

SPACIAL DYNAMICS OF CHAPECÓ (SC) LANDSCAPE: THE CONSTITUTION PROCESS INTERPRETATION OF ANTHROPIZED MOSAIC

A DINÂMICA ESPACIAL DA PAISAGEM DE CHAPECÓ (SC): INTERPRETAÇÃO DO PROCESSO DE CONSTITUIÇÃO DO MOSAICO ANTROPIZADO

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ABSTRACT

The article discusses the study of the structure, transformation and dynamics of the landscape in the Sub-basin of Lajeado São José, city of Chapecó, state of Santa Catarina – Brazil from a bibliographic review and the use of the GIS tool for the mapping and morphological interpretation of the processes that constitute this morphological structure. As a theoretical criterion, the ecological interpretation of the landscape is interpreted as a means of understanding the territory, considering in this process its problems, conflicts and dynamics of space structuring, as well as the potential of social, economic, cultural and environmental order. In this respect, is revealed the anthropic mosaic of the heterogeneities/homogeneities of the constitution processes that allow the identification and definition of the Landscape Units (LU), being a means of structuring the territory, as well as of articulating effective actions for planning in the scale of the city/fragment/sub-basin. From the data collected, it is verified how the ecological thinking supports the necessary improvement of public policies – in this case, when it is proposed to redesign the macro-zoning in light of the landscape spatial dynamics of Chapecó – and thus presenting itself as a viable alternative for the macroplanning of counties.

Keywords: Landscape Units. Macro-Zoning. Sub-basin of Lajeado São José. Chapecó-SC.

RESUMO

Este artigo aborda a estruturação, transformação e dinâmica da paisagem na Sub-Bacia do Lajeado São José, no município de Chapecó, estado de Santa Catarina – Brasil, a partir de revisão bibliográfica e o uso da ferramenta GIS para o mapeamento e a interpretação tipomorfológica dos processos que constituem essa estrutura. Como critério teórico, assume-se a interpretação ecológica da paisagem como um meio de compreender o território, considerando nesse processo suas problemáticas, conflitos e dinâmicas de estruturação do espaço, bem como as potencialidades de ordem social, econômica, cultural e ambiental. Nesse contexto, é revelado o mosaico antropizado das heterogeneidades/homogeneidades dos processos de constituição que possibilitam identificar e definir as unidades de paisagem, sendo essas um meio de estruturar o território e articular ações efetivas para o planejamento na escala da cidade/fragmento/sub-bacia. A partir dos dados levantados, demonstra-se como o pensamento ecológico fundamenta o necessário aprimoramento das políticas públicas – neste caso, ao propor o redesenho dos macrozoneamentos à luz da dinâmica espacial da paisagem de Chapecó – e, assim, se apresentando como uma alternativa viável para o macroplanejamento dos municípios.

Palavras-chave: Unidades de Paisagem. Macrozoneamento. Sub-Bacia do Lajeado São José. Chapecó-SC.



1. INTRODUCTION

The Brazilian urbanization process is far from being a subject of simple explanation and understanding. From the twentieth century, there has been the effective consolidation of borders, the occupation of the national territory and the consolidation of population inversion from the countryside to the city, developing cities in a "geographic model of spreading growth, with an unmeasured size that is the cause of speculation" (SANTOS, 1994, p. 9). The urban unfolds in flows of information and matter, industrialization and the great economic growth in the medium cities¹, especially those in active agricultural and agro-industrial regions. In this context, urban and regional development has been gaining more and more space in studies and discussions, given the growing need for the elaboration of policies, plans and guidelines, which traditionally originate in public policies that seek a general standardization of urban planning and management instruments. In the reverse of this position is the study of landscape as a key element to understand and elaborate new directions for spatial planning, since it is structured from the recognition and interpretation of the diversities and distinct social aspects of human reality.

With this contribution of reality, the paper seeks to understand the dynamics of the landscape of the municipalities that from the 1950s, and especially from 1970, are engaged in the process of consolidation of national boundaries and decentralization of the productive force of the metropolises to the interior of the country, changing the local economic matrix to serve not only the domestic market, but also exports (SANTOS, 1994): in this case Santa Catarina, with the implementation of agro-industries.

The impacts of these policies guide new directions for urbanization and regional development, as in the west of the state of Santa Catarina, in light of the characteristics of the national process and socioeconomic decisions. Globalization and communication and information technologies have directly influenced and impacted cities like Chapecó, which stand out

¹ For a better understanding of the term middle city see: Silva and Sposito (2017).

in the regional centralization of production, consumption and circulation of goods and people, expressing in their form the workforce, commercial activities and services, the capital, the political and economic power (SPOSITO, 2007).

With a particular process of development and growth, the so-called medium / non-metropolitan cities gain expression from the 1960s and 1970s, because until then Brazil was considered an agrarian country. According to Sposito (2007, p. 9), medium-sized cities are those that "establish intermediation between larger and smaller cities within different urban networks and, therefore, differ from the so-called 'medium-sized cities' whose recognition comes from their demographic sizes". For Corrêa (2006), the understanding of these territories goes through the articulated combination between demographic size, urban functions and the organization of urbanized space.

From the 1980s, and more intensely on the 1990s, it is observed that the cities considered small and medium-sized assume a significant population growth and, above all, a growth of economic activities that were previously found only in the metropolises (SPOSITO, 2007). This process eventually develops a new urbanization throughout the national territory, influencing the landscape of different hitherto rural regions. Understanding this socio-spatial reality requires specific knowledge about territorial dynamics, as well as the agents that influence local and regional transformations.

In the agenda of questions to understand the process of urbanization in Brazil, Santos (2006, p. 209) exposes a relevant focus: space materializes time, that is, it records the intentions thought and executed for each city and advances by understanding that "The urban landscape gathers and associates materialized pieces of time, in a different way and, thus, authorizes diverse economic and social behaviors", which, on the one hand, makes the analysis more complex, on the other, allows reflection on its multiple aspects. Macedo (1999, p. 11) understands the landscape as an articulator of the mentioned processes, since it:

can be considered as a product and as a system. As a product because it results from a social process of occupation and management of a given territory. As a system, insofar as from any action upon it, surely there will be a corresponding reaction, which is equivalent to the appearance of a partial or total morphological alteration.

Thus, the landscape stands as a corollary of the interactions between natural and anthropic elements, dynamically organized in a given geographical space and time period, which, according to Santos (1997), represents different moments in the development of a society. In this sense, and in light of the categorization and landscape analysis system used by the research group Open Spaces Systems – Rio de Janeiro (SEL-RJ) of the Federal University of Rio de Janeiro (UFRJ) and by the Landscape Framework Laboratory in Brazil – Open Spaces Systems (Quapá-SEL) of the University of São Paulo (USP), this article will study the structuring, transformation and dynamics of the landscape in the Sub-Basin² of Lajeado São José, Chapecó-SC, from the mapping of the processes that constitute this morphological structure, reinforcing the understanding of the landscape as:

product that incorporates the biophysical processes and the social processes reflected in it, in different times and scales, and that presents elements of territorial integration or fragmentation, creating and recreating forms, functions and flows, with different ecological functions, in different stages of human intervention (SCHLEE *et al.*, 2009, p. 235).

Landscape analysis is a way of understanding the territory, and morphological-type analysis is a way of contributing to the reflection of the evaluation methods that consider the processes of social construction and transformation of cities / regions.

² Nomenclature and delimitation defined in the work of the Budgetary Execution Managerial Information System (Sigeo), State Secretariat of Sustainable Economic Development - State of Santa Catarina, 2010.

It is understood that when the problems, conflicts and space structuring dynamics, as well as the social, economic, cultural and environmental potentialities are mapped and interpreted, they reveal the anthropized mosaic of the constitution processes that allow the identification and definition of landscape units (LUs), which are a means of structuring the territory and articulating effective actions for planning.

Thus, the transdisciplinary approach adopted here will cover concepts of Architecture and Urbanism, Landscape Ecology, Geography, Psychology and Anthropology, being linked both to biophysical, material and objective relations, as well as to sociocultural and perceptual relations, of immaterial and subjective nature. In this context, the LUs should be studied from the interaction of these two fields of relationships, and these with the anthropic action, which, to a greater or lesser extent, register the marks and impacts of this interaction (BERTRAND, 1972; CONSELHO DA EUROPA, 2000; AB'SÁBER, 2003; SCHLEE *et al.*, 2009).

2. THE CONTRIBUTION OF THE LANDSCAPE STUDY TO URBAN PLANNING

The conception of space makes it possible to reflect on the landscape dynamics “in its various scales of analysis, apprehension and intervention, and the delimitation of territories, since these, when defined by their sociocultural meanings, also refer directly to specific space systems” (SCHLEE *et al.*, 2009, p. 242). Particularly noteworthy are the disputes over land, both urban and rural, and inequalities in income distribution that “have led to conflicts and contradictions that are clearly reflected in the distribution, appropriation and treatment of open spaces and their relationship with built spaces” (SCHLEE *et al.*, 2009, p. 226).

