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Analysis of Coastal Environmental Management Practices in Subregions of California and Brazil

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ABSTRACT

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Globally, human and natural systems in urban coasts face multiple threats, most importantly from climate change. Increasingly, subnational state and local governments are being forced to include climate change impacts into coastal planning and management. Urban coastal managers are looking to more transparent and integrated coastal and environmental management regimes to better address the multiple stressors and uses, as well as to integrate public and stakeholder participation, and maximize a broad range of community economic and environmental and ecosystem benefits. This research presents a case study of coastal and environment management systems in two important coastal regions: an urbanized area of the central coast of California, United States; and the rapidly urbanizing and developing coastal lowlands of Rio de Janeiro, Brazil. Similarities and differences in coastal environmental governance, management, and outcomes were identified and analyzed. The contrasting federalist governance structures are compared, and the coastal management and environment assessment systems in the case study locations are analyzed. This research contributes to the body of knowledge on subnational coastal environmental management systems through the review of previous relevant studies; the examination of historical primary and secondary source official reports; and the collection, analysis, and discussion of important qualitative and quantitative interviews and survey data. The study concludes that transparency and accessibility to the decision-making process are essential to the success of coastal environmental management in both locations, with benefits arising from the presence of public participation and trust. The successful integration of broad stakeholders and public awareness in California provides an example that could possibly be replicable in Rio de Janeiro to increase stakeholder participation in the decision-making processes. The paper concludes with recommendations for further studies of governance and management alternatives, and for extending and strengthening state and local capabilities of coastal environmental processes within integrated coastal environmental management systems.

ADDITIONAL INDEX WORDS: *Integrated coastal zone management, coastal resource conflicts, environmental assessment, land use permitting, climate change adaptation.*

INTRODUCTION

Coastal zones are unique biogeographical areas, containing highly valued environments for a range of unique ecosystem services, from economic development and recreation to natural resource biodiversity. Most importantly, the two case study coastal zones discussed in this paper are home to mangroves, coastal dunes and beaches, coastal wetlands, as well as fragile and diverse rocky intertidal areas, which are of great biological and environmental importance and often essential to species reproduction and ecological health (Lerner and Bittencourt, 2005; Lester, 2013; Mansur *et al.*, 2006; Myers *et al.*, 2000).

Globally, growing urban coasts dominate population and settlement patterns. In both regions studied here—the central coast of the state of California and the coastal lowlands of the state of Rio de Janeiro, Brazil—the overexploitation of coastal resources for socioeconomic development threatens the fragile and irreplaceable coastal areas. According to the Brazilian Institute of Geography and Statistics (IBGE, 2012), 83% of the state of Rio de Janeiro population is concentrated in coastal areas (counties). According to Seraval and Alves (2011), the average population density in the Brazilian coastal region is five times higher than the national average. Brazilian coastal areas are regarded also as the most conflicted due to intensification of environmental pressures derived from expansion of three main vectors of development: urbanization, industrialization, and tourism exploitation (Polette, 2008). In California, an estimated 80% of the state's population currently lives within 30 miles of the coast (CCC, 2015).

Improved resource conservation and coastal environmental measures are necessary to preserve the range of unique coastal ecosystems (Jablonski and Filet, 2008; Lester, 2013; Seraval and Alves, 2011). Historically the lack of adequate planning and regulation has caused substantial loss of essential ecological resources, both in developed and developing loca-

