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Urban centres and coastal zone definition: Which area should we manage?

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ABSTRACT

Coastal areas experience population growth causing impacts on coastal and marine ecosystems. Consequently, recognizing the model of coastal cities development is of great importance for coastal management. This research studies the role of urban areas being one of the main drivers of change, and uses a model for coastal zone delimitation. The methodology of analysis was applied to Santa Catarina State, on the southern coast of Brazil. The model studies the coastal zone as a system, with ecological, social and economic characteristics, obtaining three different geographical units within the Coastal System, *shoreland, coastal uplands* and *coastal-influence lands*. Results show that 26% of the Santa Catarina State urban occupation is located on the shoreland, which represents not more than 2% of the State area. This area also concentrates main economic activities, demonstrating the importance of focusing management on the shoreland. The definition of the coastal zone as a system could be applied in other Brazilian states and even to other countries, approximating coastal zone management to the reality.

1. Introduction

Coastal areas around the world record a clear process of demographic concentration (Small and Nicholls, 2003), although attenuated in last decades (Kummu et al., 2016). In this scenery, coastal cities play a role of great importance in territory organization and development (Barragán and de Andrés 2015a). Global population concentration causes serious damage to the dynamic and fragile coastal-marine ecosystems, often leading to major problems and social conflicts (Barragan, 2014) due to the loss of important ecosystem services (Agardy et al., 2005; UNEP-MAP, 2012; UNEP, 2006). For this reason, cities and urban agglomerations management model is of great interest in coastal areas.

Latin America and the Caribbean coastal zones satisfy the model described for cities and the degradation of coastal and marine ecosystems (Scherer et al., 2014; Barragán, 2001; Yáñez-Arancibia, 1999). Urban development in this region is concentrated on coastal areas (Barragn(coord.), 2012) and Caribbean islands (Martinuzzi et al., 2007). In addition, some times urban development is not planned (Inostroza, 2016) and neighbouring vulnerable coastal environments such as bays, estuaries, coral reefs and mangroves, can be degraded and fragmented (Barragán and de Andrés, 2016).

Brazil has more than 8000 km of coastline (IBGE Instituto Brasileiro de Geografia e Estatistica, 2011), presenting a variety of coastal and marine ecosystems such as dunes, coral reefs, bays, estuaries, lagoons and mangroves (Diegues, 1999). In this country, increasing urbanization is a crucial process that affects coastal areas since the decade of 1960 (de Moraes, 1995). The occupation of the coastal zone was intensified in recent decades due to urbanization, mostly because of industrialization and tourism (de Moraes, 1999; Miranda et al., 2005). In 2011, 26% of the Brazilian population was living in coastal cities, representing 1% of the national territory (IBGE Instituto Brasileiro de Geografia e Estatistica, 2011; Oliveira et al., 2012). Moreover, five of the most populated cities (São Paulo, Rio de Janeiro, Salvador, Recife and Fortaleza) are located within 100 km from the coast.

Brazilian coastal urban occupation can be differentiated into two major geographic areas (Fig. 1): a) from Amapá to Ceará States the urban occupation and population density is lower if it is compared to the rest of the Brazilian coastal zone; b) from Ceará to Rio Grande do Sul there is an elevated population density, with a higher urbanization rate (MMA Ministerio do Meio Ambiente. 2008). Moreover, it is common to find irregular settlements (the are out of the law) along the Brazilian coast (Bourguignon, 2013), causing difficult situations for an integrated coastal zone management.

Such a complex coastal area needs a proper and efficient management. The coastal zone management in Brazil is regulated by the National Coastal Management Plan (NCMP) (*Plano Nacional de Gerenciamento Costeiro* in Portuguese). The NCMP was introduced by the Coastal Management National Law (Lei 7.661/88). In 2004 the