For Souza (1995, p. 78) the territory is “fundamentally, a space defined and delimited by and from power relations”. Of course, it's not that simple, because, as Arendt (1983, p. 212) well recalls, power “only exists in its effectiveness” and complexity. “Power that is not only ambivalent but also, as Castoriadis (and

Arendt) clearly underlines, *ubiquitous*" (SOUZA, 2015, p. 83). This omnipresence needs a "free, autonomous" society (SOUZA, 2015, p. 85) and not "heteronomous" that is "in an effective equality of conditions in the decision making process [...] even defining possible punishments for violators of these rules, and that is exercising power, which power is embodied in the form of a set of norms" (SOUZA, 2015, p. 84). Part of this set of collectively agreed conventions - whether in the form of law, decree and / or plan - establishes the processes of production, structuring and appropriation of the territory - elements inherent to urban planning and essential in landscape reading.

Souza (2000, p. 79) points out that the territory is built and / or deconstructed in the exercise of power, which gives it the most different scales of existence, such as: temporal, when permanent, for years, months or days, periodically, cyclically; and dimensional, and may involve spaces of different dimensions, such as roads and continents, for example. In this sense, Souza (2000), by understanding the territory as the space of representation and approximation of social groups, defines territoriality; and understanding that this same territory can be occupied by different social groups depending on temporality, such as over the course of a day, defines this appropriation as territorialization. That is, the territory is one of the multiple faces of social space (SOUZA, 2015),

a social construction, which incorporates economic and productive processes, defines strategies of domination over space and its resources and manifests itself on a physical basis, through multiple individual and collective appropriations, delimiting marks and milestones of cultural identity (SCHLEE et al., 2009, p. 231).

Among landscape studies, Landscape Ecology has an approach based on the study of the structure, function and dynamics of heterogeneous areas composed of interactive ecosystems. Landscape Ecology is concerned with understanding the

consequences of the spatial pattern on ecological processes. That is: how heterogeneity is expressed spatially. To do so, it basically studies three landscape features: structure, function and dynamics (FORMAN; GODRON, 1986; METZGER, 2001).

Forman and Godron (1986) understand Landscape Ecology as an important tool for scholars, citizens and planners, as this theory plays a unique role in observing the heterogeneities of a landscape. This shows how ecological systems are intertwined: an action here and now has an effect there and then - the system is interconnected, and it is essential to understand the spatial relationships between landscape elements, flows, and the ecological dynamics of the landscape mosaic. This understanding is related to the influence of spatial patterns on ecological processes, as well as the recognition of the influence of scale on ecological studies.

In Landscape Ecology, understanding the integration between parts of a whole and the different levels of action of landscape elements - a systemic approach - is widely used. In practical terms, it is proposed to understand the changes that man makes in the environment, seeking to explain the "structural and, therefore, functional changes brought by man in the mosaic as a whole, explicitly incorporating all the complexity of spatial interrelationships of its components, both natural and cultural" (METZGER, 2001, p. 7).

For Wu (2012), studying the spatial pattern without relating it to ecological processes is superficial, and it would be incomplete to investigate ecological processes without considering spatial patterns. Thus, Landscape Ecology is the science of heterogeneity and scale, providing a new scientific paradigm.

In this context, the landscape is inserted with its physical, material, objective and categorizable essence, as well as the symbolic, experimental and procedural essence. In other words, in the cultural depth (LEITE, 1992; SCHLEE et al., 2009), being the great challenge in contemporary times to understand it in its complexity. Landscape attributes are understood from the integrative definition of landscape - "heterogeneous (anthropized) mosaic

formed by interactive units, and this heterogeneity exists for at least one factor, according to an observer and on a given observation scale" (METZGER, 2001, p. 1). Thus, we work with broad spatial and temporal scales that use ecosystems, cover units, or territory use and occupation to represent landscape units. The limit of the interactive set of this landscape is structured by the factors that, at first, condition the identification of landscape units: abiotic environment, natural and anthropic disturbances (METZGER, 2001).

However, landscape units are the types of landscape components that constitute the mosaic of different uses and coverings without having the properties and dependencies of a system, but which condition and imply the functioning of the landscape by the arrangement and spatial dependence between the units. In this context "the ecology of landscapes can thus be understood as an ecology of spatial interactions between landscape units" (METZGER, 2001, p. 5), placing itself as an important tool to describe and interpret the landscape from study and understanding of the heterogeneities / homogeneities of the territory. Consequently, they are also important for the reflections that lead to urban planning, as they result from the dynamic interaction of components, which, in the multiscale view, assume an important role for: metropolis / regions / basins scales – ecological structure; city scale / fragments / sub-basin – morphological structure (scale of this work); scale of daily life / places / neighborhoods – uses and appropriations.

3. LANDSCAPE UNITS AS A TOOL FOR LANDSCAPE PLANNING: THE CASE OF CHAPECÓ

The west of the state of Santa Catarina has a process of structuring the municipalities that is closely linked to the action of economic agents, especially agro-industry, on the different actors in the region (VILLELA *et al.*, 2015). The west of the state of Santa Catarina has a process of structuring the municipalities that is closely linked to the action of economic agents, especially agro-industry, on the different actors in the region (VILLELA

et al., 2015). The municipality of Chapecó-SC has an estimated population of 213,279 inhabitants (IBGE, 2017) and is understood as a medium / non-metropolitan city, since "it participates more and more in the world market in the context of globalization, through the development of new functions and different activities" (HASS; ALDANA; BADALOTTI, 2010, p. 61), as well as the contradiction of at the same time consolidating:

its regional role, by influencing its surroundings in terms of production, circulation and consumption, on the other hand, it reaches national and international scales, which also implies to suffer the impacts that reach these scales. Between the permanence and / or change of economic agents that restructure the urban and the regional, the city also reflects these movements, overlaps and contradictions (MATIELLO *et al.*, 2016, p. 312).

The definition of the territorial outline of this work was based on the Sub-Basin of the Lajeado São José, located in the west of Santa Catarina, covering a large part of the municipality of Chapecó, which has an area of 23,750.2ha (Figure 1). This geographic contribution is part of the above Sub-Basin 73, one of nine in which the Uruguay River Basin is divided, which covers 384 municipalities, with an area of approximately 384,000 km², of which 174,494 km² are located in Brazil, which is equivalent to 2% of the Brazilian territory. Of the Brazilian area, 46,000 km² are in the state of Santa Catarina (AGÊNCIA NACIONAL DE ÁGUAS, 2010; BRASIL, 2006), corresponding to 0.54% of the national territory.

In general, in relation to the soil and relief, there is the presence of native forest still relevant, and the fertility of the soil in its original stage quite high. However, the colonization policy, combined with the intensive agricultural production model with the use of chemical inputs, led to the depletion of soils, making them of low fertility. The region is situated in areas of gently undulating to undulating relief (WELTER, 2006; BRASIL, 2010).

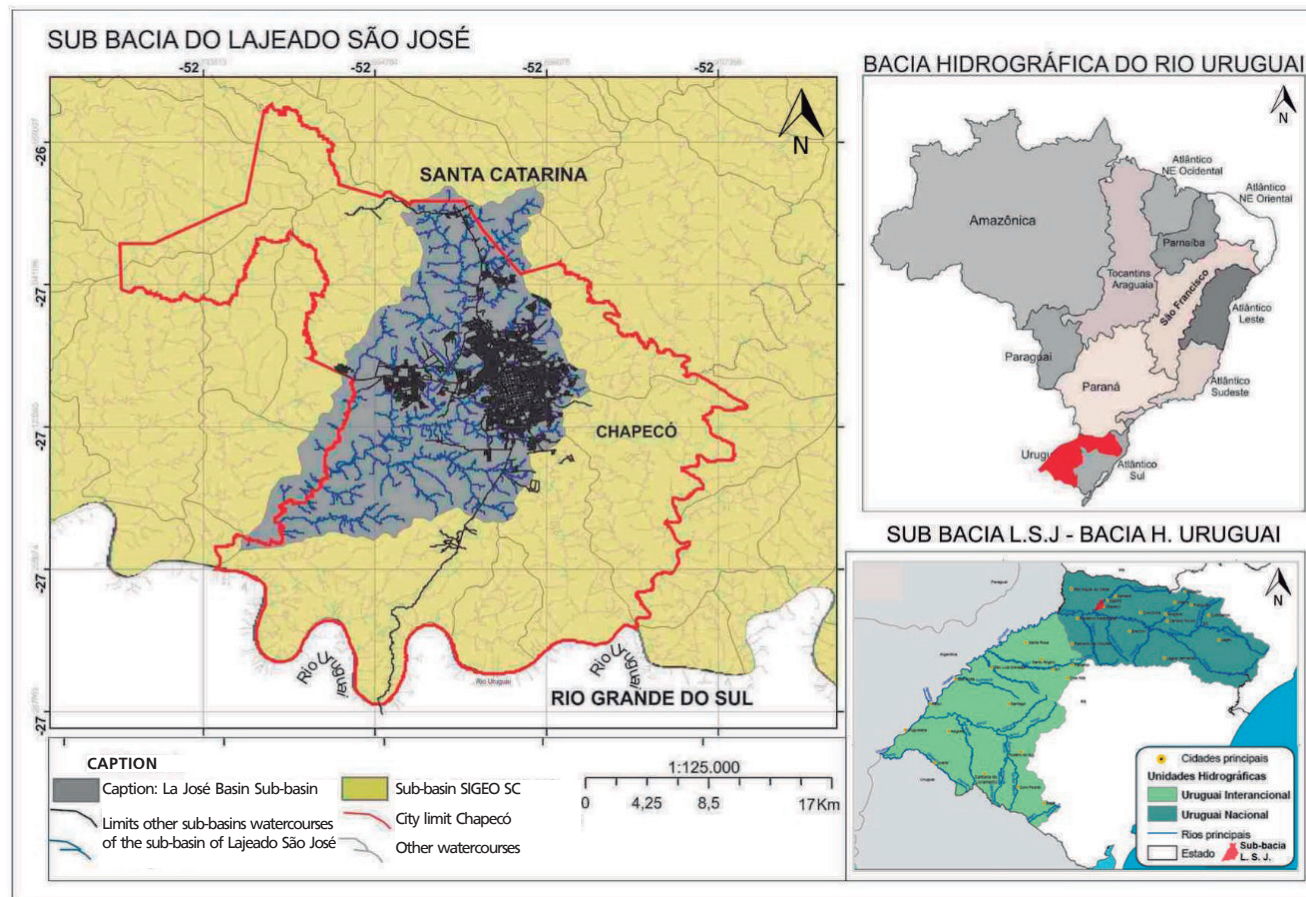


Figure 1 – Situation map of the study area.
Source: Santa Catarina state cartographic base; Chapecó road system. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.