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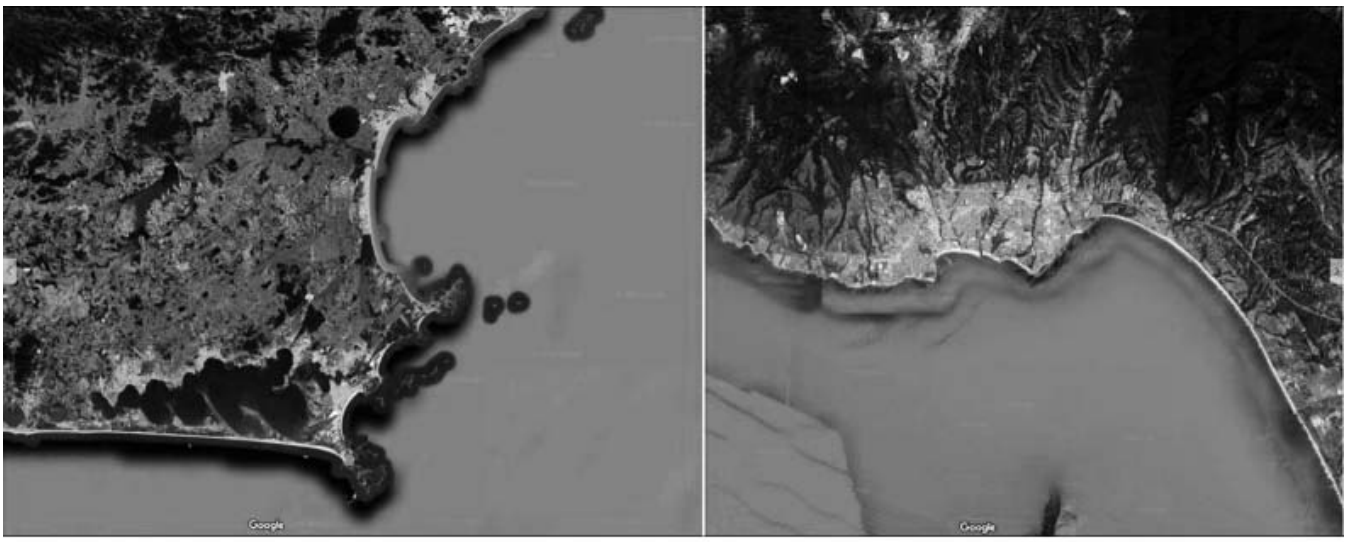

Figure 1. Bioregion of Buzios and Cabo Frio in the Coast of Rio de Janeiro, (a) in the Southeast Region of Brazil and (b) the Santa Cruz Central Coast of California on the Pacific Coast of the United States. (Source: Adapted from Google Earth)

tions. In Rio de Janeiro, significant loss of coastal forests, including the Atlantic Forest biome and coastal mangrove forests, has led to loss of biodiversity, as well as to the decline of important fishing stocks (Dantas, Lima, and Bohrer, 2009; Diegues, 1998; Lerner and Bittencourt, 2005; Mansur *et al*., 2006). In California, an estimated 90% of wetlands and 90% of kelp forests have been lost, along with important coast fisheries.

As a result, coastal areas have been subject to heightened public policy and regulatory attention, which has led to several actions, such as more complex land use regulations, more elaborate development requirements, and better environmental planning with more transparent processes throughout the developed and developing world (EIU, 2015; IBAMA/MMA Staff, 2008; Lester, 2013; Marroni and Asmus, 2013).

In the past 40-plus years, both the United State and Brazil have developed coastal and environmental assessment regimes at the national level. In both countries, environmental assessment and review and coastal permitting and management are complementary but differ in several aspects.

In Brazil, the institutional milestones are both the National Coast Management Policy Act (Law 7661/1988) and the National Environmental Policy Act (Law 6938/1981, IBAMA/MMA Staff, 2008; MMA, 1988, 1997, 2004); in the Unites States the institutional milestone is the Coastal Zone Management Act (1972).

In addition, California has state-level coastal and environmental statutes (California Coastal Act [CCC, 1976]), and the California Environmental Quality Act (1970), while Rio de Janeiro has its Coastal Economic and Ecological Zoning (ZEEC), which has been implemented only recently (INEA Staff, 2014; Lima, 2013; Vidal de Souza and von Zuben, 2012).

Figure 1 depicts the case study areas: the Buzios area in the coastal state of Rio de Janeiro in Brazil's Southeast Region and the Santa Cruz area on the central coast of California along the Pacific Coast of the United States.

The overall aim of the paper is to compare legal frameworks for urban coastal planning and management in relation to coastal environmental governance and management and environmental permitting between the case study areas in the United States and Brazil, focusing more deeply on the environmental permitting system within the overall context of urban coastal zone management. Moreover, the deficiencies of the Brazilian system are examined, and recommendations for its improvement are made, taking the U.S./California system as a reference.

