail to address the core problem of power and inequality among industry, the state, workers, and communities. The second flaw is that few of these proposals are willing to challenge the capitalist growth imperative. Without addressing both of these issues simultaneously, none of these policy prescriptions has a prayer of moving us beyond symbolic reform.

Although Florianópolis does not suffer from the environmental challenges that emerge from manufacturing in the technology sector, such as in Silicon Valley, the city continues to face the challenges of inequality as workers seeking employment in the service sector migrate to the city in greater numbers than highly skilled workers seeking employment in the tech sector.

#### **7.4. Policy Implications**

Natural and man-made amenities can result in economic growth as people migrate to amenity rich areas (Graves & Linneman, 1979; McGranahan, Wojan, & Lambert, 2011; Roback, 1982). Although the effect of amenities on growth vary by location, and natural amenities alone may not always result in growth, this dissertation suggests amenity-led development can not only drive growth, but also can be leveraged for environmental gains. Developers who benefit from the capitalization of amenities have an

economic interest in preservation. In the case of Florianópolis, the financial objectives of growth coalitions worked to support the environmental preservation aims of environmental activists and community associations in a way that resulted in positive environmental outcomes. The willingness of real estate developers to personally adopt sustainable practices (such as the blue flag beach initiative and solar distributed generation) as well as to actively lobby the local government for greater sustainability in city functions (as demonstrated by the Floripa 2030 plan and the active engagement of FloripAmañha in the Master Plan process) demonstrates the potential for such a collective action strategy in the private sector to have impact.

This analysis suggests the biggest threat to areas of preservation in the study area is unauthorized construction by both low-income groups establishing informal settlements and illegal construction by large resort developers. As outlined by Molotch (1976), growth in cities is driven by competition between elites to attract the resources and investment necessary to intensify land use. This intensification often progresses at the expense of development in less desirable locations. Investment in the luxury market has exacerbated the housing deficit in Florianópolis and environmental groups and neighborhood associations serve as the primary challengers to the overtly influential real estate developers. Constraints on use of protected areas has increased the possibility that developers will resort to illegal means to develop land, as seen in the most recent corruption case involving the environmental permitting office in Florianópolis (FLORAM). In parallel, population growth, in part driven by amenity migrants, has intensified favela growth and resulted in a pattern of socio-economic urban segregation that is characteristic of Brazil's larger cities. This segregation excludes low-income

residents from enjoying access to city amenities and access to a safe living environment. Multiple claims to land continue to result in conflict. Although conflict has led to institutional change such as the adoption of new zoning tools that allow for the use of preservation areas for low-cost housing. The introduction of another related strategic action field, organized around a disaster preparedness agenda, has the potential to address the condition of conflict by introducing a less politicized, or problematized, logic by emphasizing the risks associated with the development of certain terrains.

Fortunately, Florianópolis is particularly well postured to meet the call for innovation in identifying environmental solutions given the high density of technology companies and research institutes headquartered in the area. As solar distributed generation technologies have reached grid parity and net-metering laws have been established, increasing numbers of strategic actors with aligned interest are adopting renewable energy. This momentum can be appropriated by the local government to meet complementary goals including energy resiliency, a low-carbon footprint, and the marketing of eco-tourism. Energy storage, awaited by markets around the globe, will enhance the ability of municipalities such as Florianópolis to engage in substantive local energy and resiliency planning. Recent studies suggest there could be a 40% increase in stationary energy storage in developing countries by 2025 (IFC, 2017). While storage technology will likely have widespread deployment in countries still facing a need for rural electrification, it could well serve municipal governments in need of back-up power sources for critical infrastructure and first responders.

The degree to which cities have been able to alter path dependent business-as-usual practices and transition to practices intended to support long term environmental

and economic sustainability varies significantly worldwide. Urban Climate Action Plans and Climate Adaptation Plans are taking on grander and more visionary scales in global cities such as New York City, London, and Rotterdam as well as developing nation cities such as Quito, Ecuador and Durban, South Africa (Carmin, Anguelovski, & Roberts, 2012; Gallucci, 2013). Newly established departments or secretariats addressing sustainability in Florianópolis typically followed one of three patterns of creation: (1) the establishment of a council or center to debate objectives and determine budgetary and staff resources for creating a new municipal body, (2) the splintering of competency from an existing municipal body, or (3) the institutional grafting referenced in Chapter 4 (typically the result of a federal level mandate or recommendation of an international development finance institution) that results in the establishment of a new office within an existing municipal body. The observed changes suggest municipal governments have the ability to be nimble under the right conditions. While flexibility is needed in order to allow for transition, and is an important quality in urban planning, this flexibility is easily manipulated by city authorities and savvy developers. Online tools to enhance planning transparency, such as the Pubic Participation GIS used in Canela, Brazil, have been implemented in numerous countries and show promise as a tool for transparency and negotiation (Bugs et al., 2010).

One area for future research is a comprehensive evaluation of the transportation sector and possibilities for integrated land use planning in Florianópolis. BR-101 and Av. Rubens de Arruda Ramos, constructed in the 1970s, improved the connectivity of the island to the continent and considerably shifted local growth dynamics. For example, population and urban growth rates in the 1990s were predominantly in the dense city

center of Florianópolis and in the cities connected to Florianópolis by BR-101: São José and Palhoça. The construction of BR-282 later led to an increase in the growth rate along the road towards Santo Amaro da Imperatriz. The newer SC-408 and Treze de Maio Street, both built in 2000, noticeably increased growth inland towards Antônio Carlos, away from the urbanizing coastal areas (Lopes, 2015). While air quality has not been a problem on the island of Florianópolis to date, increasing traffic in the greater metropolitan area may become an issue over time. The Vehicle Pollution Control Plan (Law No. 8.723/1993 and Resolution CONAMA No. 418/2009) aims to reduce pollution from mobile sources and establish criteria for the Inspection and Maintenance Program for state and municipal vehicles. These federal laws should be complemented by local government initiatives in the greater metropolitan area given the growth rate of the city and the insufficient public bus transit system. Collective action groups have already emerged in the Florianópolis area and focus primarily on improving bus services and bike lanes. Drawing from the strategic action field of environmental organizations, the groups working to improve transportation in the city have made considerable strides. However, integrated land use planning by city authorities that incorporates transportation planning and land use planning could greatly benefit Florianópolis and will likely determine the long-term sustainability of the amenity-led growth model.

Municipal institutions in the study area face a significant challenge in identifying ways to effectively manage polycentric networks of power. Fostering effective cooperation across strategic action fields may require additional institutional capacity or the institutionalization of existing informal partnerships. The professionalization of many environmental NGOs opens new possibilities for partnerships between public

administration and non-profit organizations. Fligstein and McAdam (2012) suggest strategic action fields may be more stable the more connected they are to proximate action fields. Establishing mechanisms by which non-governmental partners can work autonomously under the authority of public authorities can help municipal authorities meet new managerial demands under sustainability regimes.

As seen in the case of the successful creation and co-management of the Parque da Luz, there are clear lines of authority over the functions of the park. While there are still needed improvements to the park, its management serves as a good example of ways in which civic associations and the municipal government can cooperate in the provision and maintenance of public land. The establishment of this park resulted from a long history of interaction between community associations and the local government. The success of this collaboration suggests that establishing a working relationship can foster future cooperation in keeping with the findings of game theory (Heide & Miner, 1992; Poppo, Zhou, & Ryu, 2008). The challenge is in leveraging this social capital while minimizing the possibility that conflict between diverse actors, including between neighborhood associations, can result in negative outcomes (as seen in the negotiation of the new Master Plan).

As cities continue to adopt climate and sustainability action plans, the ability of these plans to engender substantive change requires continual evaluation. Successful transition to sustainable urban form across social, environmental, and economic domains calls for new institutional arrangements. The combined effect of repeated actions of mobilization and innovation lead to the accumulation of sustainable practices and, potentially, the eventual stabilization of sustainable systems. This research has sought to

highlight the ways in which (1) group emergence and collective action can challenge the institutional status quo and (2) how group membership, and the social capital it fosters, “generate lines of action that (at least hypothetically) differ from those that would have unfolded in the absence of these constraining and enabling collective actors” (Clemens, 2007, p. 536). Fligstein and McAdam (2012, p. 186) suggest one drawback of a historical analysis of organizational fields is the tendency of such research to “take on a tone of inevitability where other paths could not have been pursued.” Challenges faced during the course of this research include the requirement to infer cultural meaning from the articulations and activities of individuals taking action within the strategic fields under review. The assumptions made in this dissertation are drawn from the indirect outputs of cognitive framing, such as documents and interviews, and as such could be further verified through additional systematic analyses such as coding or network analysis. Despite these challenges in verifying that actors do in fact believe what they say, the research offers an empirical account of a historical process toward sustainable development that seems to manifest in certain cities that follow a dual amenity and technology growth strategy. Similarities in pathways of sustainable development across different contexts warrants further analysis to verify the types of social and institutional capital that hasten sustainability. With sustainability policy being developed somewhere between objectivism and realism, the aim of this study was to return to what practitioners of planning actually do, and to consider the plays of power and institutional environments they navigate, in striving to create sustainable cities.



## APPENDIX A

### LAND USE QUESTIONNAIRE

#### Background of interviewee

What is your experience with sustainable urban planning in Florianópolis?

*Qual é a sua experiência com o planejamento urbano sustentável em Florianópolis?*

What do you think can be done to regularize informal housing in conservation areas in Florianópolis?

*O que você acha que pode ser feito para regularizar a moradia informal em áreas de conservação em Florianópolis?*

What could the city do differently to better serve people in need of low cost housing?

*O que a cidade poderia fazer de forma diferente para fornecer habitação de baixo custo?*

What do you think are the best sustainable development initiatives in the Florianópolis?

*O que você acha que são as melhores iniciativas de desenvolvimento sustentável em Florianópolis?*

What could the city do better to support sustainable land use?

*O que a cidade poderia fazer melhor para apoiar o uso sustentável da terra?*

What would make city sustainability initiatives more likely to succeed in the long term?

*O que tornaria as iniciativas de sustentabilidade da cidade mais propensas a ter êxito a longo prazo?*

#### Municipal Department - FLORAM

Have you ever had reason to work with FLORAM?

*Você já teve razão para trabalhar com a FLORAM?*

Do you think FLORAM supports sustainability in Florianópolis?

*Você acha que a FLORAM apoia a sustentabilidade em Florianópolis?*

What could FLORAM do better?

*O que a FLORAM poderia fazer melhor?*

#### Municipal Department - IPUF

What do you think about the master plan for the city and how it influences urban growth?

*O que você pensa sobre o plano diretor da cidade e como ele influencia o crescimento urbano?*

Do you think the master plan addresses sustainability?

*Você acha que o plano diretor aborda a sustentabilidade?*

What could IPUF do differently to better support sustainable growth?

*O que o IPUF poderia fazer de forma diferente para apoiar melhor o crescimento sustentável?*

## APPENDIX B

### ENERGY QUESTIONNAIRE

#### Background of interviewee

What is your background in energy?

*Qual é a sua experiência no sector de energia?*

What kind of energy projects have you been part of in Florianópolis?

*Que tipo de projetos de energia você participou em Florianópolis?*

Residential, commercial, office buildings?

*Residencial, comercial, edifícios de escritórios?*

Have you been involved in renewable or distributed generation projects? What kind?

*Você foi envolvido em projetos de geração renováveis ou distribuídos? Que tipo?*

How has your experience been coordinating with CELESC?

*Como sua experiência foi coordenada com a companhia CELESC?*

Do you collaborate or regularly meet with any other organizations or groups?

*Você colabora ou se reúne regularmente com outras organizações ou grupos?*

#### Municipal Energy Projects and Permitting

Have you been involved in any energy projects of the municipal government? What kind?

*Você foi envolvido em projetos de energia do governo municipal? Que tipo?*

What department or departments do you have to work with to install a solar unit?

*Qual departamento ou departamentos você tem que trabalhar para instalar uma unidade solar?*

Was there inter-departmental collaboration on the initiative?

*Houve colaboração interdepartamental na iniciativa?*

Is there a process for registering electrical contractor for distributed generation?

*Existe um processo para registrar o contratante elétrico para a geração distribuída?*

Has the city created new permitting protocols related to distributed generation?

*A cidade criou novos protocolos de licenciamento relacionados à geração distribuída?*

#### Market Challenges

What federal, state, or local incentives have had an impact on the distributed generation market?

*Quais incentivos federais, estaduais ou locais tiveram impacto no mercado de geração distribuída?*

What challenges have you faced? Future directions?

*Que desafios você enfrentou? Direções futuras?*

## APPENDIX C

### ABBREVIATIONS AND ACRONYMS

AAPLuz	Association of Friends of Parque da Luz
ACATE	Santa Catarina Association of Technology Companies
AEIS	Areas of Social Interest
AER	Rural Exploitation Areas
AMA	Environmental Advisory Office
ANEEL	Brazilian Electricity Regulatory Agency
APL	Preservation Areas with Limited Use
APP	Areas of Permanent Preservation
APRENDER	Actions for the Preservation of Natural Resources and Rational Economic Development
BNDES	National Bank for Economic and Social Development
BRDE	Regional Development Bank of the South
CASAN	Catarinense Water and Sanitation Company
CBD	Convention on Biological Diversity
CCD	Convention to Combat Desertification
CCEE	Chamber of Commercialization of Electrical Energy
CCP	Cities for Climate Protection Programme
CDE	Energy Development Fund
CEBRAP	Brazilian Center for Analysis and Planning
CECCA	Center for Cultural Studies and Citizenship
CELESC	Central Electric of Santa Catarina
CELTA	Business Center for Advanced Technologies
CEM	Center for Metropolitan Studies
CEPA	Center for Environmental Studies and Projects
CEPED	Center for Studies and Research on Disasters
CERTI	Regional Center for Information Technology
CIDES	Inter-Ministerial Commission for Sustainable Development
CIRM	Inter-Ministerial Commission of Marine Resources

CNPE	National Council for Energy Policy
CNPq	National Scientific and Technological Development Council
COBRAPA	Brazilian Confederation of Pádel
COFINS	Contribution for Social Security Financing
COMCAP	Capital Improvements Company
COMDEMA	Municipal Council for Environmental Defense in Florianópolis
COMDEC	Municipal Coordination Office for Civil Defense
COMDES	Metropolitan Council for the Development of Greater Florianópolis
CONAMA	National Council for the Environment
CONDEC	National Council of Civil Defense
CONSEMA	State Environmental Council
COSIP	Contribution for the Cost of Public Lighting tax
COTESPHAN	Technical Commission of Service of Artistic and Natural Patrimonial History of the City
CPRM	Mineral Resources Research Company
DETRAN	State Transport Department
DFI	Development Finance Institution
DG	Distributed Generation
DTN	Digital terrain model
ECLAC	Economic Commission for Latin America and the Caribbean
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
EPA	Environmental Protection Agency
ESC	Emerging and Sustainable Cities
ESCO	Energy Service Companies
FACISC	Federation of Industries of the State of Santa Catarina
FAPESC	Foundation for Research Support of the State of Santa Catarina
FATMA	Environmental Foundation of the State of Santa Catarina
FECASURF	Catarinense Federation of Surf
FEE	Foundation for Environmental Education