4. ANALYSIS OF LANDSCAPE UNITS

This study aims to analyze, critically, the public policy guidelines implemented regarding the propositions for the open space system and its impact on the landscape from the understanding of the spatial relations between landscape elements, flows and the ecological dynamics of the landscape. It was based on theoretical, documentary and field research based on Forman &

Godron (1986); Forman (1995, 2008); Tângari (1999, and 2014); Tângari *et al.* (2012) and the landscape categorization and analysis system used by the research group SEL-RJ from UFRJ and the Quapá-SEL Laboratory from USP.

The applied methodology was based on the mapping and interpretation of the morphological-type constitution processes, such as: (1) physical support – relief, hydrography, vegetation

cover; (2) occupation vectors – economic activities and flows, urban area evolution; (3) occupation patterns – constructive types; and (4) plans, laws and agents of transformation – milestones of the occupation process. These data supported the characterization of landscape units (LUs), and the most relevant elements for this study are natural or artificial delimitations, historical or symbolic delimitations, occupation patterns and type-morphological / environmental / functional characteristics.

The mappings were developed in a geographic information systems (GIS) and geoprocessing environment, using the free software QGIS 2.18 and ArcGis 10.4.1, allowing to capture, store and update the data, as well as to display and analyze their integrations.

5. MORPHOLOGICAL TYPE CONSTITUTION OF THE SUB-BASIN OF LAJEADO SÃO JOSÉ RESULTS AND CRITICISMS

The mapping of the morphological-type elements studied in the Sub-Basin of Lajeado São José scale made it possible to synthesize the characteristics of six LUs (Figure 2). The most significant and representative elements resulting from: natural or artificial boundaries; historical or symbolic delimitations; occupation patterns; and the morphological, environmental and functional characteristics, as well as their contribution to the urban planning of the municipality.

From the survey, the cartographic mapping and the interpretation of the sub-basin type-morphological constitution processes regarding the biophysical support, it can be highlighted that the relief, hydrography and vegetation cover elements are significant through the remaining vegetation areas and areas of rugged relief, especially the Taquaruçu River Valley (LU 3 main river - Figure 2).

The mapping performed by the interpretation of satellite images of the land use map is very important because it demonstrates the areas of reforestation, exposed soil, water bodies, pastures

and natural fields, mid-stage forests, urbanized and agricultural areas, allowing the understanding of more or less anthropized areas, that is, areas with more preserved vegetation, production and intensification of urbanization. Overall, the 23,750.2ha of the sub-basin area constitute seven types of land use (Graph 1 and Figure 3).

For the mapping of *socio-cultural support*, occupation vectors, economic activities and flows were observed, based on studies already carried out and field surveys. The historical occupation vectors, referring to the consolidated urbanized area, can be attributed, mainly from the 1960s, to the implantation of the main agro-industries, which were being incorporated into the urbanized fabric. Currently, in addition to agro-industries, also stand out as important economic activities the metalworking and furniture industry, logistics services, higher education and health, as well as the real estate market (MATIELLO et al., 2016).

The analysis of the biophysical supports and part of the sociocultural (land use) supports allow us to characterize the urbanized area as a massif whose shape spreads with a large fragment in the west and in smaller fragments to the north and south (Figure 3). As for hydrography, the watercourses run through the urbanized area in order to channel into a single sink towards the Taquaruçu River, southwest of the study area (LU 3 main river - Figure 3). As for the areas with agriculture, with the exception of the area east of the study area, where the urbanized area reaches great expression and anthropic impact, the use for planting and pastures associated with the remnant of forest and reforestation can be seen, covering much of the contours of the urbanized area.

The accesses to the highway BR 283 (east-west) and BR 480 (north-south) are important regional hubs that significantly impact the flows and circulation of the study area, cargo and passengers pass through as well as in search of the city's service centers. They are characterized by the location of logistics and transportation companies, wholesale trade, food and chemical industries and, in the case of BR 480 (connection with the state of Rio Grande

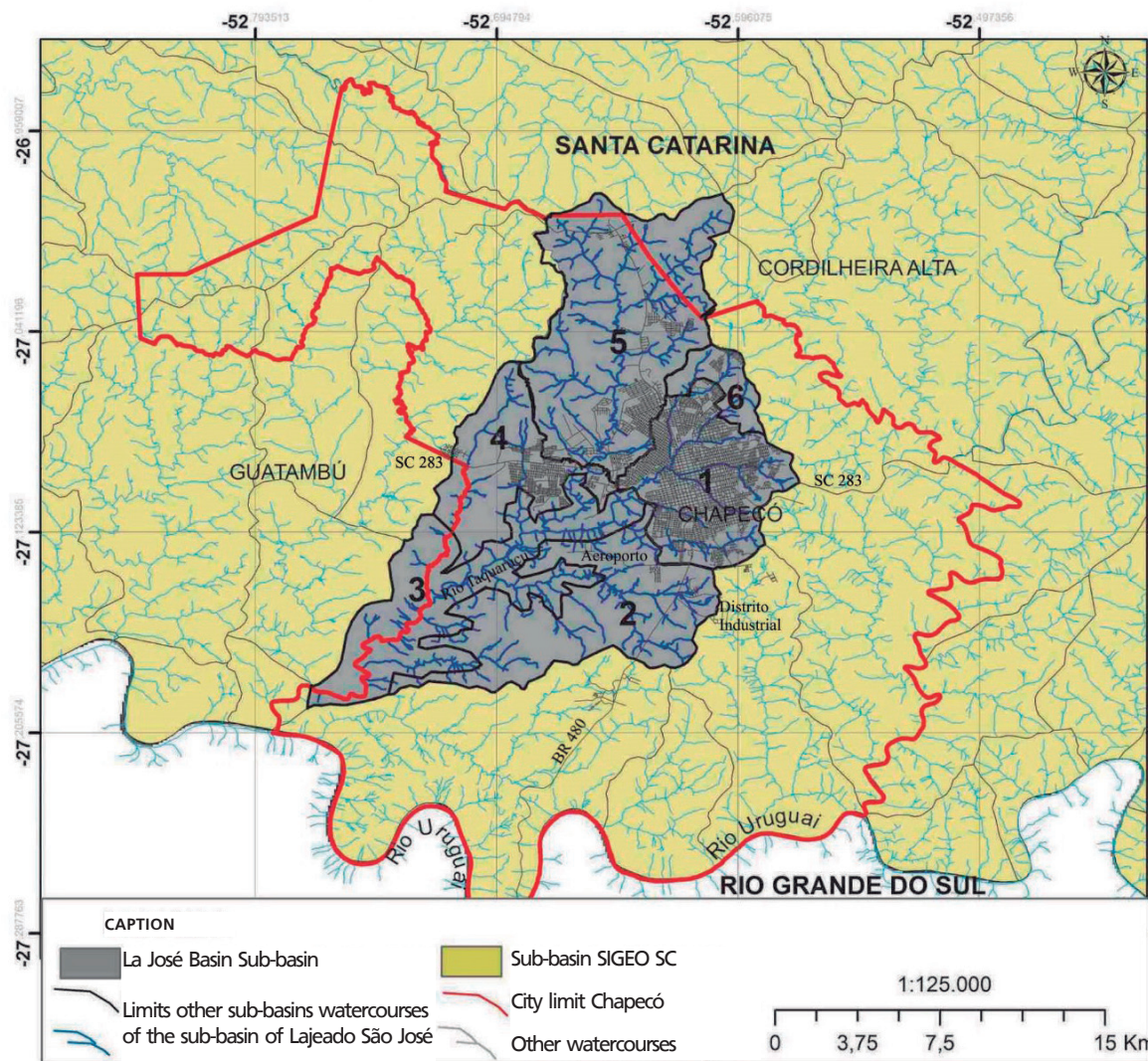
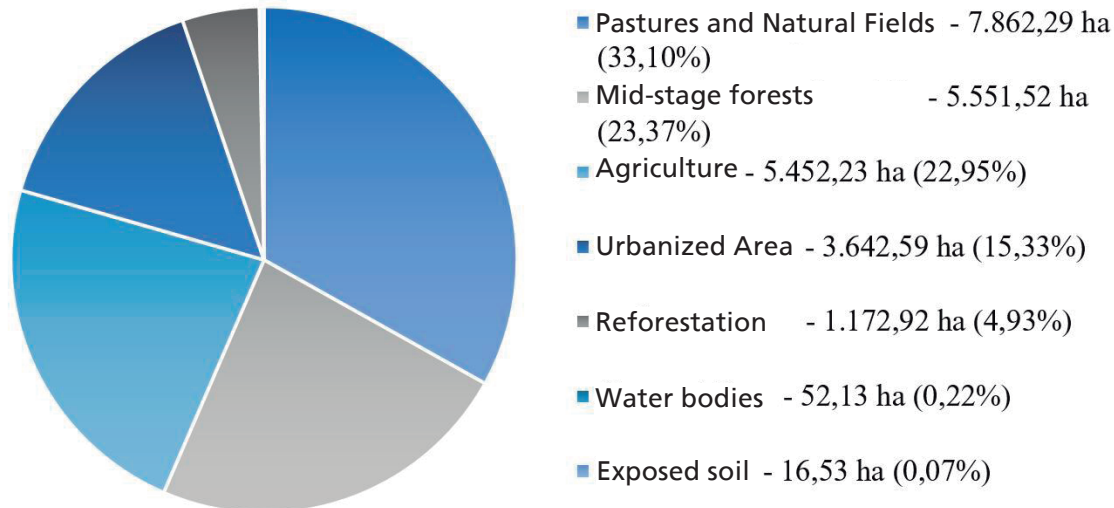


Figure 2 – Map of landscape units.
Source: Santa Catarina state cartographic base; high-resolution satellite image available on Google Earth based ArcGIS 10.4.1.
Preparation and editing, 2017.