METHODS

A case study approach has been used to analyze similarities and differences between the two studied locations, in order to identify lessons learned and best practices and to better understand governance and management at the subnational, state, and local level.

The two case study locations provide for differing federalist systems of centralized *vs*. shared coastal and environmental management. These two regional coastal areas were chosen because they represent important coastal locations with significant coastal and shoreline management histories facing many common global environmental climate change and economic stressors and threats.

Both locations have long histories of coastal management and environmental assessment and exhibit important similarities and differences, including differing federalist governance structures, similar diversity in coastal and near-shore marine natural resources, strong connections to nearby metropolitan

and regional urban centers, robust and growing tourism economies, multiple and cumulative urban and nonurban stressors, and land use development pressures threatening public access and public use.

Information and data for this research were obtained from several different sources:

(1) Various primary and secondary original and documentary sources, including government reports, historical records of coastal management, and land use and development planning records;
(2) A review of existing environmental assessment and coastal management typologies and results; and
(3) Qualitative and quantitative survey and interview data from key informants, including semistructured in-person interviews, and results from an electronic survey analyzing environmental assessment and coastal management systems in the case study locations.

Coastal Environmental Management and Governance Characterization

Coastal and environmental management and governance information was collected for each case study location. Coastal and environmental and governance information was identified at eight different levels from the country-level to the parcel and/or project site level.

These case study profiles focus on coastal environmental institutional and management regimes, including state and substate level environmental assessment, coastal planning and permitting processes, and general aspects of each case study region, highlighting important similarities and differences.

Environmental Assessment (EA)

Comparative profiles of the two environmental management models have been developed using complementary methods and typologies previously employed, including both check list and report card approaches.

Using a check list approach, based on Glasson and Salvador (2000) and Leu, Williams, and Bark (1996), key comparative evaluation criteria have been updated. In addition, the performance of each system was assessed by using a report card approach, proposed by Glasson and Salvador (2000), and based on Wood (1995).

Evaluation criteria to assess the effectiveness of environmental impact assessment (EIA) have been developed and used over the past 20 years (Sadler, 1998) and employed in a growing number of comparative studies (Glasson and Salvador, 2000; Leu, Williams, and Bark 1996; Ma, Becker, and Kilgore, 2009; Philips, 2013; Tang, 2009; Tang, Bright, and Brody, 2009; Wood, 1995, 2003). While these studies relied mainly on feedback from experts and stakeholders (see Wood, 2003, revised), the analysis presented here goes a step further, as it also employs some key comparative criteria as survey guidelines.

Qualitative and Quantitative Key Informant Data

Survey responses from key informants were assembled by conducting semistructured interviews and collecting on-line survey information from local and regional personnel, including coastal managers and a variety of public and private stakeholders. These personnel were from major governmental agencies (state, regional, and local) as well as from nongovernmental and environmental organizations.

Key informants were interviewed and surveyed to obtain detailed local-level information regarding the status and effectiveness of each system. Those key informants and experts represent important sectors within the system of coastal/environmental planning and management in both study locations: the Santa Cruz, California, and Buzios, Rio de Janeiro, regions.

The groups surveyed are the following: (A) public agencies, (B) nongovernmental organizations/nonprofit entities, (C) academic institutions (teaching and research), and (D) private organizations, including private development interests and industry associations.

Concerning the quantitative questions, respondents from each case study region were asked to rank the strengths, *i.e.* effectiveness, of a range of state, regional, and local coastal environmental management regulations and requirements, including transparency, access and quality of information, social participation, and enforcement. The ranking range was included (and explained to stakeholders) in the questionnaire (from 0 to 1, precarious; from 2 to 3, fair; and from 4 to 5, good).

As for the qualitative questions, respondents were encouraged to choose one (or more) of the available answers or even propose a different one.

RESULTS

The results reported in this section are organized as follows: (1) similarities and differences related to the coastal and environmental systems' governance and management, (2) performance comparison of the two coastal and environmental assessment systems, and (3) their evaluation by key stakeholders through interviews and questionnaires.