FEEC	Federation of Ecological Entities of Santa Catarina
FEHIS	State-level housing funds
FLORAM	Municipal Environment Foundation of Florianópolis
FMHIS	Municipal-level housing funds
FNHIS	National Social Interest Housing Fund
FSC	Forest Stewardship Council
FUMDEC	Municipal Emergency Fund for Civil Defense in Florianópolis
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i> German development agency
GRANFPOLIS	Association of Municipalities of the Greater Florianopolis Region
IAD	Institutional Analysis and Development
IBAM	Brazilian Association for Municipal Administration
IBAMA	Brazilian Institute for the Environment and Renewable Natural Resources
IBGE	Brazilian Institute of Geography and Statistics
ICLEI	Local Governments for Sustainability
ICMBio	Chico Mendes Institute for Biodiversity Conservation
ICMS	State sales and service tax
IDB	Inter-American Development Bank
IDEAL	Institute for the Development of Alternative Energies in Latin America
INDESSC	Institute for Sustainable Development of Santa Catarina
INPE	National Institute of Space Research
INMETRO	National Institute of Meteorology, Standardization, and Industrial Quality
IPCC	Intergovernmental Panel on Climate Change
IPHAN	National Historic and Artistic Heritage Institute
IPT	Institute for Technological Research
IPTU	Real estate taxes
IPUF	Urban Planning Institute of Florianópolis

ISS	City service taxes
ITPU	Federal tax on urban property
IUCN	International Union for Conservation of Nature
LED	Light-emitting diode
LEED	Leadership in Energy and Design Environmental
MC	Ministry of Cities
MDGs	Millennium Development Goals
MEL	Free Ecological Movement
MHDI	Municipal Human Development Index
MME	Ministry of Mines and Energy
MPF	Federal Public Ministry
MSA	Metropolitan Statistical Areas
NCCP	National Climate Change Policy
NDCs	Nationally Determined Contributions
NESSOP	Studies and Research in Social Work and Popular Organization
NGO	Non-Governmental Organization
NREL	National Renewable Energy Laboratory
OIKOS	Union of the Defenders of the Earth
ONS	National Electrical System Operator
OPEC	Organization of the Petroleum Exporting Countries
PAR	Residential Lease Program
PDE	Ten-year Energy Expansion Plan
PIS	Social Integration Program
PMDB	Brazilian Democratic Movement Party
PMHIS	Municipal Plan for Social Housing
PMRR	Municipal Plan for Risk Reduction
PNE	National Energy Plan
PNEF	National Energy Efficiency Plan
PNMC	National Climate Change Plan

PP	Progressive Party
PPA	Power Purchase Agreements
PPP	Public-Private Partnership
PROCON	Department of Consumer Defense
PROEOLICA	Program for the Development of the Wind Power Production Chain
PROGD	Distributed Generation Development Program for Energy
PROINFA	Program to Incentivize Alternative Energy Sources
PT	Worker's Party
PV	Green Party
RECEPET	Network of Entities for Technological Development
RIMA	Environmental Impact Report
RMF	Metropolitan Region of Greater Florianópolis
RPPN	Private Reserves of Natural Heritage
SAIDU	System of Evaluation of Urban Performance Indicators
SDGs	Sustainable Development Goals
SDS	State Secretary of Sustainable Economic Development
SEDEC	National Secretariat of Civil Defense
SEMA	Special Secretariat of the Environment
SES	Social-Ecological System
SESP	Executive Secretariat of Public Services
SIN	National Interconnected System
SINDEC	National Civil Defense System
SISNAMA	National Environmental System
SMDU	Municipal Secretariat of Environment and Urban Development
SMGPU	Municipal Urban Policy Management System
SMHSA	Municipal Secretary of Housing and Environmental Sanitation
SNHIS	National System for Special Interest Housing
SUSP	Secretariat of Urban and Public Services
TELESC	Telecommunications of Santa Catarina

UFECO	Florianópolis Union of Community Entities
UFSC	Federal University of Santa Catarina
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Program
UNDESA	United Nations Department of Economic and Social Affairs
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WCED	World Commission on Environment and Development
ZEIS	Special Zones of Social Interest



## APPENDIX D

TIMELINE OF CREATION OF MUNICIPAL BODIES AND PARKS IN  
FLORIANOPOLIS, 1965-2016

Year	Municipal Offices and Federal Laws	Conservation Units (and related actions)	Mayor <sup>77</sup>
	Mayor's Office (1889)		
	Attorney General of the Municipality (1956)		
	Civil House (1889)	First Master Plan (1952)	Paulo Fontes
	Municipal Secretariat of Public Works (1956)		
	Professor Barreiros Filho Municipal Library (1956)	Forest Station of Rio Vermelho 1962	
1965			Osvaldo Machado
1966	Municipal Secretariat of the Continent	Council of Engineering, Architecture and Urbanism	Acácio Garibaldi Santiago
1967			Acácio Garibaldi Santiago
1968			Acácio Garibaldi Santiago
1969		Integrated Development Plan of Greater Florianópolis was developed by the Santa Catarina Planning Office (ESPLAN)	Acácio Garibaldi
1970			Ari Oliveira
1971	Capital Improvements Company (Comcap)		Ari Oliveira
1972	Municipal Development Council Law No. 1110/72		Ari Oliveira
1973	Civil Defense		Ari Oliveira
1974	Secretariat of Education, Health and Social Assistance, the Service of Historic, Artistic and Natural Heritage of the Municipality (SPHAM)	Florianópolis is the first Brazilian municipality to establish municipal legislation to protect its historical, artistic and natural heritage Law No. 1202/74	Nilton Severo da Costa
1975			Nilton Severo da Costa
1976		Florianópolis Master Plan (Law 1440) <i>Diretrizes de Uso do Solo para o Aglomerado Urbano de Florianópolis</i> – AUF	Esperidião Amin
1977		Urban Planning Institute of Florianópolis	Esperidião Amin

<sup>77</sup> Interim Mayors and Mayors appointed for provisional purposes are not included.

		Park of Tabuleirinho State Law No. 2335/77	Nagib Jabor
1978			Nagib Jabor
1979	Municipal Secretariat of Administration Executive Secretary of Public Services Secretariat of Education, Health and Social Development Municipal Development Council to include a member of FATMA Law No. 1674/79		Francisco de Assis Cordeiro
1980			Francisco de Assis Cordeiro
1981	National Environmental Policy (NEP) Law No. 6938 Plan for Tourist Development (AUF)	Municipal Park Lagoa do Peri Law No. 1828/81	Francisco de Assis Cordeiro
1982		Slopes Law No. 1851/82	Francisco de Assis Cordeiro
1983			Cláudio Ávila da Silva
1984			Cláudio Ávila da Silva
1985	Municipal Secretariat of Education	Declaration of the coastal villages of the Island of Santa Catarina as areas of special interest for tourism: Establishment of Regulations for Zoning, Use and Occupation of Soil Law. No. 2193/85	Aloísio Piazza
		Restinga of Ponta das Canas, Restinga of Ponta do Sambaqui Dec. 216/85, Dec. 112/85	Aloísio Piazza
		Dunes of Ingleses, Santinho, Campeche, Armação, and Pântano do Sul Dec. 112/85	Aloísio Piazza
		Mangroves of Tapera Lei 2193/85	Aloísio Piazza
		Slope Preservation Law No. 2193/85	Aloísio Piazza
1986		Region of Costa da Lagoa Dec. 247/86	Edison Andrino de Oliveira
1987	Municipal Secretariat of Tourism, Culture and Sports Franklin Cascaes Cultural Foundation of Florianópolis (FCFFC)	Ecological Station of Carijós Dec. Fed. 94656/87	Edison Andrino de Oliveira

1988		Lagoa da Chica, Lagoinha Pequena Dec. 135/88	Edison Andrino de Oliveira
		Municipal Park of Dunas da Lagoa da Conceição Mun. Law No. 231/88	Edison Andrino de Oliveira
1989	Municipal Secretariat of Health Municipal Fund for Cinema	Mayor Esperidião, in his second term, consolidates the 10 areas of the Central Urban Area and creates compensation mechanisms such as the transfer of construction indices ( <i>índices de construção</i> )	Esperidiao Amin
1990			Esperidiao Amin
1991			Antônio Henrique Bulcão Viana
1992	Municipal Secretariat of Tourism Creation of the Environmental Education Prize Law No. 3740/92	Dunes of Barra da Lagoa Law No. 3711/92	Antônio Henrique Bulcão Viana
		Mangroves of Rio Tavares ( <i>Reserva Extrativista Marinha do Pirajubaé</i> ) Dec. Fed. 533/92	Antônio Henrique Bulcão Viana
		Municipal Park of Lagoinha do Leste Mun. Law No. 4701/92	Antônio Henrique Bulcão Viana
		Municipal Park of Galheta Mun. Law No. 3455/92 and 698/94	Antônio Henrique Bulcão Viana
1993	Municipal Council for Environmental Protection Law No. 4117/93 Municipal Secretariat of Social Assistance		Sérgio Grando
1994			Sérgio Grando
1995	Municipal Secretariat of Environment and Urban Development Municipal Environment Foundation of Florianópolis	Municipal Park of Maciço da Costeira Mun. Law No. 4605/95 and 154/95	Sérgio Grando
1996			Sérgio Grando
1997	Municipal Secretariat of Housing and Environmental Sanitation	<i>Distrito Sede</i> <i>Lei Complementar 001/97</i> <i>APC -Áreas de Preservação</i> <i>Cultural</i>	Ângela Amin
1998			Ângela Amin
1999		Municipal Park - Luz (Hercílio Luz Bridge) Com. Law 051, 1999	Ângela Amin
2000			Ângela Amin

2001	Federal Law No. 10257 City Statute		Ângela Amin
2002		Mangroves of Itacorubi Dec. Mun. 1529/2002	Ângela Amin
2003	Institute of Florianópolis for the Generation of Opportunities	Municipal Secretariat of Urban Mobility Municipal Secretariat of Safety and Traffic Management	Ângela Amin
2004	Municipal Guard		Ângela Amin
2005	Municipal Secretariat of Social Communication Municipal Directorate of Consumer Protection	Urban Park of Morro da Cruz Mun. Law No. 6893/2005	Dário Berger
2006	Health and Environmental Surveillance		Dário Berger
2007	Municipal Council for the Promotion of Equality and the Coordination of Public Policies for the Promotion of Racial Equality (COPPIR) Open University of Brazil in Florianópolis	State Park of Rio Vermelho Dec. 308/2007	Dário Berger
2008	Coordinator for Women		Dário Berger
2009	Municipal Secretariat of Science, Technology and Sustainable Economic Development Coordinator for Youth Board of Control, Evaluation and Auditing		Dário Berger
2010			Dário Berger
2011			Dário Berger
2012	Forest Code Law No. 12.651 Municipal Secretariat of Communication		Dário Berger
2013	Municipal Secretariat of Culture Municipal Secretariat of Finance, Planning and Budget Board of Electronic Government Free Music School Florianópolis Welfare Institute	Municipal Secretariat of Fishing, Mariculture and Agriculture	Cesar Souza Junior
2014	Municipal Secretariat for Transparency and Control		Cesar Souza Junior
2015	Municipal Secretariat of Consumer Protection		Cesar Souza Junior
2016			Cesar Souza Junior

## BIBLIOGRAPHY

- Adams, J. (1996). Principals and Agents, Colonialists and Company Men: The Decay of Colonial Control in the Dutch East Indies. *American Sociological Review*, 61. Retrieved from [http://www.academia.edu/2798529/Principals\\_and\\_agents\\_colonialists\\_and\\_company\\_men\\_The\\_decay\\_of\\_colonial\\_control\\_in\\_the\\_Dutch\\_East\\_Indies](http://www.academia.edu/2798529/Principals_and_agents_colonialists_and_company_men_The_decay_of_colonial_control_in_the_Dutch_East_Indies)
- Adger, W. N. (2003). Social Capital, Collective Action, and Adaptation to Climate Change. *Economic Geography*, 79(4), 387–404. <https://doi.org/10.1111/j.1944-8287.2003.tb00220.x>
- Adger, W. N. (2010). Social capital, collective action and adaptation to climate change. In M. Voss (Ed.), *Der Klimawandel: Sozialwissenschaftliche Perspektiven* (pp. 327–345). Wiesbaden: VS-Verlag für Sozialwissenschaften. Retrieved from <https://ueaeprints.uea.ac.uk/21446/>
- Agrawal, A. (2001). Common Property Institutions and Sustainable Governance of Resources. *World Development*, 29(10), 1649–1672.
- Alden, D. (1996). *The Making of an Enterprise: The Society of Jesus in Portugal, Its Empire, and Beyond, 1540-1750*. Stanford University Press.
- Almeida, C. S. (2008). *Final da década de 1920 em Florianópolis: a construção do Miramar e a urbanização da cidade*. Universidade Federal de Santa Catarina, Florianópolis.
- America do Sol. (2016). The Brazilian Atlas for Solar Energy. Retrieved February 8, 2017, from <http://americadosol.org/en/the-brazilian-atlas-for-solar-energy/>
- ANEEL - Agência Nacional de Energia Elétrica. (September 2016a). *Informacoes Gerenciais*. Retrieved from <http://www.aneel.gov.br/documents/656877/14854008/Boletim+de+Informa%C3%A7%C3%B5es+Gerenciais+-+3%C2%B0+trimestre+de+2016/a4192798-adf3-4902-b2ae-098033e69f5c>
- ANEEL - Agência Nacional de Energia Elétrica. (February 2016b). Novas regras para geração distribuída entram em vigor. Retrieved September 2, 2016, from [http://www2.aneel.gov.br/aplicacoes/noticias/Output\\_Noticias.cfm?Identidade=9086&id\\_area=90](http://www2.aneel.gov.br/aplicacoes/noticias/Output_Noticias.cfm?Identidade=9086&id_area=90)
- ANEEL - Agência Nacional de Energia Elétrica. (2017). BIG - Banco de Informações de Geração, Santa Catarina. Retrieved February 6, 2017, from <http://www2.aneel.gov.br/aplicacoes/ResumoEstadual/CapacidadeEstado.cfm>
- Angelovski, I., & Carmin, J. (2011). Something borrowed, everything new: innovation