Usos do solo da área da Sub-Bacia do Lajeado São José, Chapecó-SC



Graph 1 – Land uses of the Sub-Basin of the Lajeado São José area, Chapecó-SC.
Source: Epagri / Ciram Land Use Survey.

do Sul), access to the Industrial District. Also noteworthy is the role of the airport in providing regional attraction through its national-international articulation and mobility. In the last 15 years, some gated communities have also been implemented in rural areas and detached from the urban area.

The study of the *evolution of the urban area* (Figure 4) highlighted the different patterns of occupation and building types throughout the process of anthropic consolidation of the territory. In general, from the first settlements, we highlight the consolidation of the occupation in Passo dos Índios – name of the original nucleus designed as an orthogonal fabric, which currently corresponds to the center of the city of Chapecó (LU 1), where, in the last 10 years, a more intense verticalization process has been observed, surpassing the 30 floors, in some cases.

The expansion from this original nucleus gained expression from the 1970s, due to the more intensive installation of agro-industries, in the northern direction of the urbanized network. Occupation to the west has intensified since the 1990s, especially with the installation of new industrial plants and the federal university. More recently, over the past 15 years, urban area has sprawled over once-primary soil, or sometimes even detached from the municipality's main urban area, as in the case of closed middle-income and high-income allotments and popular housing estates.

The study of the *plans, laws and agents of transformation* allows to synthetically highlight the historical interferences in the consolidation process of the area under study. The master plans, especially those of the 1970s (CHAPECÓ, 1974), failed to organize

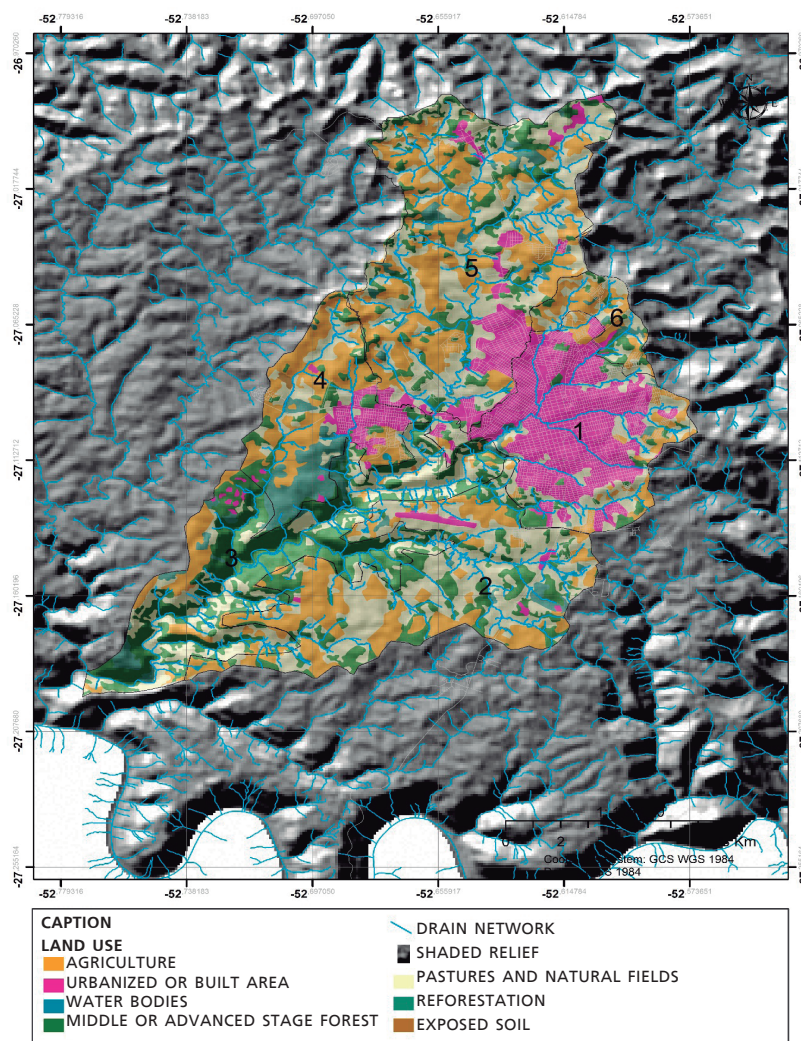


Figure 3 – Synthesis map biophysical support and sociocultural support. Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram; shaded relief of the hydrogeological map of the state of Santa Catarina. Preparation and editing: Daiane Regina Valentini, 2017.

urban sprawl. They were also responsible for the delimitation of exclusive residential areas, which contributed to spatial segregation. The plan of the 1990s (CHAPECÓ, 1990) made it difficult to install social housing in areas with more structured urbanization. The 2000s were marked by a new plan and its revisions (CHAPECÓ, 2004; 2007; 2014), which gave rise to the intensified performance of real estate capital. In this sense, we highlight the increase in construction potentials, the multiplicity of functions, the greater densification in the functional units of development decentralization (Portuguese acronym: UFDD) and the facilitation for the approval of plots in areas of future urban expansion, resulting in the formation of new urban voids – under the agreement of the Urban Development Council, today, ConCidades.

Urbanization over the area that corresponds to the drinking water catchment basin, the main source of supply for the urban area (MATIELLO *et al.*, 2016; RECHE, 2008; MONTEIRO, 2006) was also released, although under restrictions. These factors were added to government housing support programs, such as the Minha Casa, Minha Vida (My Home, My Life) and urban infrastructure programs, with the restructuring and installation of regionally connected road axes, along which land use has intensified on the edges of more consolidated urbanization and, to a lesser extent, the occupation of urban voids.

In the end, the cartographic mapping of the studied elements made it possible to synthesize the essence of each of the six identified LUs, already shown in Graph 1. Therefore, the most significant and representative elements that consist of the understanding of natural or artificial and historical or symbolic delimitations, occupation patterns and morphological, environmental and functional characteristics were considered.

The LU 1 (Figure 5) stands out for the large urban area consolidated throughout the process of occupation of the territory, for the densification and process of building verticalization and for the housing and commercial activities and services (Figures 6, 8 and 10). It represents 16% of the total area under study,

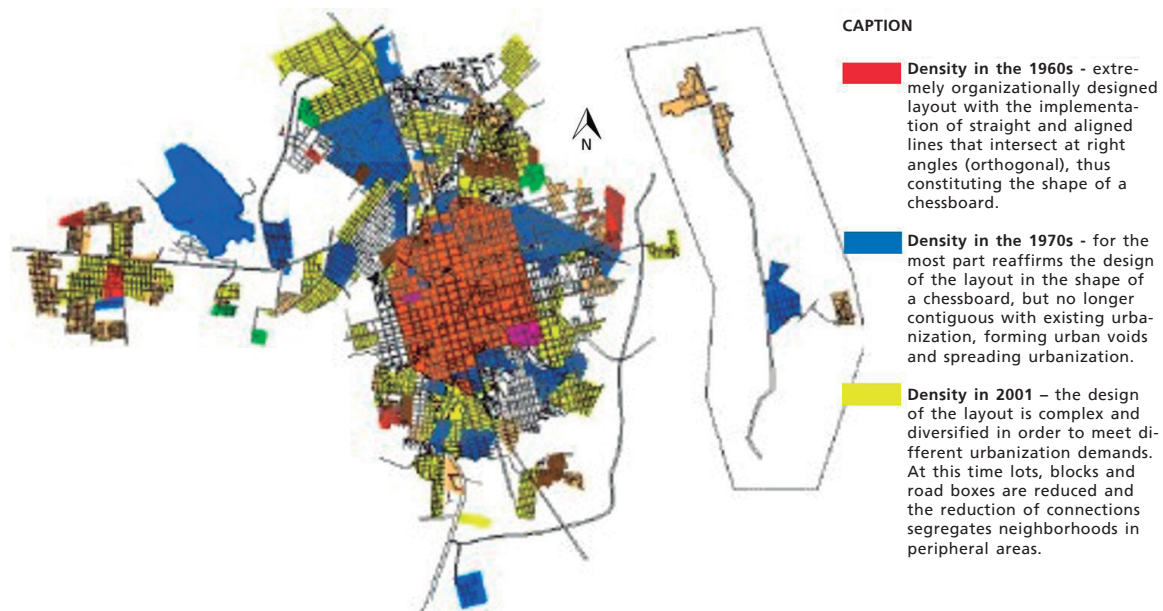


Figure 4 – Chapecó urban nucleus.
Source: Adapted from Villela (2007, p. 171).