Coastal and Environmental Systems' Governance and Management: Similarities and Differences

Table 1 shows the organization of the regions' legal structures and portrays a comparison between their respective systems of coastal environmental management and governance. Figures A1 and A2 (Appendix) show the basic structure of the institutional arrangement for Coastal Management in Brazil and for the Brazilian Environmental System (SISNAMA), with Rio de Janeiro in the state level and the Buzios County at the local level.

Both Brazil/Rio de Janeiro and the U.S./California employ federalist coastal and environmental management systems with national/state/local administration and governance. However, they exhibit very different models of decentralization and shared responsibilities among government levels. In Brazil, Rio de Janeiro, and the Buzios region, the system remains much more centralized, with limited local responsibilities and poor participation.

In the United States, California, and the Santa Cruz region, the system is based on a shared management regime. California, like other American states, retains significant original powers, and a state statute complements legal authority over state waters and the federal coastal zone management statute. While more power and responsibility

Table 1. *Systems for coastal environmental management and governance—Buzios, Rio de Janeiro, and Santa Cruz, California.*

Governance Level	Study Area: Santa Cruz (Santa Cruz County), California			Study Area: Buzios, Rio de Janeiro		
	Unit of Governance	Coastal Environmental/ Land/Water Legislation	Management Agencies/Boards	Unit of Governance	Environmental/ Land Use Legislation	Management Agencies/Boards
Country	USA	NEPA (1969), EIS, CZMA, (1972) Clean Water Act	Council on Environmental Quality (CEQ), U.S. EPA	Brazil	PNMA (6938/81), PNGC (7661/88), CONAMA 237/ 98, Federal Amendment 140/11, Atlantic Forest National Plan, ORLA Coastal Program, Cities Statute, SNUC, ZEEC, PAF	MMA, IBAMA, CONAMA, SPU, CIRM
State	California	CEQA, EIR, California Coastal Act (Fredrickson, 2013), California Coastal Plan California State Clean Water Act (Porter-Cologne)	Governor's OPR, CCC, SWRCB	Rio de Janeiro	State Environmental Policy Act, State Amendments 42159/10 and 42440/11, APA Pau Brazil Management Plan, Rio de Janeiro Coastal Management Plan, ZEE, INEPAC Landscape Heritage Decree	SEA, INEA, CECA, INEPAC, CERHI
Substate Region; Eco or Bioregion	Central Coast Region, Central Coast Bioregion	Basin Plan, TMDLs, NPDES	CCC, Central Coast Regional Office, CCRWQCB	State Coastal Macro Environmental Region MR-4, Sao Joao River Basin	Sao Joao River Watershed Plan	Sao Joao River Watershed Board, CILSJ, INEA Regional Agency
Regional	Monterey Bay	SB 375: Regional Transportation and Land Use (2008)	MPCOG	Cabo Buzios Subregion III	Sao Joao River Watershed Plan, Subregion III	Cabo Buzios Subregion Board, INEA Regional Agency
Subregional: County	Santa Cruz County	County Local Coastal Plan, GP and Elements	Planning Commission, County Board of Supervisors	Buzios County	Buzios Land Use Act, Buzios County Sustainable Master Plan, Cabo Frio County Master Plan	County Environmental Boards, County Environmental and Planning Secretary Departments
Subregional: Municipal/City Level	Cities of Santa Cruz, Aptos	City Local Coastal Plans, GP and Elements	Planning Commission, City Council	City of Buzios	Buzios Land Use Act, Buzios County Sustainable Master Plan, Local Plans for Coast and Environmental Management, Environmental Code of the City of Buzios	CMMA, County Environmental and Planning Secretary Departments
Neighborhood Level	Beach Flats, Westside Seascape	LCP Segment, Specific Plan, RDA Plan	See below	Tucuns, Tartaruga, Raza, J. Fernandes/Brava	ORLA Project in Tartaruga Beach, Permit Restrictions/ Resolution SECPLAN 104 (J. Fernandes, Areas 1, 2 and 3)	CMMA, County Environmental and Planning Departments
Project/Site Level (2nd Stage)	Coastal Development Project(s): La Bahia, Terrace Point, Seascape, Wingspread Beach	Specific Plan, CDP, EIR, ND, SB 226 (2011) in-fill projects streamlining	CCC, Original Permit Jurisdiction, Environmental Hearing Board, Planning Commission, City Council	Super Breezes Tourist Resort (Gorda Beach and Joao Fernandes Beach Development Projects (Areas 1, 2, and 3)	Specific Plan, EIS/EIR, Environmental Permitting	Local Impacts, County Environmental Boards, County Environmental and Planning Departments; Nonlocal impacts, INEA

See Table A3 for acronym explanations.

rests with the state and local levels, in Santa Cruz there has been an increase in bureaucratic and organizational complexity.