- and institutionalization in urban climate governance. *Current Opinion in Environmental Sustainability*, 3(3), 169–175.  
<https://doi.org/10.1016/j.cosust.2010.12.017>
- Aoki, M. (2001). *Toward a Comparative Institutional Analysis*. MIT Press.
- Aoki, M. (2007). Endogenizing institutions and institutional changes. *Journal of Institutional Economics*, 3(1), 1–31. <https://doi.org/10.1017/S1744137406000531>
- Aoki, M., Kim, H.-K., & Okuno-Fujiwara, M. (1997). *The Role of Government in East Asian Economic Development: Comparative Institutional Analysis*. Clarendon Press.
- Araujo, A. L. (2005). Encontros difíceis: O artista-herói e os índios corrompidos no relato de viagem Deux Années au Brésil 1862. *Luso-Brazilian Review*, 42(2), 15–39.  
<https://doi.org/10.1353/lbr.2006.0002>
- Arcadis. (2016). *Sustainable Cities Index 2016*. Retrieved from  
<https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2016/>
- Armstrong, E. A. (2002). *Forging Gay Identities: Organizing Sexuality in San Francisco, 1950-1994*. University of Chicago Press.
- Avakian, T. (2016). The 20 most expensive US cities for renters. Retrieved July 21, 2017, from <http://www.businessinsider.com/the-most-expensive-places-for-rent-in-us-2016-4>
- Aylett, A. (2015). Institutionalizing the urban governance of climate change adaptation: Results of an international survey. *Urban Climate*, 14, Part 1, 4–16.  
<https://doi.org/10.1016/j.uclim.2015.06.005>
- Aznar, A., Day, M., Doris, E., Mathur, S., & Donohoo-Vallett, P. (2015). City-Level Energy Decision Making: Data Use in Energy Planning, Implementation, and Evaluation in U.S. Cities. National Renewable Energy Laboratory. Retrieved from <http://www.ourenergypolicy.org/wp-content/uploads/2015/08/64128.pdf>
- Bäckstrand, K., & Lövbrand, E. (2015). *Research Handbook on Climate Governance*. Edward Elgar Publishing.
- Bai, X., McAllister, R. R., Beaty, R. M., & Taylor, B. (2010). Urban policy and governance in a global environment: complex systems, scale mismatches and public participation. *Current Opinion in Environmental Sustainability*, 2(3), 129–135. <https://doi.org/10.1016/j.cosust.2010.05.008>
- Baptista, S. R. (2008a). *Forest recovery and just sustainability in the Florianópolis city-*

- region*. ProQuest. Retrieved from [https://books.google.com.br/books?hl=en&lr=&id=1ywG\\_vNR7v8C&oi=fnd&pg=PR2&dq=sandra+baptista+florianopolis&ots=hRoYzgt3Hq&sig=nUaeqo1sluhy-T1ji1DrvnUMyHw](https://books.google.com.br/books?hl=en&lr=&id=1ywG_vNR7v8C&oi=fnd&pg=PR2&dq=sandra+baptista+florianopolis&ots=hRoYzgt3Hq&sig=nUaeqo1sluhy-T1ji1DrvnUMyHw)
- Baptista, S. R. (2008b). Metropolitanization and forest recovery in southern Brazil: a multiscale analysis of the Florianópolis city-region, Santa Catarina State, 1970 to 2005. *Ecology and Society*, 13(2), 5.
- Baptista, S. R. (2010). Metropolitan land-change science: A framework for research on tropical and subtropical forest recovery in city-regions. *Land Use Policy*, 27(2), 139–147.
- Baptista, S. R., & Rudel, T. K. (2006). A re-emerging Atlantic forest? Urbanization, industrialization and the forest transition in Santa Catarina, southern Brazil. *Environmental Conservation*, 33(03), 195–202.
- Barbier, E. B. (1987). The Concept of Sustainable Economic Development. *Environmental Conservation*, 14(02), 101. <https://doi.org/10.1017/S0376892900011449>
- Barman, R. J. (1999). *Citizen Emperor: Pedro II and the Making of Brazil, 1825-1891*. Stanford University Press.
- Bartelmus, P. (1986). *Environment and Development*. Allen & Unwin.
- Bastos, J. M. (2000). Urbanização, comércio e pequena produção mercantil pesqueira na Ilha de Santa Catarina. In M. A. Santos (Ed.), *Ensaio sobre a Ilha de Santa Catarina*. Florianópolis: Letras Contemporâneas.
- Bastos, M. (2004). *Atlas do município de Florianópolis* (p. 166). Florianópolis: Instituto de Planejamento Urbano de Florianópolis (IPUF).
- Basurto, X., & Ostrom, E. (2009). Beyond the tragedy of the Commons. *ECONOMIA DELLE FONTI DI ENERGIA E DELL'AMBIENTE*. <https://doi.org/10.3280/EFE2009-001004>
- Bell, S. (1, 2), & Morse, S. (3). (2012). *Sustainability indicators: Measuring the immeasurable? Second edition*. Taylor and Francis.
- Bergh, J. C. J. M. van den, & Bruinsma, F. R. (2008). *Managing the Transition to Renewable Energy: Theory and Practice from Local, Regional and Macro Perspectives*. Edward Elgar Publishing.
- Berkes, F., Colding, J., & Folke, C. (2008). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press.

- Bimber, B., Flanagan, A., & Stohl, C. (2012). *Collective Action in Organizations: Interaction and Engagement in an Era of Technological Change*. New York: Cambridge University Press.
- Birkeland, J. (2012). Design Blindness in Sustainable Development: From Closed to Open Systems Design Thinking. *Journal of Urban Design*, 17(2), 163–187. <https://doi.org/10.1080/13574809.2012.666209>
- Blackstock, K. L., & Carter, C. E. (2007). Operationalising sustainability science for a sustainability directive? Reflecting on three pilot projects. *Geographical Journal*, 173(4), 343–357. <https://doi.org/10.1111/j.1475-4959.2007.00258.x>
- Blau, P. M., & Scott, W. R. (1962). *Formal Organizations: A Comparative Approach*. Stanford Business Books.
- Bloom, B., Nobe, M., & Nobe, M. (2011). Valuing Green Home Designs: A Study of ENERGY STAR® Homes. *Journal of Sustainable Real Estate*, 3(1), 109–126. <https://doi.org/10.5555/jsre.3.1.a611518768931237>
- Bonomo, M., Angrizani, R. C., Apolinaire, E., & Noelli, F. S. (2015). A model for the Guaraní expansion in the La Plata Basin and littoral zone of southern Brazil. *Quaternary International*, 356, 54–73.
- Bourdieu, P. (1977). *Outline of a Theory of Practice*. Cambridge University Press.
- Bourdieu, P., & Wacquant, L. J. D. (1992). *An Invitation to Reflexive Sociology*. University of Chicago Press.
- Brazilian Institute of Geography and Statistics (IBGE). (2010). Censo 2010 - Atlas Demográfico. Retrieved from <http://censo2010.ibge.gov.br/apps/atlas/>
- Broekhoven, S. van, Boons, F., Buuren, A. van, & Teisman, G. (2015). Boundaries in action: a framework to analyse boundary actions in multifunctional land-use developments. *Environment and Planning C: Government and Policy*, 33(5), 1005–1023. <https://doi.org/10.1177/0263774X15605927>
- Brueckner, J., Thisse, J.-F., & Zenou, Y. (1999). Why is central Paris rich and downtown Detroit poor?: An amenity-based theory. *European Economic Review*, 43(1), 91–107.
- Bueno, A. P. (2006, October 24). *Patrimônio paisagístico e turismo na ilha de Santa Catarina: a premência da paisagem no desenvolvimento sustentável da atividade turística* (text). Universidade de São Paulo. Retrieved from <http://www.teses.usp.br/teses/disponiveis/16/16138/tde-28022007-124752/>



- Bugs, G., Granell, C., Fonts, O., Huerta, J., & Painho, M. (2010). An assessment of Public Participation GIS and Web 2.0 technologies in urban planning practice in Canela, Brazil. *Cities*, 27(3), 172–181. <https://doi.org/10.1016/j.cities.2009.11.008>
- Bulkeley, H. (2010). Cities and the Governing of Climate Change. *Annual Review of Environment and Resources*, 35, 229–53.
- Bulkeley, H., Broto, V. C., & Maassen, A. (2014). Low-carbon Transitions and the Reconfiguration of Urban Infrastructure. *Urban Studies*, 51(7), 1471–1486. <https://doi.org/10.1177/0042098013500089>
- Bulkeley, H., & Castán Broto, V. (2013). Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers*, 38(3), 361–375. <https://doi.org/10.1111/j.1475-5661.2012.00535.x>
- Bulkeley, H., Schroeder, H., Janda, K., & Zhao, J. (2009). Cities and Climate Change: The role of institutions, governance and urban planning. *ResearchGate*. Retrieved from [https://www.researchgate.net/publication/254888120\\_Cities\\_and\\_Climate\\_Change\\_The\\_role\\_of\\_institutions\\_governance\\_and\\_urban\\_planning](https://www.researchgate.net/publication/254888120_Cities_and_Climate_Change_The_role_of_institutions_governance_and_urban_planning)
- CAIXA. (2016). CAIXA's Best Practices Programme. Retrieved May 27, 2016, from [http://www1.caixa.gov.br/mpraticas/sobre\\_caixa.asp](http://www1.caixa.gov.br/mpraticas/sobre_caixa.asp)
- California ISO. (2016). *What the duck curve tells us about managing a green grid*. Retrieved from [https://www.caiso.com/Documents/FlexibleResourcesHelpRenewables\\_FastFacts.pdf](https://www.caiso.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf)
- Campos, N. J. (1991). *Terras comunais na Ilha de Santa Catarina*. Florianópolis: Editora da UFSC/ Fundação Catarinense de Cultura.
- Carmin, J., Anguelovski, I., & Roberts, D. (2012). Urban Climate Adaptation in the Global South Planning in an Emerging Policy Domain. *Journal of Planning Education and Research*, 32(1), 18–32. <https://doi.org/10.1177/0739456X11430951>
- Caruso, M. M. L. (1990). *O desmatamento da Ilha de Santa Catarina de 1500 aos dias atuais*. Florianópolis: Editora da UFSC.
- Castellani, B., & Hafferty, F. W. (2009). *Sociology and Complexity Science: A New Field of Inquiry*. Springer Science & Business Media.
- CBRE. (2016). 2017 Scoring Tech Talent. Retrieved July 21, 2017, from <http://www.cbre.us/research-and-reports/Scoring-Tech-Talent-2017>

- CEEESA. (2016). Energy Systems - Energy, Environment, and Economics. Retrieved July 31, 2017, from <http://ceesa.es.anl.gov/>
- CELESC. (2015). *Annual Sustainability Report*. Florianópolis, Brazil.
- CELESC. (2017). Histórico. Retrieved February 8, 2017, from <http://www.celesc.com.br/portal/index.php/celesc-holding/historico-holding>
- Center for Climate and Energy Solutions (C2ES). (2017). Hydropower | Center for Climate and Energy Solutions. Retrieved February 13, 2017, from <https://www.c2es.org/technology/factsheet/hydropower>
- Center for International Earth Science Information Network, & Earth Institute, Columbia University. (2015). A Spatial Analysis of the 2008 Itajaí River Valley Disaster. Retrieved May 28, 2016, from <http://blogs.ei.columbia.edu/2014/03/07/a-spatial-analysis-of-the-2008-itajai-river-valley-disaster-in-southern-brazil/>
- Centre for Disaster Studies and Research, Federal University of Santa Catarina (CEPED/UFSC). (2013). *Atlas brasileiro de desastres naturais 1991 a 2012* (p. 126). Universidade Federal de Santa Catarina.
- Centre for Research on the Epidemiology of Disasters (CRED). (2017). EM-DAT | The international disasters database. Retrieved February 21, 2017, from <http://www.emdat.be/>
- Centro Universitário de Estudos e Pesquisas sobre Desastres, Universidade Federal de Santa Catarina (CEPED). (2007). Plano Municipal de Redução de Riscos (PMRR). Retrieved from [http://www.ceped.ufsc.br/wp-content/uploads/2015/06/PMRR\\_Fpolis.pdf](http://www.ceped.ufsc.br/wp-content/uploads/2015/06/PMRR_Fpolis.pdf)
- Centro Universitário de Estudos e Pesquisas sobre Desastres, Universidade Federal de Santa Catarina (CEPED). (2012). Inscrições para o curso EaD Capacitação Básica em Defesa Civil – 2ª edição | CEPED UFSC. Retrieved May 27, 2016, from <http://www.ceped.ufsc.br/inscricoes-para-o-curso-ead-capacitacao-basica-em-defesa-civil-2a-edicao/>
- Centro Universitário de Estudos e Pesquisas sobre Desastres, Universidade Federal de Santa Catarina (CEPED). (2014). Assessoria Técnica e Avaliação de Municípios – Relatório. Retrieved from <http://www.ceped.ufsc.br/wp-content/uploads/2014/01/2014-041-RELATORIO-FINAL.pdf>
- CERTI Foundation. (2017). Technological Competencies. Retrieved July 31, 2017, from <http://www.certi.org.br/en/>
- City of Boulder. (2017). Open Space and Mountain Parks. Retrieved July 21, 2017, from

<https://boulder.colorado.gov/osmp>

- Clark, G. L., Gertler, M. S., Feldman, M. P., & Williams, K. (2003). *The Oxford Handbook of Economic Geography*. OUP Oxford.
- Clark, T. N., Lloyd, R., Wong, K. K., & Jain, P. (2002). Amenities Drive Urban Growth. *Journal of Urban Affairs*, 24(5), 493–515. <https://doi.org/10.1111/1467-9906.00134>
- Clark, W. C., & Dickson, N. (2003). Sustainability science: The emerging research program. *Proceedings of the National Academy of Sciences*, 100(14), 8059–8061.
- Clean Energy Group. (2016). Sterling Municipal Substation. Retrieved February 15, 2017, from <http://www.cleanegroup.org/ceg-projects/resilient-power-project/featured-installations/sterling/>
- Clemens, E. S. (1997). *The People's Lobby: Organizational Innovation and the Rise of Interest Group Politics in the United States, 1890-1925*. Chicago: University of Chicago Press.
- Clemens, E. S. (2007). Toward a Historicized Sociology: Theorizing Events, Processes, and Emergence. *Annual Review of Sociology*, 33(1), 527–549. <https://doi.org/10.1146/annurev.soc.33.040406.131700>
- Clemens, E. S., & Cook, J. M. (1999). Politics and Institutionalism: Explaining Durability and Change. *Annual Review of Sociology*, 25, 441–466.
- Cohen, D. A. (2013). A Most-People's Climate Movement? *NACLA Report on the Americas*, 46(1), 50–54. <https://doi.org/10.1080/10714839.2013.11722012>
- Colak, I., Fulli, G., Sagioglu, S., Yesilbudak, M., & Covrig, C.-F. (2015). Smart grid projects in Europe: Current status, maturity and future scenarios. *Applied Energy*, 152, 58–70. <https://doi.org/10.1016/j.apenergy.2015.04.098>
- Cole, L. W., & Foster, S. R. (2001). *From the Ground Up: Environmental Racism and the Rise of the Environmental Justice Movement*. NYU Press.
- Colten, C. E., Kates, R. W., & Laska, S. B. (2008). Community Resilience: Lessons from New Orleans and Hurricane Katrina. Community and Regional Resilience Initiative. Retrieved from <http://rwkates.org/pdfs/a2008.03.pdf>
- COMCAP. (2014). *Plano de Ações da COMCAP para 2014 Metas sob responsabilidade do Departamento Técnico – DPTE*. Florianópolis. Retrieved from <https://www.jundiai.sp.gov.br/servicos-publicos/wp-content/uploads/sites/18/2014/11/23-Marius.pdf>