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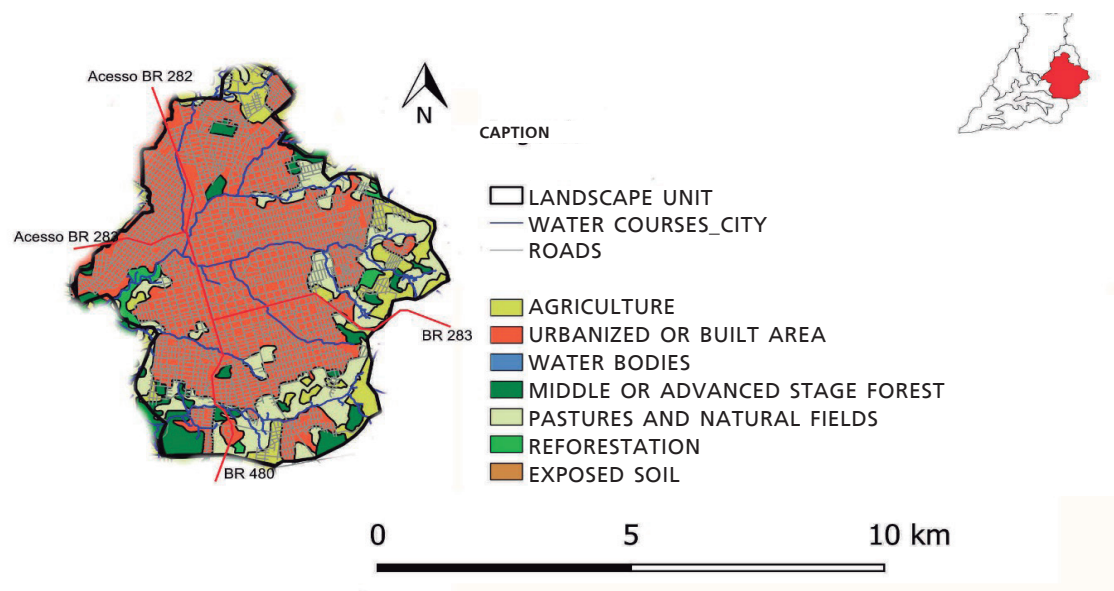


Figure 5 – Landscape unit 1.
Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram.
Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.



Figure 6 - Consolidated urban area that conforms to LU1 and predominantly agricultural use area of LU2. Source: Photo by Victorino Zolet (October 2013), edited by Alexandre M. Matiello, 2016.

with little use of pasture and natural fields, agriculture and mid-stage forests. Features relief of gently undulating and undulating soils; predominant slope from 3% to 20% with flat areas from 0% to 3%; remnants of middle or advanced-stage forest vegetation at the edges; and restricted water capillarity, but well distributed throughout the unit. It encompasses most of the urbanized area and presents the records of all the processes of consolidation and expansion of the urban nucleus (both by the insertion of the agro-industry plant, which became a vector of urban expansion, as well as by state action, through government programs of urban infrastructure³); and economic,

³ This was the case of the Urban Community Program for Accelerated Recovery (Portuguese acronym: Cura) of the mid-1970s, which privileged and valued some areas by intervening mainly with paving of streets and sidewalks (CHAPECÓ, 1979).

service (mainly education and health) and production activities. This unit connects the four accesses to the municipality: BR 283 (east-west direction), BR 480 (south) and access to BR 282 (to the north – connection to the east coast and the international border with Argentina to the west).

The LU 2 (Figure 7) is characterized by sparse and industrial residential, agricultural and recreational occupation, for being the southern connection of the municipality (BR 480) and for presenting a favorable topography for urbanization (Figure 6). It represents 21% of the total area under study, and is characterized by the balance between pastures and natural fields, agriculture, middle or advanced stage forests and reforestation points and urbanized and / or built area. It has relief of gently undulating

Figure 7 – Landscape unit 2.
Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.

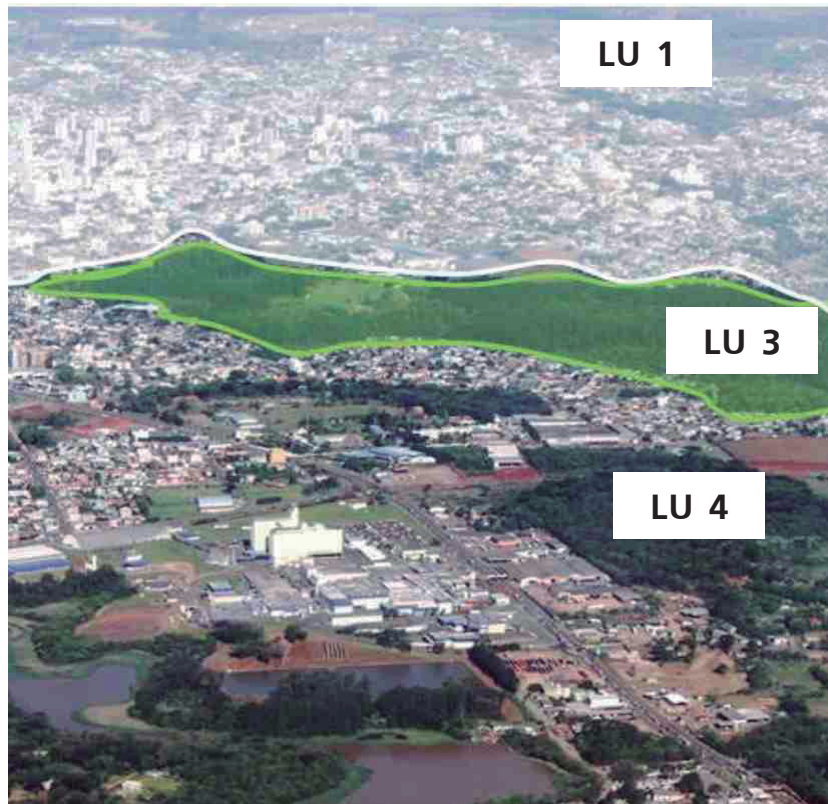
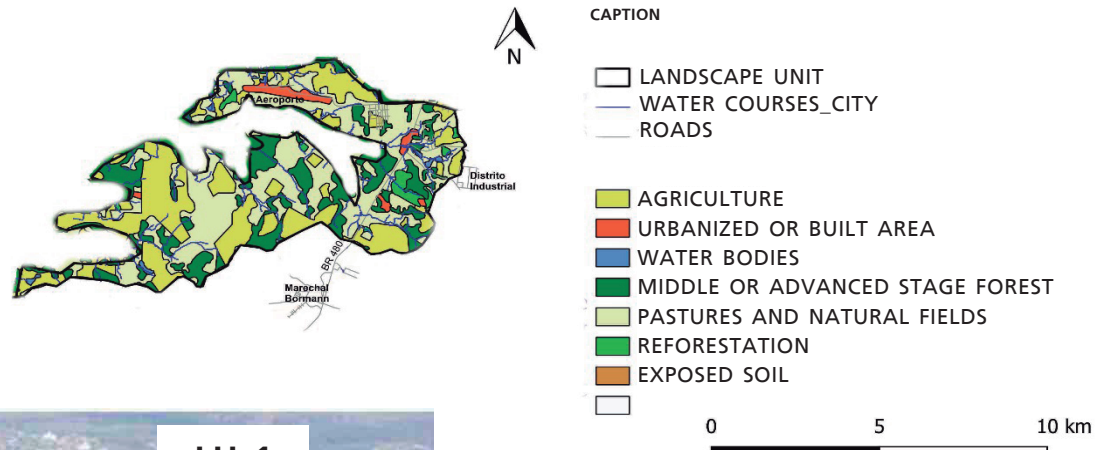


Figure 8 – Consolidated urban area that comprises LU1, the Taquaruçu Valley Valley fund (LU3) and the subcentrality with consolidated urbanized area (Efapi Neighborhood – LU4).
Source: Photo by Victorino Zolet (October, 2013), edited by Alexandre M. Matiello, 2016.

and undulating soils, with a predominant slope of 3% to 8% and significant areas of 8% to 20%, few areas of middle or advanced stage forest vegetation distributed throughout the unit, remnant of reforestation and water capillarity more that is present and well distributed by the unit. It gives access to the south of the municipality to students, workers and cargo, being the axis of connection with Rio Grande do Sul. It is characterized by industrial activity along BR 480, with isolated housing nucleus (Marechal Bormann) and club headquarters. It suffers great impact because of this accessibility / mobility and the pressure of urbanization caused by it. It also works as a local and regional airport connection.

The LU 3 (Figure 9) conforms to the Taquaruçú River valley, the remaining vegetation, and steep slope - without intensive

urbanization and with features aimed at environmental preservation. (Figures 8, 10 and 14). It represents 20% of the total area under study. It stands out for the large area of forests in middle or advanced stage, with good representation of pastures and natural fields and remnants of agriculture and use for reforestation. The relief is strongly undulating, with large slopes – predominance of 20% to 45%, constituting the Taquaruçú River Valley. There is significant sparsely anthropized vegetated open space, constituting preservation areas and small agricultural and environmental production properties not protected by local legislation. Historically, the anthropic action was small, a situation that has been changing with the implementation of the road contour, which generates pressure for occupation along this axis.