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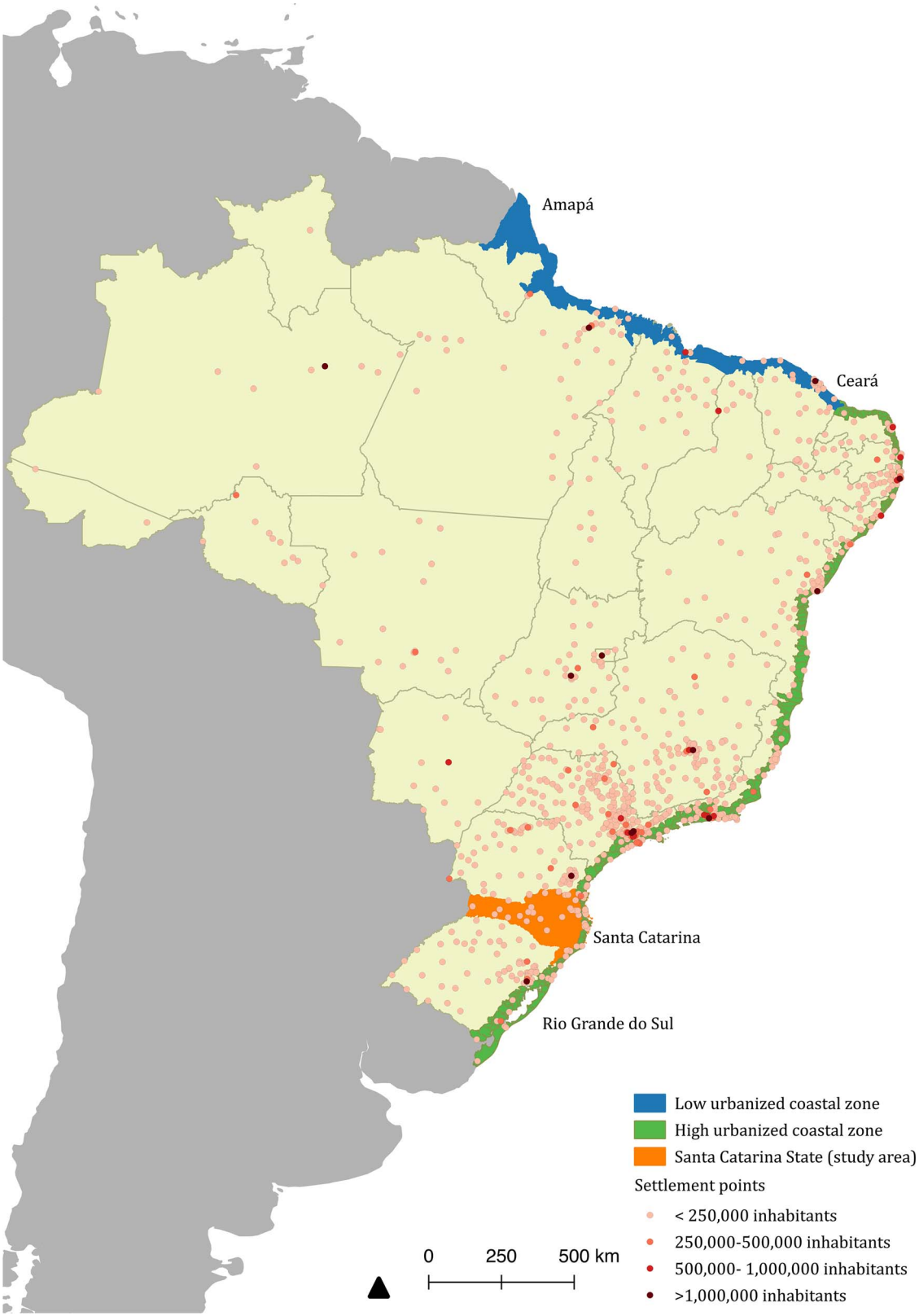

Fig. 1. Geographic coastal sets in Brazil according to the urban settlement.
Source: Population settlement datasets from CIESIN, 2011

Decree that regulates the Plan was sanctioned (Decree5300/2004), legally introducing the *Orla Project,* an instrument developed by the Environmental Ministry (Oliveira et al., 2012). This project aims to manage the maritime border, area that supports main economic and natural activities in the coastal zone (MMA-SPU, 2006).

The National Coastal Management Plan defines and delimits Brazilian coastal zone (Nicolodi et al., 2009). In this sense, coastal municipalities delimit the inner coastal zone. Moreover, non-coastal