- Commons, J. R. (1924). *Legal Foundations of Capitalism*. Transaction Publishers.
- Compact of Mayors. (2016). Florianópolis is taking action on climate change. Retrieved January 21, 2017, from <https://www.compactofmayors.org/cities/florianopolis/>
- Correa, C. H. P. (2004). *História de Florianópolis Ilustrada*. Florianópolis: Insular.
- Corrêa da Silva, R., de Marchi Neto, I., & Silva Seifert, S. (2016). Electricity supply security and the future role of renewable energy sources in Brazil. *Renewable and Sustainable Energy Reviews*, 59, 328–341.  
<https://doi.org/10.1016/j.rser.2016.01.001>
- Da Costa Silva, G. (2010). Environmental justice: a case of socio-environmental vulnerability in Rio De Janeiro. *Aspects de l'environnement Urbain Au Brésil*, 4. Retrieved from <https://eue.revues.org/743>
- Da Silva, A. (2008). *A ILHA DE SANTA CATARINA E SUA TERRA FIRME: Estudo sobre o governo de uma capitania subalterna (1738-1807)*. Universidade de São Paulo, São Paulo, Brazil. Retrieved from <https://ri.ufs.br/bitstream/123456789/1587/1/SantaCatarinaCapitania.pdf>
- Dastrup, S., Zivin, J. S. G., Costa, D. L., & Kahn, M. E. (2011). *Understanding the Solar Home Price Premium: Electricity Generation and* (Working Paper No. 17200). National Bureau of Economic Research. <https://doi.org/10.3386/w17200>
- Davis, G. F., & Greve, H. R. (1997). Corporate Elite Networks and Governance Changes in the 1980s. *American Journal of Sociology*, 103(1), 1–37.  
<https://doi.org/10.1086/231170>
- Davis, G. F., McAdam, D., Scott, W. R., & Zald, M. N. (2005). *Social Movements and Organization Theory*. Cambridge University Press.
- De Assis, L. (2000). *Planos, Ações e Experiências na transformação da “pacata” Florianópolis em capital turística*. Universidade Federal de Santa Catarina, Florianópolis, Brazil.
- De Mello, F. (2006). *Aetchá Nhanderukuary Karai Retarã: Entre deuses e animais: Xamanismo, Pa rentesco e Transformação entre os Chiripá e Mbyá Guarani*. Universidade Federal de Santa Catarina, Florianópolis, Brazil. Retrieved from <https://repositorio.ufsc.br/bitstream/handle/123456789/88608/235594.pdf?sequence=1&isAllowed=y>
- De Soto, H. (1989). *The Other Path: The Invisible Revolution in the Third World*. New York: Harper & Row,.
- Deller, S. C., Tsai, T.-H. (Sue), Marcouiller, D. W., & English, D. B. K. (2001). The Role

- of Amenities and Quality of Life In Rural Economic Growth. *American Journal of Agricultural Economics*, 83(2), 352–365. <https://doi.org/10.1111/0002-9092.00161>
- De Olho Na Ilha, R. |. (2015, March 17). Prefeitura começa a troca de semáforos em Florianópolis | Notícias. Retrieved February 9, 2017, from <http://www.deolhonailha.com.br/florianopolis/noticias/prefeitura-comeca-a-troca-de-semaforos-em-florianopolis.html>
- Department of Energy (DOE). (2007). *The potential benefits of distributed generation and rate-related issues that may impede their expansion* (A Study Pursuant to Section 1817 of the Energy Policy Act of 2005). Retrieved from <https://www.ferc.gov/legal/fed-sta/exp-study.pdf>
- Dewald, U., & Truffer, B. (2012). The Local Sources of Market Formation: Explaining Regional Growth Differentials in German Photovoltaic Markets. *European Planning Studies*, 20(3), 397–420. <https://doi.org/10.1080/09654313.2012.651803>
- Diario Catarinense (DC). (2016). Ciclone de até 118 km/h causa destruição em Santa Catarina. *Diário Catarinense*. Retrieved from <http://dc.clicrbs.com.br/sc/noticias/noticia/2016/12/ciclone-de-ate-118-km-h-causa-destruicao-em-santa-catarina-8607371.html>
- Diario do Sul. (2015, July 10). Cinco décadas de existência do Complexo Jorge Lacerda. *Diario Do Sul*. Retrieved from <http://diariodosul.com.br/SITE2015/noticia/21169/Cinco-decadas-de-existencia-do-Complexo-Jorge-Lacerda-.html>
- Dillard, J., Dujon, V., & King, M. C. (2008). *Understanding the Social Dimension of Sustainability*. Routledge.
- DiMaggio, P., & Powell, W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48(2), 147–160.
- Domhoff, G. W. (2011). Who Rules America: Why San Francisco Is Different. Retrieved July 22, 2017, from [http://www2.ucsc.edu/whorulesamerica/local/san\\_francisco.html](http://www2.ucsc.edu/whorulesamerica/local/san_francisco.html)
- Dominelli, L. (2012). *Green Social Work: From Environmental Crises to Environmental Justice*. Polity.
- Durkheim, E. (2014). *The Division of Labor in Society*. Simon and Schuster.
- Economic Commission for Latin America and the Caribbean (ECLAC). (2009). Economics of climate change in Latin America and the Caribbean: Summary

2009. Retrieved from <http://www.cepal.org/en/publications/2930-economics-climate-change-latin-america-and-caribbean-summary-2009>
- Eletrobras. (2017). Our Business. Retrieved March 9, 2017, from <http://www.eletrobras.com/elb/data/Pages/LUMIS293E16C4PTBRIE.htm>
- Empresa de Pesquisa Energetica (EPE). (2017). Consumo de energia elétrica no Brasil cai 0,9% em 2016. Retrieved February 12, 2017, from <http://www.epe.gov.br/mercado/Paginas/Consumodeenergiael%C3%A9tricoBrasilcai0,9em2016.aspx?CategoriaID=>
- Fairbridge, R. W. (1976). Shellfish-Eating Preceramic Indians in Coastal Brazil. *Science*, 191(4225), 353–359. <https://doi.org/10.1126/science.191.4225.353>
- Federative Republic of Brazil (Brazil). (2015). Federative Republic of Brazil: Intended Nationally Determined Contribution towards Achieving the Objective of the United Nations Framework Convention on Climate Change. Retrieved from <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Brazil%20First/BRAZIL%20iNDC%20english%20FINAL.pdf>
- Fei, J., Wang, Y., Yang, Y., Chen, S., & Zhi, Q. (2016). Towards Eco-city: The Role of Green Innovation. *Energy Procedia*, 104, 165–170. <https://doi.org/10.1016/j.egypro.2016.12.029>
- Fernandes, E. (2007). Constructing the ‘Right To the City’ in Brazil. *Social and Legal Studies*, 16(2). Retrieved from <http://journals.sagepub.com/doi/abs/10.1177/0964663907076529>
- Fernandes, E. (2010). *The City Statute and the legal-urban order* (The City Statute of Brazil: A Commentary) (pp. 55–70). Cities Alliance and Brazil Ministry of Cities. Retrieved from [http://www.citiesalliance.org/sites/citiesalliance.org/files/CA\\_Images/CityStatuteofBrazil\\_English\\_Ch4.pdf](http://www.citiesalliance.org/sites/citiesalliance.org/files/CA_Images/CityStatuteofBrazil_English_Ch4.pdf)
- Fernando, L., Sant’Anna, H., Rabinovici, J., & Spitzeck, M. (2016). Brazil - Environment. Retrieved January 11, 2017, from <http://latinlawyer.com/reference/article/40585/brazil/>
- FHFA. (2017). House Price Index | Federal Housing Finance Agency. Retrieved July 21, 2017, from <https://www.fhfa.gov/DataTools/Downloads/pages/house-price-index.aspx>
- Finnemore, M., & Sikkink, K. (1998). International Norm Dynamics and Political Change. *International Organization*, 52(04), 887–917. <https://doi.org/10.1162/002081898550789>

- FipeZAP. (2017). Índices de imóveis residenciais Fipezap - Pesquisas do mercado. Retrieved March 8, 2017, from <http://fipezap.zapimoveis.com.br/noticias-fipezap/pesquisas-e-relatorios/indice-residencial/>
- FIRJAN. (2016). *Quanto custa a energia elétrica para a pequena e média indústria no Brasil?* (Publicacoes Sistema FIRJAN). Brazil. Retrieved from <http://www.firjan.com.br/lumis/portal/file/fileDownload.jsp?fileId=2C908A8A559C8BA001563303D3744A1B&inline=1>
- Fligstein, N. (2008). Theory and Methods for the Study of Strategic Action Fields. *ResearchGate*. Retrieved from [https://www.researchgate.net/publication/268411485\\_Theory\\_and\\_Methods\\_for\\_the\\_Study\\_of\\_Strategic\\_Action\\_Fields](https://www.researchgate.net/publication/268411485_Theory_and_Methods_for_the_Study_of_Strategic_Action_Fields)
- Fligstein, N., & McAdam, D. (2012). *A Theory of Fields*. Oxford University Press, USA.
- Flood, R. L., & Carson, E. (2013). *Dealing with Complexity: An Introduction to the Theory and Application of Systems Science*. Springer Science & Business Media.
- Florida, R. (1996). Lean and Green: The Move to Environmentally Conscious Manufacturing. *California Management Review*, 39(1), 80–105. <https://doi.org/10.2307/41165877>
- Florida, R. (2015). America's Leading Creative Class Cities in 2015. Retrieved July 21, 2017, from <http://www.citylab.com/work/2015/04/americas-leading-creative-class-cities-in-2015/390852/>
- Florida, R., Cushing, R., & Gates, G. (2002, August 1). When Social Capital Stifles Innovation. Retrieved July 20, 2017, from <https://hbr.org/2002/08/when-social-capital-stifles-innovation>
- Florida, R., & Gates, G. (2004). 7. Technology and Tolerance: The Importance of Diversity to High-Technology Growth. *Research in Urban Policy*, 9, 199.
- Florida, R. L. (2002). *The Rise of the Creative Class: And how It's Transforming Work, Leisure, Community and Everyday Life*. Basic Books.
- Florida, R. L. (2012). *The Rise of the Creative Class: Revisited*. Basic Books.
- FloripAmanha. (2007). Operação Moeda Verde | FloripAmanha.org / Notícias de Florianópolis e da Associação FloripAmanhã. Retrieved January 30, 2017, from <http://floripamanha.org/2007/05/operacao-moeda-verde/>
- FloripAmanha. (2008, February 18). Governo do Estado quer criar Reserva da Biosfera Urbana na Ilha de Santa Catarina. Retrieved from <http://floripamanha.org/2008/02/governo-do-estado-quer-criar-reserva-da->

biosfera-urbana-na-ilha-de-santa-catarina/

- Flyvbjerg, B. (1998). *Rationality and Power: Democracy in Practice*. Chicago: University of Chicago Press. Retrieved from <http://press.uchicago.edu/ucp/books/book/chicago/R/bo3640330.html>
- Foley, J. A., DeFries, R., Asner, G. P., Barford, C., Bonan, G., Carpenter, S. R., ... Snyder, P. K. (2005). Global Consequences of Land Use. *Science*, 309(5734), 570–574. <https://doi.org/10.1126/science.1111772>
- Foxon, T. J. (2013). Transition pathways for a UK low carbon electricity future. *Energy Policy*, 52, 10–24. <https://doi.org/10.1016/j.enpol.2012.04.001>
- Frayssinet, F. (2008). ENVIRONMENT-BRAZIL: Development Vs. Preservation in Florianopolis. Retrieved November 28, 2016, from <http://www.ipsnews.net/2008/03/environment-brazil-development-vs-preservation-in-florianopolis/>
- Frosch, R. (1992). Industrial ecology: A philosophical introduction. *Proceedings of the National Academy of Sciences of the United States of America*, 89(8), 3669.
- Funari, P. P. A. (2009). Archeological Heritage and Cultural Resources in Brazil. *Area Studies - Brazil, Regional Sustainable Development Review*, 126.
- Fundação Municipal de Meio Ambiente (FLORAM). (2011, June 21). Floram completa 16 anos de fundação. Retrieved March 7, 2017, from <http://www.pmf.sc.gov.br/entidades/floram/index.php?pagina=notpagina&noti=4633>
- Fundação Municipal do Meio Ambiente (FLORAM). (2016). Áreas de Preservação, Áreas de Preservação Permanente. Retrieved March 8, 2017, from <http://www.pmf.sc.gov.br/entidades/floram/index.php?cms=areas+de+preservacao>
- G1. (2016, April 25). Moradores do Siri, em Florianópolis, aguardam projeto de remoção. *Globo Santa Catarina*. Retrieved from <http://g1.globo.com/sc/santa-catarina/noticia/2016/04/moradores-do-siri-em-florianopolis-aguardam-projeto-de-remocao.html>
- Galiana, I. (2015). *Post-2015 Development Agenda, Brazil Perspectives, Energy*. Post-2015 Consensus. Retrieved from [http://www.copenhagenconsensus.com/sites/default/files/brazil\\_seminar\\_resource\\_guide.pdf](http://www.copenhagenconsensus.com/sites/default/files/brazil_seminar_resource_guide.pdf)
- Gallucci, M. (2013). 6 of the World's Most Extensive Climate Adaptation Plans. Retrieved May 25, 2016, from <http://insideclimatenews.org/news/20130620/6->