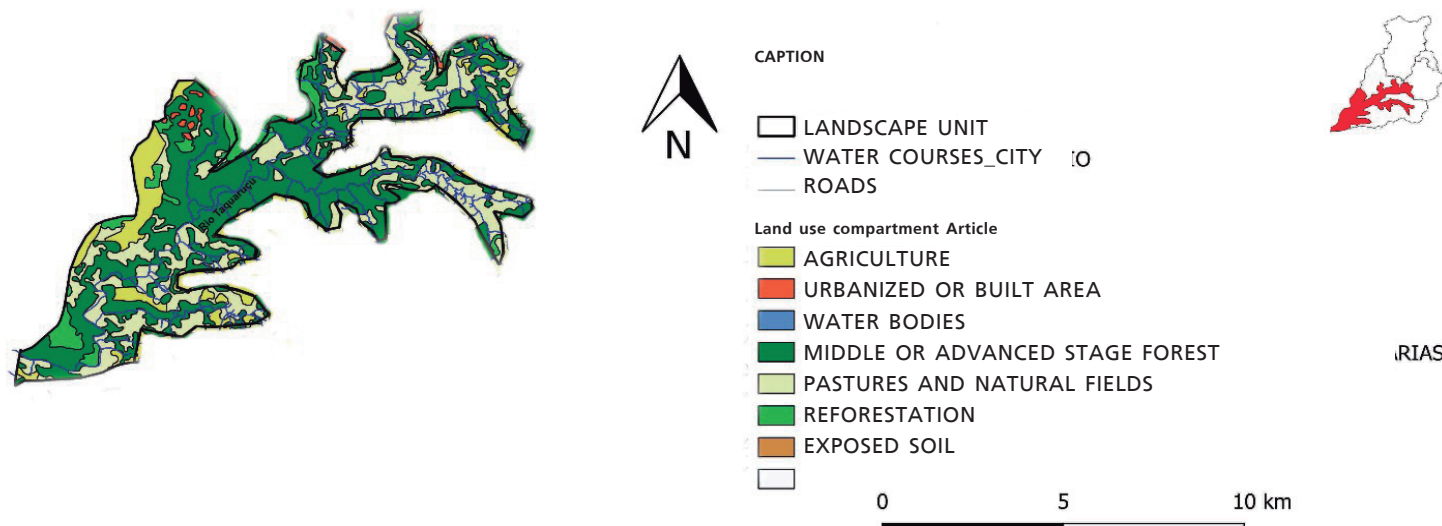


Figure 9 – Landscape unit 3.

Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.

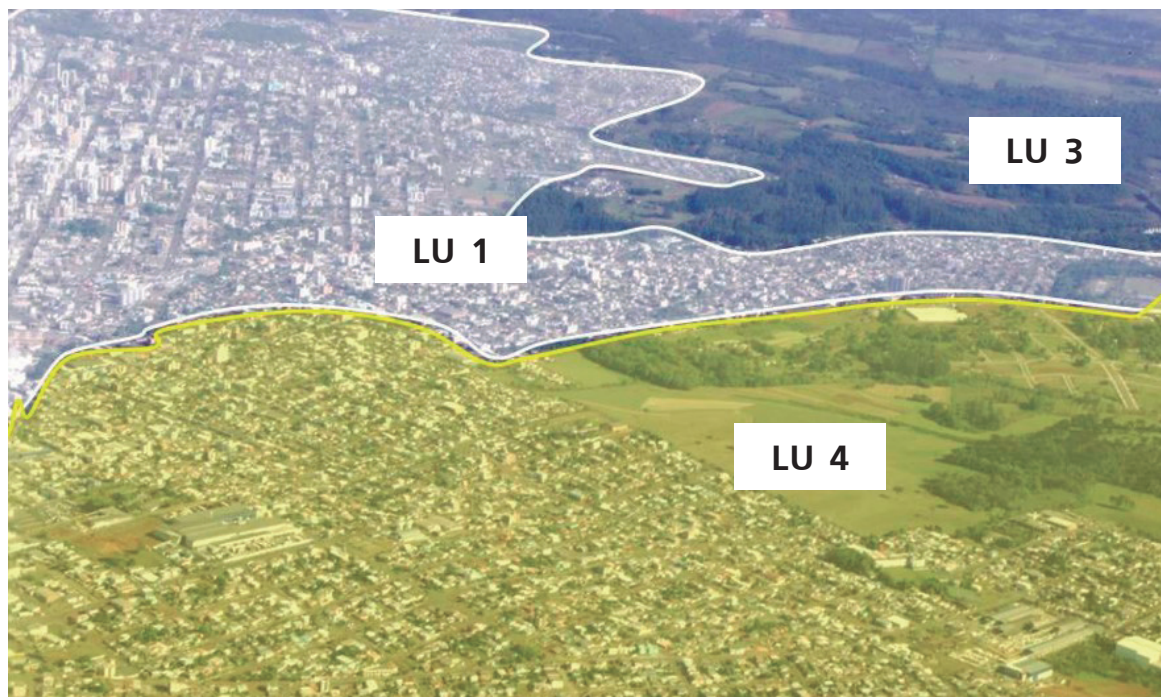


Figure 10 - Landscape unit 5: more consolidated area, where there is a large urban void in the process of urbanization. Source: Photo by Victorino Zolet (October, 2013), edited by Alexandre M. Matiello, 2016.

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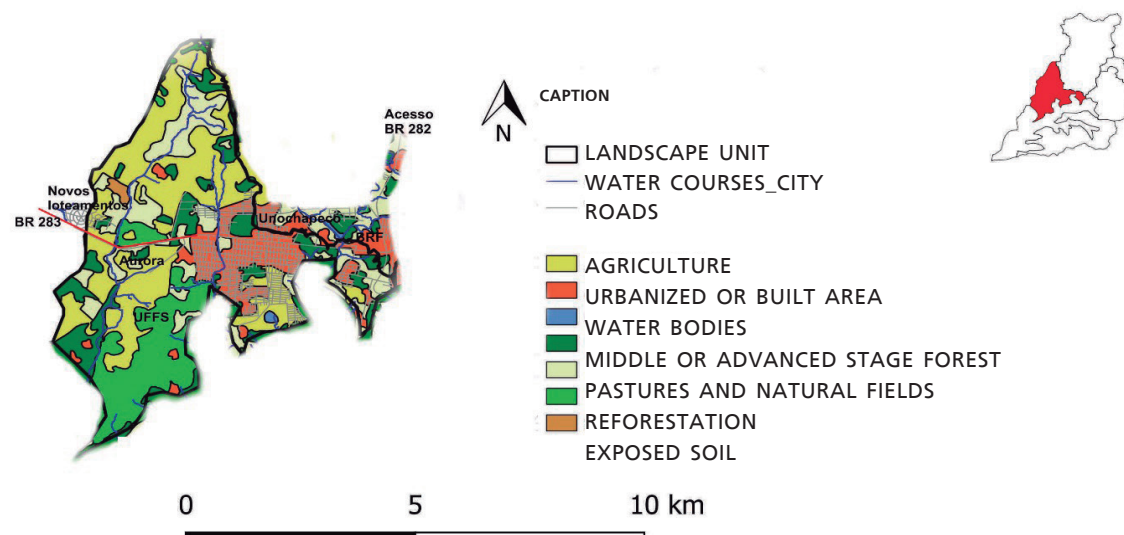


Figure 11 – Landscape unit 4. Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.

The LU 4 (Figure 11) proved to be a subcentrality with a consolidated urbanized area (Efapi Neighborhood) and expanding borders, hosting important growth vectors, such as universities (Federal University of Fronteira Sul (UFFS) Community University of Chapecó Region (Unochapecó)), agro-industries (Aurora and BRF) and new allotments (Figure 8). It represents 12% of the total area under study, highlighting the large area of agriculture and the balance between reforestation, pastures and natural fields, forests in the middle or advanced stage and urbanized area. It has relief of undulating soils, with a predominant slope of 3% to 20% with flat areas of up to 3% and restricted water capillarity, but well distributed throughout the unit. Important urbanized area that is consolidated mainly when the expansion of the urban network (east-west) and the installation of agro-industries. It operates as a west access to the municipality through BR 283 – for students, workers and those using health services – and connecting with the international border (Argentina). It is associated with an important urban area (Efapi Neighborhood), which is an educational and commercial hub, and an area of urban expansion, and therefore suffers from great pressure for occupation.

The LU 5 (Figure 12) is the area of the municipality's drinking water catchment basin, which has specific zoning with minimum lots of 600m² to reduce the impact on soil permeability (Figures 10 and 14). It is being occupied with denser urbanization and consolidated with remnants of environmental preservation areas. It represents 28% of the total area under study, which includes pasture areas, natural fields and agriculture, and the balance between middle and advanced stage forests, urbanized area and reforestation. The LU has relief of undulating soils, predominant slope of 3% to 20%, with flat areas of up to 3% and large water capillarity well distributed throughout the unit. It serves as north access to the municipality for students, workers, cargo and demand for health services by BR 282. It is the axis of connection with the state of Paraná to the north (production flow and

entry), the eastern coast of the state of Santa Catarina and the international border (Argentina) to the west. It is characterized by wholesale and logistics activity and isolated housing units. It is an environmental area that was previously protected by legislation, but with the Master Plan of the 2000s (CHAPECÓ, 2004; 2007; 2014) and its changes, suffers great pressure for occupation and urbanization.