Table 2 highlights important differences and similarities between the two regions' geographical and environmental features, according to different criteria.

Table A3 (Appendix) shows the list of the acronyms used in those tables and in the entire text.

Similarities

An important similarity between Buzios and Santa Cruz is that both are near large metropolitan areas. In Santa Cruz, the San Francisco Bay Area is located about 100 km to the north, and in Buzios, the Rio de Janeiro metropolitan area is located about 150 km to the west.

While the Santa Cruz coast can be characterized as a more mature region from a land development perspective, and Buzios as a rapidly growing region, both face many similar development and growth pressures and share threats to their environment and natural resources, such as coastal water quality, as well as threats to the quantity and quality of species and habitats.

In both regions, ecosystems and habitats of great biological and environmental importance are at risk; this is the case of the restinga/open arboreal steppe in the region of Buzios and Cabo Frio and the coastal and marine near-shore environments and habitats in California.

Both regions are very popular residential locations and tourist destinations (they are both international tourist beach destinations as reflected in a recent review of overnight accommodations, where the short-term rental site Airbnb advertised 300+ rentals each for Buzios, Rio de Janeiro, and for Santa Cruz, California), making them targets of continued real estate development, often to the detriment of public use. Indeed, the high land value of coastal sites contributes to continued threats to natural areas, their ecosystems, and biodiversity. The continued threats resulting from privatization of shoreline and oceanfront land is a very important issue in both locations. There are many examples of property owners trying to restrict not only coastal views but also public access.

Enforcement in both locations remains very controversial and political, often requiring civil action. Examples from Buzios in Rio de Janeiro are illustrated in Figure 2, where private kiosks were removed in order to vacate the local sand strip and facilitate public access to beach and to the ocean.

Differences

Several important differences between the two systems were documented, including important aspects of governance, permitting, and management, particularly social participation, enforcement, and agency coordination and cooperation.

Greater limitations and constraints have been identified in Rio de Janeiro's governing system. Although federalism is an important aspect of each system, the structure and operation of coastal and environmental management in California is much more robust. Higher levels of comanagement and decentralization have been identified in the state of California. In fact, throughout the coastal zone of California, the vast majority of sites are governed by local coastal plans (LCPs) carried out by local authorities, including the several local governments in the Santa Cruz region of the California central coast. Overall, complex multilevel governance with shared responsibilities, involving federal, state, and local levels, characterizes this decentralization of government. In addition, government agencies involved in coastal and environmental management are supported and monitored by a civil society with a long history of social and environmental activism.

Coastal zone and environmental management in California involves a unique set of state-level governance mechanisms, including the regulatory California Coastal Commission (CCC), and an innovative nonregulatory agency, the California State Coastal Conservancy (CSCC). Acting in concert with its coastal management partner agencies, the CSCC has become a state leader in local coastal climate change adaptation efforts. It also provides a unique state–local governance model in terms of integrated community-based, local coastal climate change adaptation and management. Since 2013, the CSCC has funded 42 projects, totaling $7 million in funding for climate change planning initiatives. The conservancy has focused many of its efforts on, and has been a major partner in, building knowledge, skills, and capacities of local managers, decision-makers, and the general public.

In contrast, in the state of Rio de Janeiro and in the coastal region of Buzios (Sun Coast/Baixadas Litoraneas region), coastal/environmental governance is much more centralized, with much stronger federal and state responsibilities and much weaker obligations and responsibilities at the regional or local levels. More recently, a decentralization process has been carried out in some Brazilian states. In Rio de Janeiro, it has been carried out through a partial transfer of responsibility for environmental permitting from the Rio de Janeiro State Environmental Institute (INEA) to local municipalities.