worlds-most-extensive-climate-adaptation-plans

- George, A. L., & Bennett, A. (2005). *Case Studies and Theory Development in the Social Sciences*. MIT Press.
- Giehl, G. (2016). Operação moeda verde - Ambiental - Âmbito Jurídico. Retrieved January 30, 2017, from [http://www.ambito-juridico.com.br/site/index.php?n\\_link=revista\\_artigos\\_leitura&artigo\\_id=1875](http://www.ambito-juridico.com.br/site/index.php?n_link=revista_artigos_leitura&artigo_id=1875)
- Gladwell, M. (2006). *The Tipping Point: How Little Things Can Make a Big Difference*. Little, Brown.
- Glaeser, E. L., Kallal, H. D., Scheinkman, J. A., & Shleifer, A. (1992). Growth in Cities. *Journal of Political Economy*, 100(6), 1126–1152. <https://doi.org/10.1086/261856>
- Glaeser, E. L., Kolko, J., & Saiz, A. (2001). Consumer city. *Journal of Economic Geography*, 1, 27–50.
- Gorski, P. S. (2003). *The Disciplinary Revolution: Calvinism and the Rise of the State in Early Modern Europe* (1 edition). Chicago: University of Chicago Press.
- Gosnell, H., & Abrams, J. (2011). Amenity migration: diverse conceptualizations of drivers, socioeconomic dimensions, and emerging challenges. *GeoJournal*, 76(4), 303–322. <https://doi.org/10.1007/s10708-009-9295-4>
- Governo de Santa Catarina. (2016). Governo do Estado lança projeto da Celesc que vai instalar placas de energia solar em mil residências catarinenses - Governo do Estado de Santa Catarina. Retrieved February 11, 2017, from <http://sc.gov.br/mais-sobre-energia/23676-governo-do-estado-lanca-projeto-da-celesc-que-vai-instalar-placas-de-energia-solar-em-mil-residencias-catarinenses>
- Graham, S., & Marvin, S. (2001). *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*. Psychology Press.
- Graves, P., & Linneman, P. (1979). Household migration: Theoretical and empirical results - ScienceDirect. *Journal of Urban Economics*, 6(3), 383–404.
- Green, G. P. (2001). Amenities and Community Economic Development: Strategies for Sustainability. *The Journal of Regional Analysis & Policy*, 31(2), 61–75.
- Green, G. P., Deller, S. C., & Marcouiller, D. W. (2005). *Amenities and Rural Development: Theory, Methods and Public Policy*. Edward Elgar Publishing.
- Greenhouse Gas Protocol (GHG Protocol)). (2017). GHG Protocol for Cities | Greenhouse Gas Protocol. Retrieved February 10, 2017, from <http://www.ghgprotocol.org/city-accounting>

- Greenpeace. (2014). Solar: a energia que transforma vidas. Retrieved July 31, 2017, from <http://www.greenpeace.org/brasil/pt/Noticias/A-energia-que-transforma-vidas/>
- Greif, A. (1998). Historical and Comparative Institutional Analysis. *The American Economic Review*, 88(2), 80–84.
- Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global Change and the Ecology of Cities. *Science*, 319(5864), 756–760. <https://doi.org/10.1126/science.1150195>
- Gustke, C. (2016, July 20). A ‘Smart’ Green Tech Hub in Vermont Reimagines the Status Quo. *The New York Times*. Retrieved from <https://www.nytimes.com/2016/07/21/us/a-smart-green-tech-hub-in-vermont-reimagines-the-status-quo.html>
- Haas, P. M., Keohane, R. O., & Levy, M. A. (1993). Institutions for the earth: sources of effective international environmental protection. *Global Environmental Accords Series (USA)*. Retrieved from <http://agris.fao.org/agris-search/search.do?recordID=US9525610>
- Hall, S. (n.d.). *Green Growth Machine: Governing cities for the low carbon economy*. University of Hull, UK. Retrieved from <http://www2.hull.ac.uk/science/PDF/HALL%203b.pdf>
- Hammond, G. P., & Pearson, P. J. G. (2013). Challenges of the transition to a low carbon, more electric future: From here to 2050. *Energy Policy*, 52, 1–9. <https://doi.org/10.1016/j.enpol.2012.10.052>
- Hediger, W. (1999). Reconciling “weak” and “strong” sustainability. *International Journal of Social Economics*, 26(7/8/9), 1120–1144.
- Heide, J. B., & Miner, A. S. (1992). The Shadow Of The Future: Effects Of Anticipated Interaction And Frequency Of Contact On Buyer-Seller Cooperation. *Academy of Management Journal*, 35(2), 265–291. <https://doi.org/10.2307/256374>
- Heimer, C. A. (1999). Competing Institutions: Law, Medicine, and Family in Neonatal Intensive Care. <https://doi.org/http://dx.doi.org/10.2307/3115095>
- Helm, B. (2013, December 4). How Boulder Became America’s Startup Capital. Retrieved July 31, 2017, from <https://www.inc.com/magazine/201312/boulder-colorado-fast-growing-business.html>
- Hochstetler, K., & Keck, M. E. (2007). *Greening Brazil: Environmental Activism in State and Society*. Duke University Press.

- Hodgson, G. M. (2000). What Is the Essence of Institutional Economics? *Journal of Economic Issues*, (2), 317.
- IBGE :: Instituto Brasileiro de Geografia e Estatística. (2010). Private Foundations and Non-Profit Associations in Brazil - 2010. Retrieved March 8, 2017, from <http://www.ibge.gov.br/english/estatistica/economia/fasfil/2010/default.shtm>
- IBGE :: Instituto Brasileiro de Geografia e Estatística. (2011). Evolução da Divisão Territorial do Brasil 1872-2010. Retrieved January 21, 2017, from [http://www.ibge.gov.br/home/geociencias/geografia/default\\_evolucao.shtm](http://www.ibge.gov.br/home/geociencias/geografia/default_evolucao.shtm)
- IBGE :: Instituto Brasileiro de Geografia e Estatística. (2014). Gross Domestic Product of Municipalities 2010-2014. Retrieved February 10, 2017, from [http://www.ibge.gov.br/english/estatistica/economia/pibmunicipios/2014/default\\_base.shtm](http://www.ibge.gov.br/english/estatistica/economia/pibmunicipios/2014/default_base.shtm)
- IBGE :: Instituto Brasileiro de Geografia e Estatística (IBGE). (2016). IBGE - Cidades. Retrieved May 28, 2016, from <http://www.cidades.ibge.gov.br/xtras/home.php>
- IBP. (2015). *Brazil Energy Policy, Laws and Regulations Handbook Volume 1 Strategic Information and Basic Laws*. Lulu.com.
- Ideal Institute. (2016). *The Brazilian Market Of Distributed Solar PV Generation - Annual Report 2016*. Retrieved from [https://issuu.com/idealeco\\_logicas/docs/estudofv2016\\_en?reader3=1](https://issuu.com/idealeco_logicas/docs/estudofv2016_en?reader3=1)
- IDOM- Confederação Brasileira de Pádel (COBRAPA) Consortium. (2014a). Estudo 1: Mitigação e Mudança Climática. Retrieved from [http://www.urbandashboard.org/iadb/index\\_studies.html?lang=ES#?city=FLN&page=1](http://www.urbandashboard.org/iadb/index_studies.html?lang=ES#?city=FLN&page=1)
- IDOM- Confederação Brasileira de Pádel (COBRAPA) Consortium. (2014b). Estudo 2: Vulnerabilidade e riscos naturais. Retrieved from [http://www.urbandashboard.org/iadb/index\\_studies.html?lang=ES#?city=FLN&page=1](http://www.urbandashboard.org/iadb/index_studies.html?lang=ES#?city=FLN&page=1)
- IDOM- Confederação Brasileira de Pádel (COBRAPA) Consortium. (2014c). Estudo 3: Crescimento Urbano. Retrieved from [http://www.urbandashboard.org/iadb/index\\_studies.html?lang=ES#?city=FLN&page=1](http://www.urbandashboard.org/iadb/index_studies.html?lang=ES#?city=FLN&page=1)
- INMET - Instituto Nacional de Meteorologia. (2017). CLIMATOLOGIA DE MESES E TRIMESTRES DE MAIORES E MENORES TEMPERATURAS E PLUVIOSIDADES MÉDIAS NO PERÍODO DE 1961-2009. Retrieved January 27, 2017, from <http://www.inmet.gov.br/portal/index.php?r=clima/mesTempo>

- Innes, J. E., & Booher, D. E. (2010). *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*. Routledge.
- Instituto Chico Mendes de Conservacao da Biodiversidade (ICMBio). (2015a). *Aves da Estacao Ecologica de Carijos*. Retrieved from [http://www.icmbio.gov.br/portal/images/stories/DCOM\\_Guia\\_de\\_Aves\\_da\\_ESE\\_C\\_Carij%C3%B3s\\_web\\_comp.pdf](http://www.icmbio.gov.br/portal/images/stories/DCOM_Guia_de_Aves_da_ESE_C_Carij%C3%B3s_web_comp.pdf)
- Instituto Chico Mendes de Conservacao da Biodiversidade (ICMBio). (2015b). *Conservacao da Biodiversidade na Zona Costeira e Marinha de Santa Catarina* (p. 33).
- Instituto de Planejamento urbano de Florianopolis. (2016). 39 Anos do IPUF. Retrieved December 26, 2016, from <http://www.esperidiaoamin.net.br/2016/03/30/39-anos-do-ipuf/>
- Inter-American Development Bank (IDB). (2016). Responding to urban development challenges in emerging cities. Retrieved November 18, 2016, from <http://www.iadb.org/en/topics/emerging-and-sustainable-cities/responding-to-urban-development-challenges-in-emerging-cities,6690.html>
- Intergovernmental Panel on Climate Change (IPCC). (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. Retrieved from [https://www.ipcc.ch/pdf/special-reports/srex/SREX\\_Full\\_Report.pdf](https://www.ipcc.ch/pdf/special-reports/srex/SREX_Full_Report.pdf)
- Intergovernmental Panel on Climate Change (IPCC). (2014). *Fifth Assessment Report - Impacts, Adaptation and Vulnerability*. Retrieved from <http://www.ipcc.ch/report/ar5/wg2/>
- International Finance Corporation (IFC). (2017). Significant Growth Expected in Energy Storage Deployments in Emerging Markets. Retrieved February 18, 2017, from [http://www.ifc.org/wps/wcm/connect/news\\_ext\\_content/ifc\\_external\\_corporate\\_site/news+and+events/news/significant+growth+expected+in+energy+storage+deployments+in+emerging+markets+according+to+ifc+esmap+report](http://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/significant+growth+expected+in+energy+storage+deployments+in+emerging+markets+according+to+ifc+esmap+report)
- International Union for Conservation of Nature (IUCN). (1980). World Conservation Strategy: Living Resource Conservation for Sustainable Development. Retrieved from <https://portals.iucn.org/library/efiles/edocs/WCS-004.pdf>
- IPCC NGGIP. (2017). EFDB - Main Page. Retrieved February 13, 2017, from <http://www.ipcc-nggip.iges.or.jp/EFDB/main.php>
- IPHAN - Instituto do Patrimônio Histórico e Artístico Nacional. (2016). Sistema de Gerenciamento do Patrimônio Arqueológico (SGPA). Retrieved December 26, 2016, from <http://portal.iphan.gov.br/pagina/detalhes/236/>

- IPHAN - Instituto do Patrimônio Histórico e Artístico Nacional. (2017). IPHAN - Instituto do Patrimônio Histórico e Artístico Nacional - Bens Tombados. Retrieved January 16, 2017, from <http://portal.iphan.gov.br/pagina/detalhes/126>
- IRENA, International Renewable Energy Agency. (2012). *Renewable Energy Policy in Cities: Sao Paulo, Brazil, Case Study* (p. 8). Retrieved from [https://www.irena.org/Publications/RE\\_Policy\\_Cities\\_CaseStudies/IRENA%20cities%20case%206%20Sao%20Paulo.pdf](https://www.irena.org/Publications/RE_Policy_Cities_CaseStudies/IRENA%20cities%20case%206%20Sao%20Paulo.pdf)
- IRENA, International Renewable Energy Agency. (2015). *Renewable Energy Policy Brief: Brazil*. Retrieved from [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_RE\\_Latin\\_America\\_Policies\\_2015\\_Country\\_Brazil.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Latin_America_Policies_2015_Country_Brazil.pdf)
- Jacobs, J. (2016). *The Death and Life of Great American Cities*. Knopf Doubleday Publishing Group.
- Jarvis, D. S. L., & Sovacool, B. K. (2011). Conceptualizing and evaluating best practices in electricity and water regulatory governance. *Energy*, 36(7), 4340–4352. <https://doi.org/10.1016/j.energy.2011.04.007>
- Johnson, K. M., & Beale, C. L. (1998). The Rural Rebound. *The Wilson Quarterly* (1976-), 22(2), 16–27.
- Justica Federal, Tribunal Regional Federal da 4a Regiao. (2013, February 28). Justiça mantém proibição de construções na Praia do Santinho (SC). Retrieved January 30, 2017, from [http://www2.trf4.jus.br/trf4/controlador.php?acao=noticia\\_visualizar&id\\_noticia=8902](http://www2.trf4.jus.br/trf4/controlador.php?acao=noticia_visualizar&id_noticia=8902)
- Kanitz, A. F. (1999). *O PARQUE TECNOLÓGICO DA GRANDE FLORIANÓPOLIS-SC - PARQTEC- ALFA: A APLICAÇÃO DO MODELO WILLIAN BOLTON NA SUA ORGANIZAÇÃO*. Universidade Federal de Santa Catarina, Florianópolis.
- Kemp, R. L., & Stephani, C. J. (2013). *Global Models of Urban Planning: Best Practices Outside the United States*. McFarland.
- Keohane, R. O., & Victor, D. G. (2011). The Regime Complex for Climate Change. *Perspectives on Politics*, 9(1), 7–23. <https://doi.org/10.1017/S1537592710004068>
- King, A. A., & Lenox, M. J. (2001). Lean and Green? An Empirical Examination of the Relationship Between Lean Production and Environmental Performance. *Production and Operations Management*, 10(3), 244–256. <https://doi.org/10.1111/j.1937-5956.2001.tb00373.x>
- Kingstone, P. (2004). *Critical Issues in Brazil's Energy Sector: The Long (and*

- Uncertain) March to Energy Privatization in Brazil*. James A. Baker III Institute for Public Policy: Rice University. Retrieved from <http://www.bakerinstitute.org/files/2757/>
- Klyza, C. M., Isham, J., & Savage, A. (2006). Local Environmental Groups and the Creation of Social Capital: Evidence from Vermont. *Society & Natural Resources*, 19(10), 905–919. <https://doi.org/10.1080/08941920600902070>
- Konzen, L. (2013). *Norms and Space: Understanding Public Space Regulation in the Tourist City*. Lund University.
- Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, 99(3), 483–99.
- Kuhnlen, A. (1994). *Reciclando o Cotidiano o Lixo como Politica Publica e como Representacao Social*. Universidade Federal de Santa Catarina, Florianópolis.
- Lago, P. F. (1978). *Santa Catarina: dimensões e perspectivas*. Florianópolis: Editora Meridional.
- Landers, J. (2010). *Iberian Empires, 1600-1800*. Oxford: Oxford University Press.
- Lang, J. (2013). *Portuguese Brazil: The King's Plantation*. Elsevier.
- Leite, C. (2012). *Cidades inteligentes, Cidade Sustentáveis*.
- Leite, C., & Awad, J. (2012). *Cidades sustentáveis, cidades inteligentes: desenvolvimento sustentável num planeta urbano*. Bookman.
- Levin, S. A., & Clark, W. C. (2010). Toward a Science of Sustainability. Retrieved from <https://dash.harvard.edu/handle/1/9774654>
- Lin, N. (2002). *Social Capital: A Theory of Social Structure and Action*. Cambridge University Press.
- Local Governments for Sustainability (ICLEI), & Massachusetts Institute of Technology (MIT), Department of Urban Studies and Planning. (2012). Progress and Challenges in Urban Climate Adaptation Planning: Results of a Global Survey. Retrieved from [http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient\\_Cities\\_2012/Urban\\_Adaptation\\_Report\\_23May2012.pdf](http://resilient-cities.iclei.org/fileadmin/sites/resilient-cities/files/Resilient_Cities_2012/Urban_Adaptation_Report_23May2012.pdf)
- Logan, J. R., & Molotch, H. (2007). *Urban Fortunes: The Political Economy of Place*. University of California Press.
- Loorbach, D. (2010). Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. *Governance*, 23(1),

161–183. <https://doi.org/10.1111/j.1468-0491.2009.01471.x>

Loorbach, D., Frantzeskaki, N., & Thissen, W. (2011). A Transition Research Perspective on Governance for Sustainability. In C. C. Jaeger, J. D. Tabara, & J. Jaeger (Eds.), *European Research on Sustainable Development: Volume 1: Transformative Science Approaches for Sustainability* (pp. 73–89). New York and Heidelberg: Springer.