The LU 6 (Figure 13) proved to be an expanding area of urbanization largely due to the future development vector (eastern contour) and its favorable topography (Figure 14). It represents 3% of the total area under study, and stands out for the existence of agriculture areas, pastures and natural fields and the representativity of forests in the middle or advanced stage and remnants of reforestation and urbanized area. It has relief of undulating soils, predominant slope of 8% to 20% and significant areas of 3% to 8% with flat areas of 0% to 3% and more present and well distributed water capillarity. Sparsely anthropized area, which has good characteristics for urban expansion. It is not established as a connection axis neither local nor regional and includes primary production activities. It is currently receiving pressure for occupation and urbanization

The method made possible the comparative study, the problematization and the evaluation of the LUs as territory ordinator and landscape qualifiers, as well as assisted in the reflection on the incident macro-zoning in the Sub-Basin of Lajeado São José. *In summary*, it is shown in Table1:

In general, the data lead us to understand that the agro-industrial matrix and the recent process of consolidation of the urbanization of this municipality (after 1980) have interfered with the current understanding of the complexity of this territory, given the delineation of the macro-zoning of the municipality of Chapecó, with only two major characterizations: urban and rural (Figure 15).

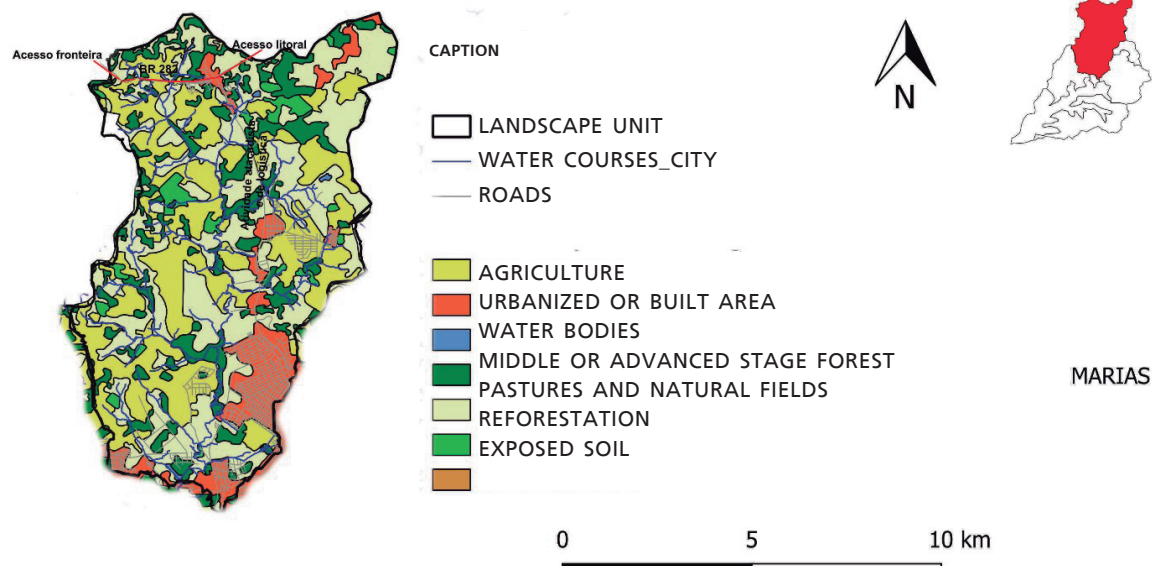


Figure 12 – Landscape unit 5.
Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.

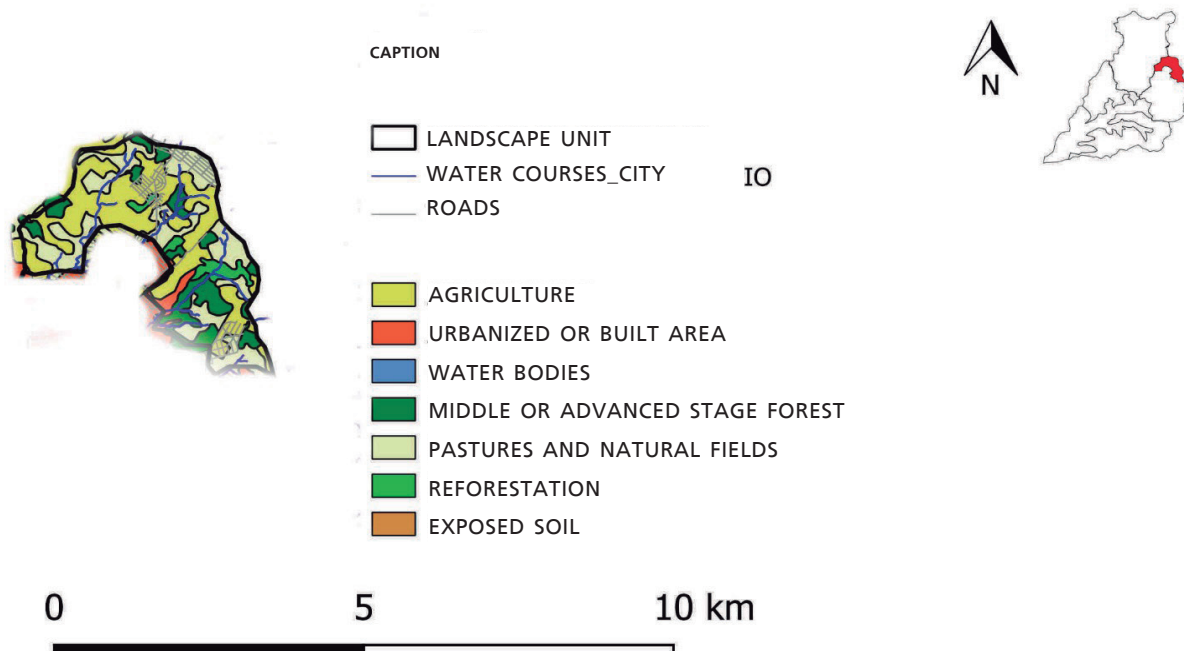


Figure 13 – Landscape unit 66.
Source: Santa Catarina state cartographic base; land use survey Epagri / Ciram. Preparation and editing: Daiane Regina Valentini and Ana Laura Villela, 2018.



Figure 14 – Landscape unit 6: area that conserves agricultural use, but has been undergoing more recent urbanization.
Source: Photo by Victorino Zolet (October, 2013), edited by Alexandre M. Matiello, 2016.

Table 1 – Characterization of landscape units of the Sub-Basin of Lajeado São José

LU 1	It stands out for the predominance of the urbanized area and for the connection of the four entrances to the municipality;
LU 2	It stands out for being the southern gateway to the municipality (connection to the airport and Rio Grande do Sul) - with a strong presence of industrial activity and club headquarters;
LU 3	It stands out for the large sparsely anthropized green area – Taquaruçú River valley bottom with environmental area not protected by local legislation and small production properties;
LU 4	It stands out for being the west gate of the municipality and housing important urbanized area (Efapi Neighborhood) and connection with the international border (Argentina);
LU 5	Includes a large part of the municipality's water catchment basin and represents the northern gateway to the municipality – the state of Paraná, the coast of the state of Santa Catarina and the international border (Argentina), with a strong presence of wholesale activity throughout of access;
LU 6	It is a sparsely anthropized area, which has good characteristics for urban expansion – it is not established as a connection axis neither local nor regional and includes primary production activities.