However, despite on-going efforts to improve current practices and processes in Rio de Janeiro, current institutional practices and barriers prevent better coordination and integration among environmental planning agencies and authorities that regulate coastal land use, as well as active participation from stakeholders and the general public.

Even though Brazilian legislation provides a number of mechanisms for coastal zone planning, such as the National Coastal Management Plans (PNGC), there remain some serious constraints to its effective implementation. Two of the most important are the lack of political will to fully develop controls on coastal development with measures such an active enforcement and the insufficient resources financial and otherwise at the local and regional levels.

While in California the state-level Coastal Commission shares responsibility for a project's approval with local land use authorities through local coastal plans (LCP), in Rio de Janeiro no such a management partnership is found. Although some Brazilian cities have developed local plans for coast and environmental management, they are generally neither implemented nor enforced. Without legal and political support, implementing and enforcing coastal environmental management plans often ranks low among government priorities, mostly depending on the political will of local authorities.

Table 2. *Similarities and differences between the case study areas.*

General Aspects	Specific Criteria	Santa Cruz, (Santa Cruz County), California (sources)	Buzios, Rio de Janeiro (sources)	Similarity/ Difference
Economical/ Demographic	Population growth rate	Slow(ing) rate, migration and seasonal (U.S. Census Bureau, 2010)	High rates, migration and seasonal (IBAMA/MMA Staff, 2008; IBGE, 2010, 2012; Seraval and Alves, 2011)	Difference
Economical/ Environmental	Availability of residential units and lots	Constrained supply (Lester, 2013)	Increasing supply (Obraczka, 2008)	Difference
	Development vector at state/ national level	Coastal industrialization, tourism, construction, port development, energy supply and water supply	Oil exploitation, tourism, construction, shipbuilding and ports (Jablonski and Filet, 2008; Marroni and Asmus, 2013; Polette, 2008)	Similarity
	Impact of the tourism industry on local economy	Major role	Major role (Bidegain and Pereira, 2005; Jablonski and Filet, 2008)	Similarity
	Land cost, opportunity cost	Elevated, high, growth tendency	Elevated, high, growth tendency (Obraczka, 2008)	Similarity
	Conversion of natural areas to real estate projects	Expansion tendency reduced through CEQA (Fulton and Shigley, 2005) and Coastal Act (Czech, Krausman, and Devers, 2000)	Preponderant role in local economy; expansion tendency (Dantas, Lima, and Bohrer, 2009; Mansur *et al.*, 2006)	Difference (partial)
Geographic/ Environmental	Occurrence of areas with coastal characteristics (*restingas*, rocky shores, cliffs), terrestrial and marine environment transition zone	Vast presence of cliffs, beaches (Griggs, 2010)	Major presence of areas of dunes, beaches, mangroves, rocky cliffs, shores (Ab'Saber, 1974; Araújo *et al.*, 1998; Araújo, 1997; Fernandes and Sá, 2000; Myers *et al.*, 2000)	Similarity
	Fragile and megadiverse ecosystems, biological importance, rich scenery and landscapes	Endangered, maritime chaparral, wetlands, (CNPS Inventory and CNDDB 2016; U.S. and CDFG/ Natural Diversity database, 2013; Myers *et al.*, 2000; Nichols, 2014; Vasey, 2012)	Cabo Frio Center of Plant Diversity (Biodiversity Hotspot), threat to *restinga*, open arboreal steppe (Araújo, 1997; Diegues, 1998; FEEMA Staff, 1988; Fernandes and Sá, 2000; Myers *et al.*, 2000)	Similarity
	Risks to environmental and human health and property	Landslides and erosion of cliffs due to climate changes and anthropogenic action (Griggs, 2010)	High social risk due to poor housing conditions (IBAMA/MMA Staff, 2008); disempowered situation of poorer local ecosystem users largely continues (Wever *et al.*, 2012)	Similarity
	Environmental and social impact of oil industry	High, though minimized by present moratorium along most of the coast	High and increasing risk: Campos Basin; *Pre-Sal* oil fields (Obraczka, 2008, 2014)	Similarity
Governance/ Management	Amount of protected public areas	High (CNDDB)	Low, including protected sustainable use areas (Medeiros and Garay, 2006; Medeiros, 2006)	Difference
	Information availability	Elevated (Fulton and Shigley, 2005)	Low, precarious access (Jablonski and Filet, 2008; Marroni and Asmus, 2013)	Difference
	Environmental and Conservancy agencies	Relevant role (Beyeler and Eger, 2013; Lester, 2013)	Nonrelevant role, though mentioned in Basin Plan (Bidegain and Pereira, 2005), partial action of the water agencies (MMA, 2006)	Difference
	Complexity of the environmental management and permitting process	Very complex (Bass, Bogdan, and Rivasplata, 2012; Fulton and Shigley, 2005; Lester, 2013)	Very complex, laws in excess (CNI, 2013; Riccioppo, 2010)	Similarity
	Inspection, enforcement	Moderate to very high enforcement standards (Lester, 2013; Olshansky, 1996a,b)	Lack of inspection, high level of impunity (Lerner and Bittencourt, 2005; Obraczka, 2008, 2014)	Difference
	Integration among agencies/ entities; compatibility instruments	NEPA/CEQA Requirements (Bass, Bogdan, and Rivasplata, 2012; Fulton and Shigley, 2005); law cases from lawsuits (Weiner, 2005); Difficulty due to the number of agencies and competences involved (Olshansky,1996a,b)	Defined in PNMA (MMA, 1981); PNGC II (MMA, 2004, 1997); PNGC I (MMA, 1988),but not implemented (Cardoso *et al.*, 2011; CNI, 2013; Obraczka, 2008; Puppim de Oliveira, 2002; Riccioppo, 2010) Very weak (Jablonski and Filet, 2008; Marroni and Asmus, 2013)	Difference