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. *Futures*, 42(3), 237–246. <https://doi.org/10.1016/j.futures.2009.11.009>

Lopes, C., & Chiavari, J. (2015). *Brazil's New Forest Code: How to Navigate the Complexity*. Climate Policy Initiative. Retrieved from <https://climatepolicyinitiative.org/publication/brazils-new-forest-code-how-to-navigate-the-complexity/>

Lopes, G. B. (2015). *ORIGEM, DESENVOLVIMENTO E IMPACTOS DOS GRANDES EMPREENDIMENTOS TURÍSTICOS EM FLORIANÓPOLIS*. Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Lubell, M., Feiock, R. C., & de la Cruz, E. E. R. (2009). Local Institutions and the Politics of Urban Growth. *American Journal of Political Science*, 53(3), 649–665. <https://doi.org/10.1111/j.1540-5907.2009.00392.x>

Lucas, R. E. (1993). Making a Miracle. *Econometrica*, 61(2), 251–272. <https://doi.org/10.2307/2951551>

Macbeth, J., Carson, D., & Northcote, J. (2004). Social Capital, Tourism and Regional Development: SPCC as a Basis for Innovation and Sustainability. *Current Issues in Tourism*, 7(6), 502–522. <https://doi.org/10.1080/1368350050408668200>

Macedo, J. (2000). *LAND USE POLICIES AND URBANIZATION OF INFORMAL SETTLEMENTS: PLANNING INITIATIVES FOR ENVIRONMENTAL PROTECTION AREAS IN CURITIBA, BRAZIL*. University of Florida.

Magee, C. (2016, August 2). Is the Long-Term PPA Becoming Outdated for Corporate Renewables Procurement? Retrieved February 7, 2017, from <https://www.greentechmedia.com/articles/read/corporate-renewables-procurement-must-evolve-beyond-the-long-term-ppa>

Magris, R., & Barreto, R. (2010). Mapping and assessment of protection of mangrove habitats in Brazil. *Pan-American Journal of Aquatic Sciences*, 5(4), 546–556.

March, J. G., & Olsen, J. P. (2010). *Rediscovering Institutions*. Simon and Schuster.

- Marchant, A. (1942). Feudal and Capitalistic Elements in the Portuguese Settlement of Brazil. *The Hispanic American Historical Review*, 22(3), 493–512. <https://doi.org/10.2307/2506836>
- Marcouiller, D. W., Kim, K.-K., & Deller, S. C. (2004). Natural amenities, tourism and income distribution. *Annals of Tourism Research*, 31(4), 1031–1050. <https://doi.org/10.1016/j.annals.2004.04.003>
- Marshall, A. (1997). *Principles of Economics* (Revised edition). Amherst, N.Y: Prometheus Books.
- Martens, P. (2006). Sustainability: science or fiction? *Sustainability: Science, Practice & Policy*, 2(1). Retrieved from <https://sspp.proquest.com/sustainability-science-or-fiction-f3429e3be00f>
- Martin, N., & Rice, J. (2015). Improving Australia's renewable energy project policy and planning: A multiple stakeholder analysis. *Energy Policy*, 84, 128–141. <https://doi.org/10.1016/j.enpol.2015.04.034>
- Martine, G., & McGranahan, G. (2010). Brazil's Early Urban Transition: What Can It Teach Urbanizing Countries? - pubs.iied.org. UNFPA Urbanization and Emerging Population. Retrieved from <http://pubs.iied.org/10585IIED/>
- Martínez-Jurado, P. J., & Moyano-Fuentes, J. (2014). Lean Management, Supply Chain Management and Sustainability: A Literature Review. *Journal of Cleaner Production*, 85, 134–150. <https://doi.org/10.1016/j.jclepro.2013.09.042>
- Matson, P., Clark, W. C., & Andersson, K. (2016). *Pursuing Sustainability: A Guide to the Science and Practice*. Princeton University Press.
- Maxwell, K. (1995). *Pombal, Paradox of the Enlightenment*. CUP Archive.
- Mazmanian, D. A., & Kraft, M. E. (2009). *Toward Sustainable Communities: Transition and Transformations in Environmental Policy*. MIT Press.
- Mccauley, S. M., & Stephens, J. C. (2012). Green energy clusters and socio-technical transitions: analysis of a sustainable energy cluster for regional economic development in Central Massachusetts, USA. *Sustainability Science*, 7(2), 213–225. <https://doi.org/http://dx.doi.org.proxy.libraries.rutgers.edu/10.1007/s11625-012-0164-6>
- McGinnis, M. D. (2011). Networks of Adjacent Action Situations in Polycentric Governance. *Policy Studies Journal*, 39(1), 51–78. <https://doi.org/10.1111/j.1541-0072.2010.00396.x>
- McGinnis, M. D., & Ostrom, E. (2014). Social-ecological system framework: initial



changes and continuing challenges. *Ecology and Society*, 19(2), 30.

- McGranahan, D. A., Wojan, T. R., & Lambert, D. M. (2011). The rural growth trifecta: outdoor amenities, creative class and entrepreneurial context. *Journal of Economic Geography*, 11(3), 529–557. <https://doi.org/10.1093/jeg/lbq007>
- Melillo, J. M., Richmond, Terese (T. C.), & Yohe, G. W. (2014). Climate Change Impacts in the United States: The Third National Climate Assessment. <https://doi.org/10.7930/J0Z31WJ2>
- Melo, É., Neves, E. M. A., & Pazzini, L. H. A. (2011). Brazilian electricity sector restructuring: From privatization to the new governance structure. In *2011 8th International Conference on the European Energy Market (EEM)* (pp. 905–910). <https://doi.org/10.1109/EEM.2011.5953138>
- Mendell, M. (1989). Market Reforms and Market Failures: Karl Polanyi and the Paradox of Convergence. *Journal of Economic Issues (Association for Evolutionary Economics)*, 23(2), 473.
- Meyer, J. W., Boli, J., Thomas, G. M., & Ramirez, F. O. (1997). World Society and the Nation-State. *American Journal of Sociology*, 103(1), 144–181. <https://doi.org/10.1086/231174>
- Meyer, J. W., & Drori, G. S. (2009). *World Society: The Writings of John W. Meyer*. OUP Oxford.
- Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, 83(2), 340–363.
- Mill, J. S. (1870). *Principles of political economy, with some of their applications to social philosophy*. (5th London ed.). D. Appleton and company,.
- Miller, C. (2015, February 9). America's Most Innovative Tech Hubs. Retrieved July 31, 2017, from <https://www.nerdwallet.com/blog/studies/americas-most-innovative-tech-hubs/>
- Ministerio das Cidades (MC). (2013). *Déficit Habitacional Municipal no Brasil 2010*. Fundacao Joao Pinhero. Retrieved from <http://www.fjp.mg.gov.br/index.php/docman/cei/deficit-habitacional/216-deficit-habitacional-municipal-no-brasil-2010/file>
- Ministerio de Minas e Energia (MME). (2016b). Brasil registra 3.565 conexões de geração distribuída até maio. Retrieved March 10, 2017, from [http://www.mme.gov.br/web/guest/pagina-inicial/outras-noticias/-/asset\\_publisher/32hLrOzMKwWb/content/brasil-registra-3-565-novas-conexoes-de-geracao-distribuida-no-ano-ate-maio](http://www.mme.gov.br/web/guest/pagina-inicial/outras-noticias/-/asset_publisher/32hLrOzMKwWb/content/brasil-registra-3-565-novas-conexoes-de-geracao-distribuida-no-ano-ate-maio)

- Ministerio de Minas e Energia (MME). (2016a). Publicações e Indicadores. Retrieved March 8, 2017, from <http://www.mme.gov.br/web/guest/publicacoes-e-indicadores>
- Miranda, M. E. (2000). *Continente de São Pedro: administração pública no período colonial*. Assembleia Legislativa do Estado do Rio Grande do Sul.
- Mol, A. P. J. (1996). Ecological modernisation and institutional reflexivity: Environmental reform in the late modern age. *Environmental Politics*, 5(2), 302–323. <https://doi.org/10.1080/09644019608414266>
- Molotch, H. (1976). The City as a Growth Machine: Toward a Political Economy of Place. *American Journal of Sociology*, (2), 309.
- Montesquieu, C. de S. (1878). *The spirit of laws*. (New ed.). G. Bell and sons.,.
- Morgenthau, H. (1948). *Politics Among Nations: The Struggle for Power and Peace*. Nova York: Alfred Kopf. Retrieved from [http://sca.district70.org/ourpages/auto/2014/4/24/50263602/Morgenthau\\_Politics%20Among%20Nations.pdf](http://sca.district70.org/ourpages/auto/2014/4/24/50263602/Morgenthau_Politics%20Among%20Nations.pdf)
- Municipal Human Development Index (MHDI). (2010). Atlas of Human Development in Brazil. Retrieved November 22, 2016, from [http://atlasbrasil.org.br/2013/en/o\\_atlas/perguntas\\_frequentes/](http://atlasbrasil.org.br/2013/en/o_atlas/perguntas_frequentes/)
- Nagendra, H., & Ostrom, E. (2014). Applying the social-ecological system framework to the diagnosis of urban lake commons in Bangalore, India. *Ecology and Society*, 19(2), 67.
- Nee, V. (1998). Sources of the new institutionalism. In *The New Institutionalism in Sociology* (pp. 1–16). New York: Russell Sage.
- Neumayer, E. (2013). *Weak versus strong sustainability: Exploring the limits of two opposing paradigms*. Edward Elgar Publishing Ltd. Retrieved from <https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edselc&AN=edselc.2-52.0-84882015428&site=eds-live>
- Nevens, F., Frantzeskaki, N., Gorissen, L., & Loorbach, D. (2013). Urban Transition Labs: co-creating transformative action for sustainable cities. *Journal of Cleaner Production*, 50, 111–122. <https://doi.org/10.1016/j.jclepro.2012.12.001>
- Neves, E. M. S. C. (2012). Environmental policy, municipalities and intergovernmental cooperation in Brazil. *Estudos Avançados*, 26(74), 137–150. <https://doi.org/10.1590/S0103-40142012000100010>

- Nielsen, E. (2014). *Smart Growth Machines: The Political Economy of Sustainable Place - Repository*. University of California, Santa Barbara. Retrieved from <http://www.alexandria.ucsb.edu/lib/ark:/48907/f3pg1pw4>
- Noelli, F. S. (2004). La distribución geográfica de las evidencias arqueológicas guaraní. *Revista de Indias*, 64(230), 17–23.
- Norberg, J., & Cumming, G. S. (2013). *Complexity Theory for a Sustainable Future*. Columbia University Press.
- North, D. C. (1991). Institutions. *Journal of Economic Perspectives*, 5(1), 97–112. <https://doi.org/10.1257/jep.5.1.97>
- Noticias do Dia (ND). (2014, September 16). Programa Floripa Legal deve regularizar cerca de 50 mil imóveis até 21 de novembro. Retrieved from <http://ndonline.com.br/florianopolis/noticias/programa-floripa-legal-deve-regularizar-cerca-de-50-mil-imoveis-ate-21-de-novembro>
- Novais, A. (2013, March 26). Technology Cities of Brazil. Retrieved March 24, 2017, from <http://thebrazilbusiness.com/article/technology-cities-of-brazil>
- NREL. (2016). *Top Ten Utility Green Pricing Programs*. Retrieved from <http://www.nrel.gov/analysis/pdfs/utility-green-power-rankings.pdf>
- Offe, C. (1985). New Social Movements: Challenging the Boundaries of Institutional Politics. *Social Research*, 52(4), 817–868.
- Olson, M. (2009). *The Logic of Collective Action*. Harvard University Press.
- Operador Nacional do Sistema Elétrico (ONS). (2016). ONS - Conheça o Sistema - O que é o SIN - Sistema Interligado Nacional. Retrieved March 8, 2017, from [http://www.ons.org.br/conheca\\_sistema/o\\_que\\_e\\_sin.aspx](http://www.ons.org.br/conheca_sistema/o_que_e_sin.aspx)
- Ostrom, E. (2010b). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. *American Economic Review*, 100, 1–33.
- Ostrom, E. (2010a). Institutional Analysis and Development: Elements of The Framework in Historical Perspective. In C. Crothers (Ed.), *Historical Developments and Theoretical Approaches in Sociology* (Vol. Vol II). Retrieved from <http://www.eolss.net/sample-chapters/c04/e6-99a-34.pdf>
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press.
- Ostrom, E. (2009). A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325(419). <https://doi.org/10.1126/science.1172133>