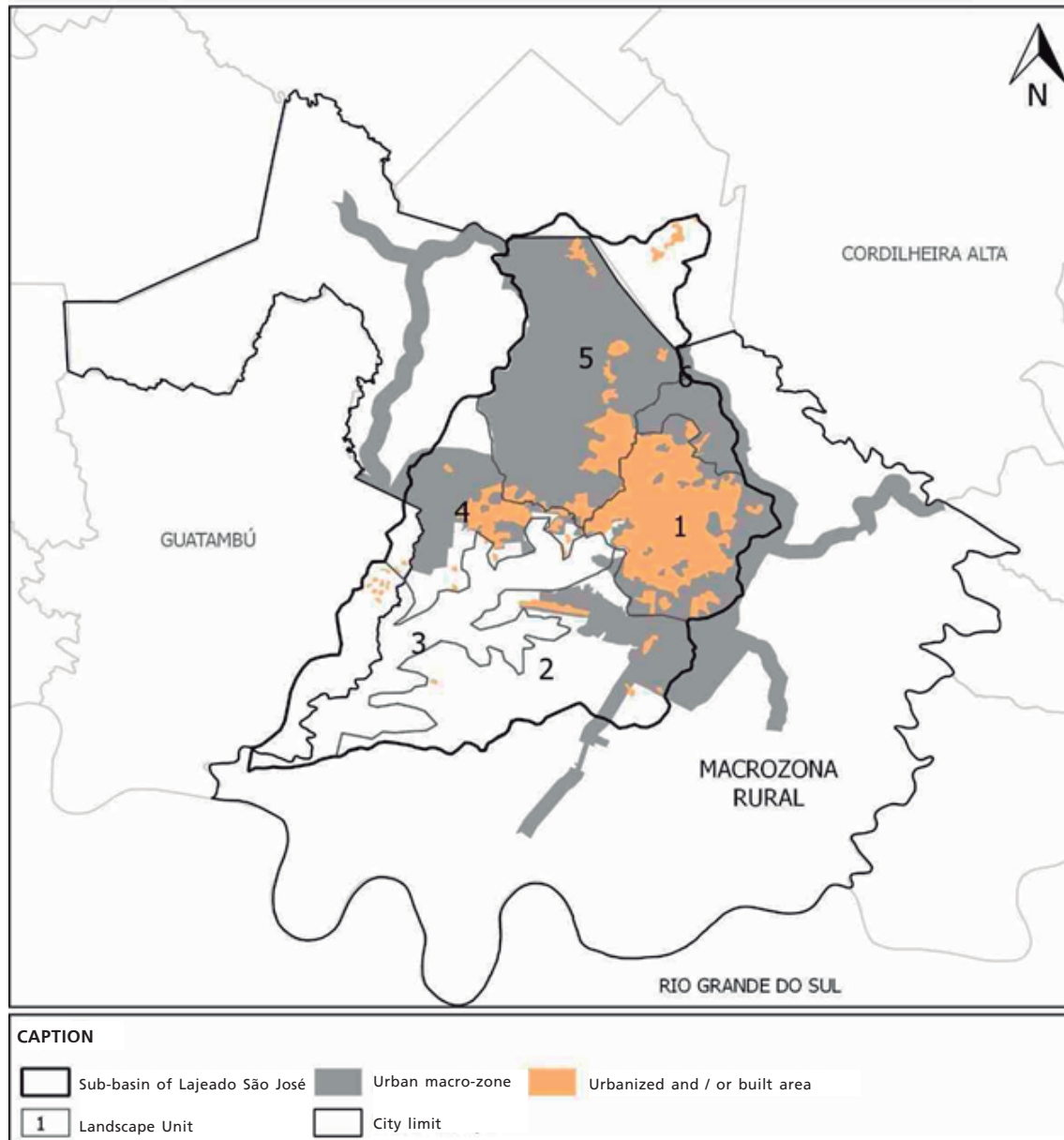


Figure 15 – Macroeconomic confrontation of the municipality of Chapecó (2014) and the identified landscape units.
Source: Santa Catarina state cartographic base. Preparation and editing: Daiane Regina Valentini, 2017.

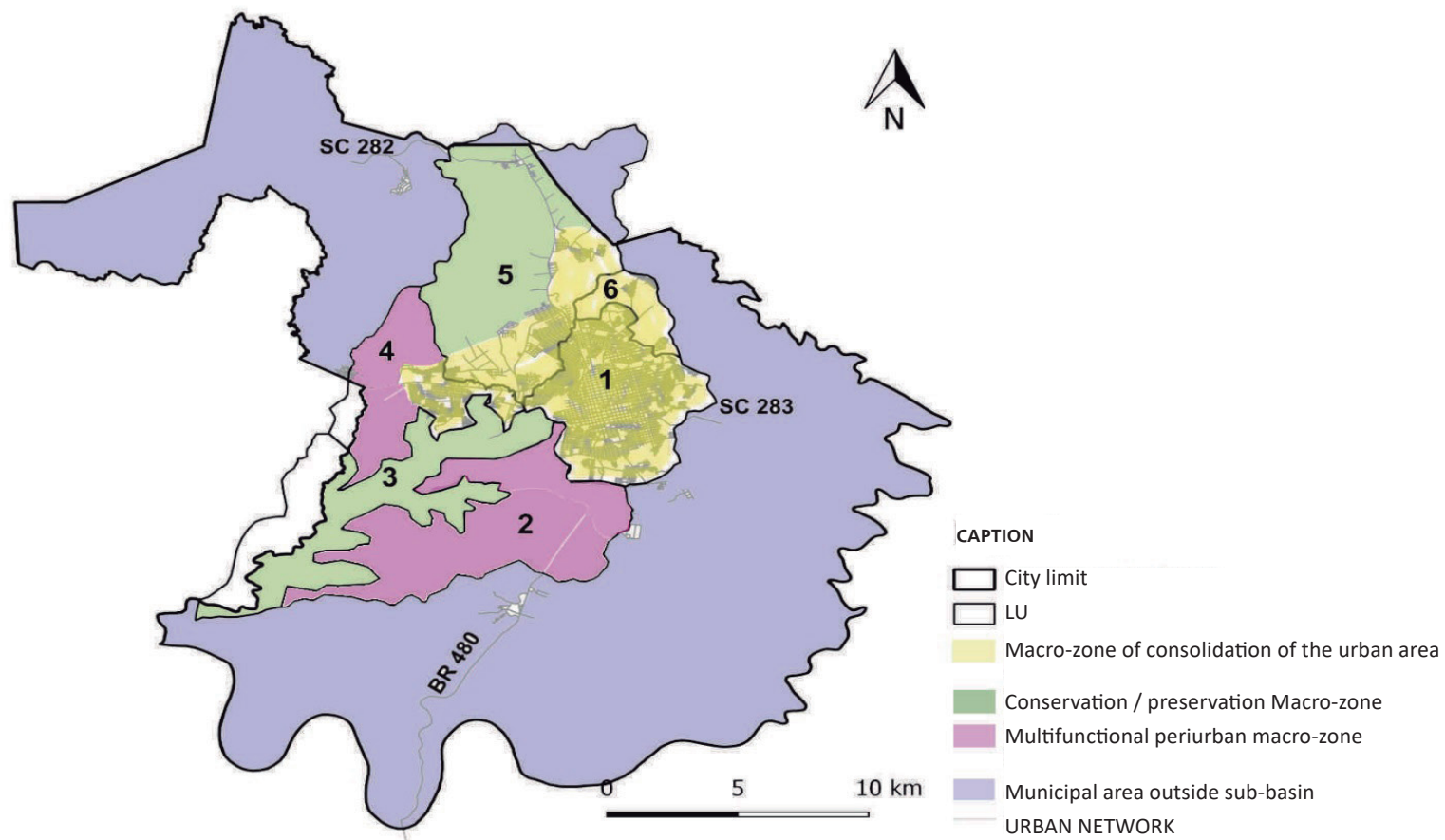


Figura 16 – Redesign of the macro-zoning of the municipality of Chapecó (2014) from the identified landscape units.
Source: Santa Catarina state cartographic base; Chapecó road system. Preparation and editing: Ana Laura Vianna Villela, 2018.

The landscape assessment method, considering the social construction and transformation processes of the Sub-Basin of Lajeado São José, shows that for this territory analysis scale, landscape design and morphological structure are the most important parameters as LUs identifiers. Socio-environmental conflicts and occupation patterns were presented as a deepening of this characterization. The landscape units thus describe and interpret the landscape that presents a homogeneous configuration, by identifying the morphological types incident in the sub-basin scale and which are directly related to the understanding of the qualifying attributes of this landscape and the planning of this territory, especially in the sense of their experiences and social meanings.

Specifically regarding the territory planning, one realizes the importance of understanding the landscape units. The studies, analyses and reflections made, when confronted with the macro-zoning of the municipality of Chapecó (2014), point to the need for refinement of public policy for this territory, which should take on more delineated designs in the process of urbanization, production, supply, experiences and social meanings.

In this sense, from the analysis of the Sub-Basin of the Lajeado São José, the need for a redesign of the Chapecó municipality macro-zoning from two to at least four macro-zones is shown (Figure 16). The *first one* explains the processes of consolidation of urban areas that are strongly expressed in LUs 1, 4, part of 5 (it must be considered that part of the catchment basin has non-recent occupation) and larger than LU 6; the *second* of conservation / preservation – LUs 3 (Taquaruçú River Valley) and part of LU 5 (part of the water catchment basin); the *third* of peri-urban areas characterized by multifunctionality (production – industrial and primary – and services, leisure, housing) and fragmented urban occupation from expansion processes (LU 2 and LU 4); and the *fourth*, the rural macro-zone, characterized by primary production and recreational activities (municipal area outside sub-basin – to be studied).

6. CONCLUSION AND DEVELOPMENTS

This study takes an additional step in identifying factors for interpreting Chapecó's landscape spatial dynamics by showing how LUs advance as a method of analysis and stand as an important tool for landscape description and interpretation from the study and understanding of heterogeneities / homogeneities of the territory and, consequently, as a fundamental element to be considered in planning decisions. This context results from the dynamic interaction of its components, which in the multiscale view makes explicit the morphological structure as an element of analysis of the city / fragments / sub-basin scale. In this sense, it sheds light on more qualitative processes that are built from the interconnection of factors – such as those that characterize medium / non-metropolitan cities from the 1980s on – and places as fundamental the understanding of spatial relations between the elements of landscape.

Contributing to this point, this article evaluates the morphological types that present landscape qualification attributes of the Sub-Basin of the Lajeado São José in the city of Chapecó-SC, from the identification and characterization of the physical-environmental agents and processes acting in the area that directly affect the social construction process of this landscape. This reinforces the importance and breadth of this study for understanding cities by demonstrating how ecological thinking advances and underpins the necessary improvement of public policies – in this case by redesigning macro-zonings and their interfaces with the spatial dynamics of the landscape.

Finally, it is understood that a new work and research agenda has been placed to deepen the study of each landscape unit characterized here regarding the understanding and contextualization of the elements that make up the open space system, for its effective systematization favoring the quality of life.

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Editor's Note:
Submitted on: 05/11/2018
Approved on: 07/10/2019