Table 2. Continued.

General Aspects	Specific Criteria	Santa Cruz, (Santa Cruz County), California (sources)	Buzios, Rio de Janeiro (sources)	Similarity/ Difference
	Coastal management	Substantial outcomes preserving coastal resources (Lester, 2013)	Incipient (Jablonski and Filet, 2008; Voivodic, 2007); *ad hoc* interventions and the predominance of top-down mechanisms of control and regulation (Jablonski and Filet, 2008)	Difference
Social	Use/access of public areas like beaches and rocky shores	Moderate to very high use conflicts due to the process of privatization of beaches and restricting access to coast and seashore. Increasing demands for public access/ environmental and coastal resources protection from the public (Fulton and Shigley, 2005; Lester, 2013)	Conflicts due to privatization of beaches/access to seashore**;** growing loss of natural landscape/ scenic resources (Lerner and Bittencourt, 2005; Mansur *et al.*, 2006; Soares *et al*., 2006); radical changes on traditional communities' way of life (Diegues, 1998; UFRJ Staff, 2001); Increasing demands for public access/environmental and coastal resources protection from the public (Mansur *et al*., 2006)	Similarity
	Social participation	Elevated high (adapted from Glasson and Salvador, 2000)	Incipient (Lim, 1985)	Difference

See Table A3 for acronym explanations.

Performance Comparison of the Two Coastal Management and Environmental Assessment Systems

In California, environmental management has become an integral part of the land use and planning entitlement and permitting process. Particularly in Santa Cruz, coastal development permits and approvals are issued after the successful completion of the environmental review process.

In Rio de Janeiro and in Buzios, the environmental review is often performed during or after the permitting process. Additionally, transparency in the permitting process is inadequate, which makes access to information more difficult. Consequently, there is a significant obstacle to participation opportunities in the coastal environmental review and permitting process, not only for important stakeholders but also for the community at large.

The continued centralization of important functions of the permitting process at the state level in Rio de Janeiro similarly contributes to a reduced participation of lower governmental bodies, especially municipalities.

Figure 2. (a) Kiosks were removed due to civil action in order to vacate (b) the local sand strip and facilitate public access to beach and to the ocean in Ferradura Beach, Buzios, Rio de Janeiro. Source: Roberto Campolina, 2014.