- Ostrom, E. (2011). Background on the Institutional Analysis and Development Framework. *Policy Studies Journal*, 39(1), 7–27. <https://doi.org/10.1111/j.1541-0072.2010.00394.x>
- Ostrom, V., Tiebout, C. M., & Warren, R. (1961). The Organization of Government in Metropolitan Areas: A Theoretical Inquiry. *The American Political Science Review*, (4), 831.
- Parsons, T. (1956). Suggestions for a Sociological Approach to the Theory of Organizations-I. *Administrative Science Quarterly*, 1(1), 63–85. <https://doi.org/10.2307/2390840>
- Partelow, S. (2016). Coevolving Ostrom’s social–ecological systems (SES) framework and sustainability science: four key co-benefits. *Sustainability Science*, 11(3), 399–410. <https://doi.org/10.1007/s11625-015-0351-3>
- Partridge, M. (2010). The duelling models: NEG vs amenity migration in explaining US engines of growth. *Papers in Regional Science*, 89(3), 513–536.
- Pearce, D. W., Markandya, A., & Barbier, E. (1989). *Blueprint for a Green Economy*. Earthscan.
- Peck, J. (2005). Struggling with the Creative Class. *International Journal of Urban and Regional Research*, 29(4), 740–770. <https://doi.org/10.1111/j.1468-2427.2005.00620.x>
- Pegas, F. de V., & Castley, J. G. (2016). Private reserves in Brazil: Distribution patterns, logistical challenges, and conservation contributions. *Journal for Nature Conservation*, 29, 14–24. <https://doi.org/10.1016/j.jnc.2015.09.007>
- Pekelman, C., & Schuch, F. (2012). *ANÁLISE DAS RECORRENTES INUNDAÇÕES EM ÁREA DE RESTINGA URBANIZADA DO MUNICÍPIO DE FLORIANÓPOLIS/SC*. Instituto Federal de Educação Ciência e Tecnologia de Santa Catarina. Retrieved from [http://www.cartografia.org.br/cbc/trabalhos/1/175/CT01-11\\_1404150908.pdf](http://www.cartografia.org.br/cbc/trabalhos/1/175/CT01-11_1404150908.pdf)
- Pellow, D. N., & Park, L. S.-H. (2002). *The Silicon Valley of Dreams: Environmental Injustice, Immigrant Workers, and the High-Tech Global Economy*. NYU Press.
- Penafiel, F. M. (2005). *IDEOLOGIA DO MOVIMENTO AMBIENTALISTA: Um Estudo de Casos Múltiplos em quatro Organizações Não Governamentais de Florianópolis*. Universidade Federal de Santa Catarina, Florianópolis, Brazil.
- Pepper, D. (1993). *Eco-socialism : from deep ecology to social justice* /. Routledge,.

- Pereira, E. B., Martins, F. R., Abreu, S., & Ruther, R. (2006). *Brazilian Atlas for Solar Energy*. São José dos Campos: Brazilian Institute for Space Research.
- Pereira, R. M. F. do A. (2003, January 1). *Formação sócio-espacial do litoral de Santa Catarina (Brasil): gênese e transformações recentes*. Universidade Federal de Santa Catarina, Florianópolis, Brazil. Retrieved from <https://periodicos.ufsc.br/index.php/geosul/article/view/13604>
- Peters, B. G. (2011). *Institutional Theory in Political Science: The New Institutionalism*. Bloomsbury Publishing USA.
- Peters, B. G., Pierre, J., & King, D. S. (2005). The Politics of Path Dependency: Political Conflict in Historical Institutionalism. *Journal of Politics*, 67(4), 1275–1300. <https://doi.org/10.1111/j.1468-2508.2005.00360.x>
- Pimenta, M., & Pimenta, L. (2011). Poverty and standard of living on the central slum hills of Florianópolis: climbing over division. *ACTA Geográfica*, 5(9), 47–66.
- Pinch, T. J., Hughes, T. P., & Bijker, W. E. (2012). *The Social Construction of Technological Systems : New Directions in the Sociology and History of Technology* (Vol. Anniversary ed). Cambridge, Mass: The MIT Press. Retrieved from <https://login.proxy.libraries.rutgers.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=457446&site=eds-live>
- Polanyi, K. (2001). *The Great Transformation: The Political and Economic Origins of Our Time*. Beacon Press.
- Poppo, L., Zhou, K. Z., & Ryu, S. (2008). Alternative Origins to Interorganizational Trust: An Interdependence Perspective on the Shadow of the Past and the Shadow of the Future. *Organization Science*, 19(1), 39–55. <https://doi.org/10.1287/orsc.1070.0281>
- Portal Solar. (2017). Energia Fotovoltaica Residencial é vendida no mercado livre de energia | BLOG SOLAR: NOTÍCIAS E CURIOSIDADES SOBRE ENERGIA SOLAR. Retrieved March 10, 2017, from <http://www.portalsolar.com.br/blog-solar/energia-solar/energia-fotovoltaica-residencial-e-vendida-no-mercado-livre-de-energia.html>
- Porter, M. E. (1996). Competitive Advantage, Agglomeration Economies, and Regional Policy. *International Regional Science Review*, 19(1–2), 85–90. <https://doi.org/10.1177/016001769601900208>
- Porter, M. E. (2011). *Competitive Advantage of Nations: Creating and Sustaining Superior Performance*. Simon and Schuster.

- Porter, M. E., & Linde, C. van der. (1995, September 1). Green and Competitive: Ending the Stalemate. Retrieved March 20, 2017, from <https://hbr.org/1995/09/green-and-competitive-ending-the-stalemate>
- Prefeitura de Florianópolis (PMF), & Inter-American Development Bank (IDB). (2015). Plano de Ação Florianópolis Sustentável 2015.
- Prous, A., & Fogaca, E. (1999). Archaeology of the Pleistocene-Holocene boundary in Brazil. *Quaternary International*, 53–54, 21–41.
- Putnam, R. D. (2001). *Bowling Alone: The Collapse and Revival of American Community*. Simon and Schuster.
- Randazzo, R., & Reagor, C. (2015, July 17). Solar can raise home values — if you own the system. Retrieved February 7, 2017, from <http://www.azcentral.com/story/money/real-estate/2015/07/17/solar-raise-home-values-system/30296123/>
- Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management*, 25(9), 898–916. <https://doi.org/10.1108/01443570510613956>
- Rebichi, S. (2008). *O Potencial da Geracao Solar Fotovoltaica Conectada ao Sistema de Distribuicao Urbano: Estudo de Caso Para Um Alimentador com Pico de Carga Diurno*. Universidade Federal de Santa Catarina, Florianópolis.
- Rees, W. e. (1992). Ecological footprints and appropriated carrying capacity: what urban economics leaves out. *Environment & Urbanization*, 4(2), 121–130.
- Rees, W., & Wackernagel, M. (1996). Urban ecological footprints: Why cities cannot be sustainable—And why they are a key to sustainability. *Environmental Impact Assessment Review*, 16(4), 223–248. [https://doi.org/10.1016/S0195-9255\(96\)00022-4](https://doi.org/10.1016/S0195-9255(96)00022-4)
- Rip, A., & Kemp, R. (1998). Human choice and climate change. Vol. II, Resources and technology. In S. Rayner & E. L. Malone (Eds.), *Technological Change* (pp. 327–399). Columbus, OH: Battelle Press. Retrieved from <http://doc.utwente.nl/34706/1/K356.pdf>
- Rizzo, P. M. (2013). *O Planejamento Urbano no Contexto da Globalizacao: Caso do Plano Diretor do Campeche em Florianopolis, SC*. Universidade Federal de Santa Catarina, Florianópolis.
- Roback, J. (1982). Wages, Rents, and the Quality of Life. *Journal of Political Economy*, 90(6), 1257–1278. <https://doi.org/10.1086/261120>

- Robinson, J., Burch, S., Talwar, S., O'Shea, M., & Walsh, M. (2011). Envisioning sustainability: Recent progress in the use of participatory backcasting approaches for sustainability research. *Technological Forecasting and Social Change*, 78(5), 756–768. <https://doi.org/10.1016/j.techfore.2010.12.006>
- Rocha, J. C. de C., Filho, T. H. P. H., & Cazetta, U. (2007). *Política nacional do meio ambiente: 25 anos da Lei*. Editora del Rey.
- Rosa, S. (2016, February 8). Santa Catarina Emerges as Breeding Ground for Startups in Brazil. Retrieved July 26, 2017, from <http://www.nearshoreamericas.com/santa-catarina-startups-tech-brazil-florianopolis/>
- Rudel, T. (2013). *Defensive Environmentalists and the Dynamics of Global Reform*. Cambridge University Press.
- Russell-Wood, A. J. R. (Ed.). (1975). *FROM COLONY TO NATION: Essays on the Independence of Brazil* (1st edition). Baltimore: The Johns Hopkins University Press.
- Russell-Wood, A. J. R. (2005). Bandeirismo in Colonial Brazil: An Introduction and Overview. *The Americas*, 61(3), 353–371. <https://doi.org/10.1353/tam.2005.0048>
- Sadler, D. J. (2010). *Brazil Imagined: 1500 to the Present*. University of Texas Press.
- Santana, S. E., & Barroso, G. F. (2014). Integrated Ecosystem Management of River Basins and the Coastal Zone in Brazil. *Water Resources Management*, 28(14), 4927–4942. <https://doi.org/10.1007/s11269-014-0754-4>
- Santos, F. M., & Pereira, R. M. F. do A. (2008). Análise histórico-espacial do setor hoteleiro no núcleo urbano central de Florianópolis/SC. *GEOSUL*, 46.
- Santos, M. (2008). O espaço dividido: os dois circuitos da economia urbana dos países subdesenvolvidos. *Milton Santos*, 4. Retrieved from <http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=LILACS&lang=p&nextAction=lnk&exprSearch=601706&indexSearch=ID>
- Sassen, S. (2006). *Territory, Authority, Rights: From Medieval to Global Assemblages*. Princeton University Press.
- SC, D. G. (2016, September 21). Justiça começa a ouvir testemunhas da Operação Moeda Verde. Retrieved January 30, 2017, from <http://g1.globo.com/sc/santa-catarina/noticia/2016/09/justica-comeca-ouvir-testemunhas-da-operacao-moeda-verde.html>
- Scharpf, F. W. (1997). *Games Real Actors Play: Actor-centered Institutionalism in Policy Research*. Boulder, Colo.: Westview Press.

- Schensul, D. (2014). On Vulnerability to Climate Change: Daniel Schensul in conversation with The Straddler. Retrieved May 26, 2016, from <http://www.thestraddler.com/201513/piece6.php>
- Schmitz, P. I. (2013). A OCUPAÇÃO PRÉ-HISTÓRICA DO ESTADO DE SANTA CATARINA. *Tempos Acadêmicos*, 0(11). Retrieved from <http://periodicos.unesc.net/historia/article/view/1122>
- Schneiberg, M., & Clemens, E. S. (2006). The Typical Tools for the Job: Research Strategies in Institutional Analysis\*. *Sociological Theory*, 24(3), 195–227. <https://doi.org/10.1111/j.1467-9558.2006.00288.x>
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle*. Transaction Publishers.
- Schumpeter, J. A. (1947). The Creative Response in Economic History. *The Journal of Economic History*, 7(2), 149–159.
- Schwartz, S. B. (Ed.). (2004). *Tropical Babylons: Sugar and the Making of the Atlantic World, 1450-1680*. University of North Carolina Press. Retrieved from [http://www.jstor.org/stable/10.5149/9780807895627\\_schwartz](http://www.jstor.org/stable/10.5149/9780807895627_schwartz)
- Scott, W. R. (2000). *Institutional Change and Healthcare Organizations: From Professional Dominance to Managed Care*. University of Chicago Press.
- Scott, W. R. (2001). *Institutions and organizations*. Sage Publications.
- Secretaria Municipal da Habitacao e Saneamento Ambiental (SMHSA). (2009). *Plano Municipal de Habitacao de Interesse Social - PMHIS - Contracto 669/FMIS/2008, Revisao 3 Julho 2009* (p. 93). Retrieved from [http://portal.pmf.sc.gov.br/arquivos/arquivos/pdf/16\\_08\\_2010\\_15.41.22.197114da500fbc9c40c97b79dde1fd77.pdf](http://portal.pmf.sc.gov.br/arquivos/arquivos/pdf/16_08_2010_15.41.22.197114da500fbc9c40c97b79dde1fd77.pdf)
- Secretaria Municipal de Habitação e Saneamento Ambiental (SMHSA), & Prefeitura de Florianópolis. (2011). Revisao do Plano Municipal de Redução de Riscos de Escorregamento do Município de Florianópolis. Retrieved from [http://www.pmf.sc.gov.br/arquivos/arquivos/pdf/29\\_05\\_2013\\_14.09.52.5302e632a9bceee10a75c36f382efd5c.pdf](http://www.pmf.sc.gov.br/arquivos/arquivos/pdf/29_05_2013_14.09.52.5302e632a9bceee10a75c36f382efd5c.pdf)
- Selznick, P. (1949). *TVA and the Grass Roots: A Study of Politics and Organization*. University of California Press.
- Sen, A. (2001). *Development as Freedom*. OUP Oxford.
- Seto, K. C., Fragkias, M., Güneralp, B., & Reilly, M. K. (2011). A Meta-Analysis of



- Global Urban Land Expansion. *PLOS ONE*, 6(8), e23777.  
<https://doi.org/10.1371/journal.pone.0023777>
- Seto, K. C., Güneralp, B., & Hutyra, L. (2012). Global forecasts of urban expansion to 2030 and direct impacts on biodiversity and carbon pools. *Proceedings of the National Academy of Sciences of the United States of America*, 109(40), 16083–16088.
- Sewell, W. H. (1992). A Theory of Structure: Duality, Agency, and Transformation. *American Journal of Sociology*, 98(1), 1–29.
- Sewell, W. H. (1996). Historical Events as Transformations of Structures: Inventing Revolution at the Bastille. *Theory and Society*, 25(6), 841–881.
- Silva, A. F. da. (1980). *Composição florística e estrutura de um trecho da Mata Atlântica de encosta do Município de Ubatuba - São Paulo*. Universidade Estadual de Campinas. Instituto de Biologia. Retrieved from <http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&src=google&base=REPIDISC&lang=p&nextAction=lnk&exprSearch=145650&indexSearch=ID>
- Silva, F. (2007, July 29). MEL é apenas recordação de ecologistas | FloripAmanha.org / Notícias de Florianópolis e da Associação FloripAmanhã. Retrieved December 1, 2016, from <http://floripamanha.org/2007/07/mel-e- apenas-recordacao-de-ecologistas/>
- Silverman, H., & Isbell, W. (2008). *Handbook of South American Archaeology*. Springer Science & Business Media.
- Simon, H. (1982). *Models of Bounded Rationality* (Vol. 1). Cambridge, Mass: MIT Press.
- Skocpol, T., & Amenta, E. (1986). States and Social Policies. *Annual Review of Sociology*, 12, 131–157.
- Soares-Filho, B., Rajão, R., Macedo, M., Carneiro, A., Costa, W., Coe, M., ... Alencar, A. (2014). Cracking Brazil's Forest Code. *Science*, 344(6182), 363–364.  
<https://doi.org/10.1126/science.1246663>
- SOS Mata Atlântica. (2016). SOS Mata Atlântica em Florianópolis. Retrieved November 24, 2016, from <https://www.sosma.org.br/blog/ultima-semana-da-exposicao-itinerante-da-sos-mata-atlantica-em-florianopolis/>
- SOS Mata Atlantica, & Instituto Nacional de Pesquisas Espaciais. (2011). *Atlas dos Remanescentes Florestais da Mata Atlantica, Período 2008-2010*. São Paulo, Brazil. Retrieved from <http://www.inpe.br/noticias/arquivos/pdf/atlasrelatoriofinal.pdf>

- Souza, A. (2008). The Gathering Momentum for Environmental Justice in Brazil. *Environmental Justice*, 1(4), 183–188. <https://doi.org/10.1089/env.2008.0516>
- Sovacool, B. K. (2014). What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research & Social Science*, 1, 1–29. <https://doi.org/10.1016/j.erss.2014.02.003>
- Spatuzza, A. (2016, December 21). Brazil may cancel PPAs amid “significant” demand dip. Retrieved February 12, 2017, from <http://www.rechargenews.com/wind/1201183/brazil-may-cancel-ppas-amid-significant-demand-dip>
- Spitzcovsky, D. (2013). O mapa brasileiro de desastres naturais - Blog do Clima. Retrieved February 14, 2017, from [http://planetasustentavel.abril.com.br/blog/blog-do-clima/2013/09/12/o-mapa-brasileiro-de-desastres-naturais/?utm\\_source=facebook](http://planetasustentavel.abril.com.br/blog/blog-do-clima/2013/09/12/o-mapa-brasileiro-de-desastres-naturais/?utm_source=facebook)
- Starik, M., & Rands, G. P. (1995). Weaving an Integrated Web: Multilevel and Multisystem Perspectives of Ecologically Sustainable Organizations. *The Academy of Management Review*, 20(4), 908–935. <https://doi.org/10.2307/258960>
- Storper, M., & Scott, A. (2009). Rethinking human capital, creativity and urban growth. *Journal of Economic Geography*, 9(2), 147–167.
- Streeck, W., & Schmitter, P. C. (1985). Community, Market, State-and Associations? The Prospective Contribution of Interest Governance to Social Order. *European Sociological Review*, 1(2), 119–138.
- Strippel, J., & Bulkeley, H. (2013). *Governing the Climate: New Approaches to Rationality, Power and Politics*. Cambridge University Press.
- Sugai, M. I. (1994). *As intervenções viárias e as transformações do espaço urbano. A Via de Contorno Norte-Ilha*. Faculdade de Arquitetura e Urbanismo da Universidade da USP, Sao Paulo, Brazil.
- SustentArqui. (2015). Creche sustentável em Florianópolis espera receber a certificação LEED. Retrieved March 10, 2017, from <http://sustentarqui.com.br/construcao/creche-sustentavel-em-florianopolis-certificacao-leed/>
- Swearingen, W. S. J. (2010). *Environmental City: People, Place, Politics, and the Meaning of Modern Austin*. University of Texas Press.
- Swidler, A. (1986). Culture in Action: Symbols and Strategies. *American Sociological Review*, 51(2), 273–286. <https://doi.org/10.2307/2095521>

- Tainter, J. (1990). *The Collapse of Complex Societies*. Cambridge University Press.
- Talwar, S., Wiek, A., & Robinson, J. (2011). User engagement in sustainability research. *Science and Public Policy*, 38(5), 379–390.
- Tarrow, S. (1998). *Power in Movement: Social Movements and Contentious Politics*. Cambridge University Press.
- Tarrow, S. (2001). Beyond globalization: Why creating transnational social movements is so hard and when is it most likely to happen. *Annual Review of Political Science*, 5.
- Temis, T., & Tainter, J. (2016). The Nexus of Population, Energy, Innovation, and Complexity. *American Journal of Economics & Sociology*, 75(4), 1005–1043.
- Terando, A. J., Costanza, J., Belyea, C., Dunn, R. R., McKerrow, A., & Collazo, J. A. (2014). The Southern Megalopolis: Using the Past to Predict the Future of Urban Sprawl in the Southeast U.S. *PLOS ONE*, 9(7), e102261. <https://doi.org/10.1371/journal.pone.0102261>
- Thelen, K. (1999). Historical Institutionalism in Comparative Politics. *Annual Review of Political Science*, 2(1), 369–404. <https://doi.org/10.1146/annurev.polisci.2.1.369>
- Thome, L. (2016, August 20). Mais de 50 mil pessoas vivem em 64 comunidades irregulares de Florianópolis. *Hora de Santa Catarina*. Retrieved from <http://horadesantacatarina.clicrbs.com.br/sc/geral/noticia/2016/08/mais-de-50-mil-pessoas-vivem-em-64-comunidades-irregulares-de-florianopolis-7300817.html>
- Tocqueville, A. de. (1873). *American Institutions and Their Influence*. A.S. Barnes.
- UN Water. (2017). UN-Water: Water, food and energy nexus. Retrieved February 20, 2017, from <http://www.unwater.org/topics/water-food-and-energy-nexus/en/>
- UNEP. (1992). Rio Declaration - Rio Declaration on Environment and Development - United Nations Environment Programme (UNEP). Retrieved January 14, 2017, from <http://www.unep.org/documents.multilingual/default.asp?documentid=78&articleid=1163>
- United Nations Conference on Environment and Development (UNCED). (1992). Agenda 21, Rio Declaration, Forest Principles. New York: United Nations. Retrieved from <https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>
- United Nations, Department of Economic and Social Affairs (DESA). (2016). World

- Urbanization Prospects - Population Division - United Nations. Retrieved May 31, 2016, from <http://esa.un.org/unpd/wup/default.aspx>
- United Nations Department of Economic and Social Affairs (UNDESA). (2014). World Urbanization Prospects: The 2014 Revision, Highlights. Retrieved from <http://www.compassion.com/multimedia/world-urbanization-prospects.pdf>
- United Nations Development Program (UNDP) Brazil, Institute for Applied Economic Research (IPEA), & João Pinheiro Foundation (FJP). (2010). Municipal Human Development Index (MDHI). Retrieved May 28, 2016, from [http://www.atlasbrasil.org.br/2013/en/o\\_atlas/idhm/](http://www.atlasbrasil.org.br/2013/en/o_atlas/idhm/)
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2016a). Biosphere Reserves | United Nations Educational, Scientific and Cultural Organization. Retrieved January 16, 2017, from <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2016b). Florianopolis | Creative Cities Network. Retrieved January 21, 2017, from <http://en.unesco.org/creative-cities/florianopolis>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2017). Biosphere Reserve Information, Brazil, Mata Atlântica. Retrieved March 8, 2017, from <http://www.unesco.org/mabdb/br/brdir/directory/biores.asp?mode=gen&code=BR A+01>
- United Nations Environment Programme (UNEP). (2016). Cities and Climate Change. Retrieved November 18, 2016, from <http://www.unep.org/resourceefficiency/Policy/ResourceEfficientCities/FocusAreas/CitiesandClimateChange/tabid/101665/>
- United Nations Framework Convention on Climate Change. (2016). Greenhouse Gas Inventory Data. Retrieved November 18, 2016, from [http://unfccc.int/ghg\\_data/items/3800.php](http://unfccc.int/ghg_data/items/3800.php)
- United Nations Framework Convention on Climate Change (UNFCCC). (2007). Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries. Retrieved from <https://unfccc.int/resource/docs/publications/impacts.pdf>
- United Nations, General Assembly. (2015b). Adoption of the Paris Agreement. Retrieved from <https://unfccc.int/resource/docs/2015/cop21/eng/109r01.pdf>
- United Nations, General Assembly. (2016a). Rio+20 - United Nations Conference on Sustainable Development. Retrieved May 7, 2016, from

<http://www.uncsd2012.org/index.html>

- United Nations, General Assembly. (2015). Transforming our world: the 2030 Agenda for Sustainable Development, A/RES/70/1. Retrieved May 7, 2016, from [http://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/70/1&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E)
- United Nations, General Assembly. (2016). The Sustainable Development Goals Report 2016. Retrieved from <http://unstats.un.org/sdgs/report/2016/The%20Sustainable%20Development%20Goals%20Report%202016.pdf>
- United Nations Human Settlements Programme (UN-HABITAT), Regional Office for Latin American and The Caribbe. (2002). The Statute of the City: new tools for assuring the right to the city in Brasil. Retrieved from <http://www.polis.org.br/uploads/916/916.pdf>
- United States Environmental Protection Agency (EPA). (2016). Global Greenhouse Gas Emissions Data [Overviews and Factsheets]. Retrieved November 18, 2016, from <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>
- Van Vliet, M. T. H., Wiberg, D., Leduc, S., & Riahi, K. (2016). Power-generation system vulnerability and adaptation to changes in climate and water resources. *Nature Climate Change*, 6(4), 375–380. <https://doi.org/10.1038/nclimate2903>
- Vaz, N. (1991). *O Centro Historico de Florianopolis*. Florianópolis: FCC/UFSC.
- Veblen, T. (1912). *The Theory of the Leisure Class: An Economic Study of Institutions*. B. W. Huebsch.
- Verbong, G., & Geels, F. (2007). The Ongoing Energy Transition: Lessons from a Socio-Technical, Multi-Level Analysis of the Dutch Electricity System (1960–2004). *ResearchGate*, 35(2), 1025–1037. <https://doi.org/10.1016/j.enpol.2006.02.010>
- Vieira, D. (2011). *Policies to Encourage the Sustainable Development of Brazilian Electricity System with Distributed Generation*. University of Cambridge, Cambridge, U.K. Retrieved from [http://www2.aneel.gov.br/biblioteca/trabalhos/trabalhos/Dissertacao\\_Daniel\\_Vieira.pdf](http://www2.aneel.gov.br/biblioteca/trabalhos/trabalhos/Dissertacao_Daniel_Vieira.pdf)
- Viola, E. (1987). O movimento ecológico no Brasil (1974-1986): do ambientalismo à ecopolítica. *Revista Brasileira de Ciências Sociais*, 1(3), 5–26.
- Viola, E. (1995). O Ambientalismo multissetorial no Brasil para além da Rio-92: o desafio de uma estratégia globalista viável. In *Meio Ambiente, Desenvolvimento e Cidadania: desafios para as ciências sociais*. Florianópolis: Universidade Federal de Santa Catarina.

- Wallace, G. (2014, August 4). New survey reveals where the world's millionaires live. Retrieved July 22, 2017, from <http://money.cnn.com/2014/08/04/luxury/most-millionaires-cities/index.html>
- Walsh, B. (2012, January 16). Red State, Green City: How Austin Has Become America's Clean-Tech Hub. *Time*. Retrieved from <http://content.time.com/time/magazine/article/0,9171,2103780,00.html>
- Water Institute, SIWI. (2013). *Cooperation for a Water Wise World – Partnerships for Sustainable Development*. Retrieved from [http://indiaenvironmentportal.org.in/files/file/2013\\_WWW\\_Report.pdf#page=45](http://indiaenvironmentportal.org.in/files/file/2013_WWW_Report.pdf#page=45)
- Wathern, P. (2013). *Environmental Impact Assessment: Theory and Practice*. Routledge.
- Weber, M. (2009). *The Theory Of Social And Economic Organization*. Simon and Schuster.
- Wedemeier, J. (2015). Creative Professionals, Local Amenities and Externalities: Do Regional Concentrations of Creative Professionals Reinforce Themselves Over Time? *European Planning Studies*, 23(12), 2464–2482. <https://doi.org/10.1080/09654313.2014.988015>
- Westley, F., Olsson, P., Folke, C., Homer-dixon, T., Vredenburg, H., Loorbach, D., ... van der Leeuw, S. (2011). Tipping Toward Sustainability: Emerging Pathways of Transformation. *Ambio*, 40(7), 762–80. <https://doi.org/http://dx.doi.org.proxy.libraries.rutgers.edu/10.1007/s13280-011-0186-9>
- Wetlands International (WI), The Nature Conservancy, & University of Cambridge. (2014). *Mangroves for coastal defence: Guidelines for coastal managers & policy makers*. Retrieved from <https://www.weadapt.org/knowledge-base/disaster-resilience/mangroves-for-coastal-defence>
- Wiek, A., Farioli, F., Fukushi, K., & Yarime, M. (2012). Sustainability science: bridging the gap between science and society. *Sustainability Science*, 7, 1–4. <https://doi.org/http://dx.doi.org.proxy.libraries.rutgers.edu/10.1007/s11625-011-0154-0>
- World Bank. (2013). Brazil Protects the Amazon [Text/HTML]. Retrieved November 22, 2016, from <http://www.worldbank.org/en/results/2013/10/09/Brazil-protects-Amazon-increasing-size-protected-areas>
- World Bank. (2015). GDP ranking | Data. Retrieved November 22, 2016, from <http://data.worldbank.org/data-catalog/GDP-ranking-table>

- World Bank. (2016). Brazil | Data. Retrieved May 28, 2016, from <http://data.worldbank.org/country/brazil>
- World Commission on Environment and Development (WCED). (1987). *Our Common Future: Report of the World Commission on Environment and Development*. Oxford: Oxford University Press. Retrieved from <http://www.un-documents.net/our-common-future.pdf>
- World Wildlife Fund (WWF). (2016). South America: Along the Atlantic coast of southeastern and southern Brazil, Ecoregions. Retrieved March 8, 2017, from <https://www.worldwildlife.org/ecoregions/nt0160>
- Wu, J., & Plantinga, A. J. (2003). The influence of public open space on urban spatial structure. *Journal of Environmental Economics and Management*, 46(2), 288–309. [https://doi.org/10.1016/S0095-0696\(03\)00023-8](https://doi.org/10.1016/S0095-0696(03)00023-8)
- Yamin, F., & Depledge, J. (2004). *The International Climate Change Regime: A Guide to Rules, Institutions and Procedures*. Cambridge University Press.
- Young, A. (2016). Adaptation actions for integrated climate risk management into urban planning: a new framework from urban typologies to build resilience capacity in Santos (SP). *City, Territory & Architecture*, 3(1), 1.
- Young, A. (2016). It's official — Silicon Valley housing prices set a new all-time record. Retrieved July 22, 2017, from <http://www.salon.com/2016/08/12/its-official-silicon-valley-is-now-the-most-expensive-housing-market-in-the-us/>
- ZAP Imóveis. (n.d.). ZAP o especialista em imóveis | Apartamentos, Casas e Imóveis à Venda e para Alugar. Retrieved March 8, 2017, from <https://www.zapimoveis.com.br/>