Table 3. *Summary of performance of environmental assessment systems in Brazil and United States.*

Criteria	Brazil	USA
Environmental policies regulations and guidelines	Fair	Good
Institutional/administrative framework	Deficient	Good
EA procedure	Fair	Good
Role of key actors	Deficient	Good
Compliance of monitoring and enforcement	Very deficient	Fair
EA implementation and effectiveness in practice	Very deficient	Fair–good
Availability of resources	Deficient	Deficient–Fair

Based on Glasson and Salvador (2000); updated based on Obraczka (2014).

Enforcement of law and regulations in Rio de Janeiro is quite problematic, especially at the local level, due to the lack of resources in the great majority of the municipalities. Beyond the initial environmental analysis, the system does not require monitoring on any regular basis, nor impose a consistent enforcement.

Similar complaints regarding effective enforcement have been voiced over nonexistent, lax, or inconsistent enforcement under the California coastal management for a very long time. Only recently has the state's law been improved to allow for meaningful monetary fines for enforcement violations.

In the case of Brazil/Rio de Janeiro, policy implementation and enforcement are neither adequately planned nor funded and policies are frequently carried out by minimal staff with insufficient resources, especially at the local level. Integration among government bodies is still very limited.

In general, Brazil still needs additional institutional or administrative frameworks and resources for improving coastal and environmental management, despite the recent governance structures established by different states.

Environmental assessment systems of the case study regions were reviewed with the help of an updated version of widely used assessment criteria and by comparing different national-level EA systems, notably Brazil and the United States. This review identified several areas of asymmetrical performance of the two national systems, confirming an earlier assessment (Table 3).

Using a more elaborate set of criteria, Table 4 shows several documented differences between key aspects of the EA systems in each country. The comparison shown in Table 4 confirms that the environmental management system in U.S./California (under the complimentary National Environmental Policy Act [NEPA] and California Environmental Quality Act [CEQA] requirements) performs better than the Brazilian one in all aspects of the evaluation criteria used.

For instance, the scoping stage is an important aspect of public participation in the U.S./California system, while this is absent in the Brazil/Rio de Janeiro system. In addition, both the identification and extent of analysis of environmental impacts are very often much more limited in the preparation of impact statements and reports in the Brazilian system.

Evaluation of Coastal and Environmental Systems' Governance and Management through Questionnaires and Interviews with Key Stakeholders

The coastal environmental management system of each region has also been evaluated using structured interviews and an electronic survey directed to a group of key informants composed by experts and stakeholders.

The questions used in the interview and survey were developed from the analysis of the available data and results from former studies (Tables 1, 2, 3, and 4). They included qualitative and quantitative questions. Results from the most

Table 4. *Performance of Brazil/Rio de Janeiro in USA/California EA systems.*

Criteria	Brazil	U.S. NEPA	California CEQA	Notes
Legal Basis	Partially	Projects requiring federal approval	Public and private projects in California	There are statutory and categorical exemptions and overriding considerations
Coverage	Partially	Yes	Yes	Just for some specific projects in Brazil
Alternative Proj. Design	No	Yes	Yes	
Screening	Yes	Yes	Yes	
Scoping	No	Yes	Yes	California public comment
Content of EIS	Partially	Yes, EIS	Yes, EIR	Partially for some projects and for some Brazilian states
Public Review of EIS	Partially	Yes	Yes	Incipient in Rio de Janeiro
Decision-making	No	Partially	Partially	In California, statement of overriding considerations; partially in very few cases in Brazil
Impact monitoring	No	No	Yes	Mitigation and monitoring requirements in CEQA
Mitigation	Partially	Yes	Yes	Just for some specific cases in Brazil
Consultation; Participation	No	Yes	Yes	Public meetings and public hearings
System monitoring	No	Partially	Project level requirements	Project level mitigation and monitoring; state clearinghouse, OPR
Costs and benefits	No	Yes	Yes	Philips (2013)
Strategic Environmental Assessment (SEA)	No	Partially	No	Tang (2009); Tang, Bright, and Brody (2009)

Based on the evaluation criteria developed by Sadler (1998), Glasson and Salvador (2000), and employed by Philips (2013); Updated based on Obraczka (2014).

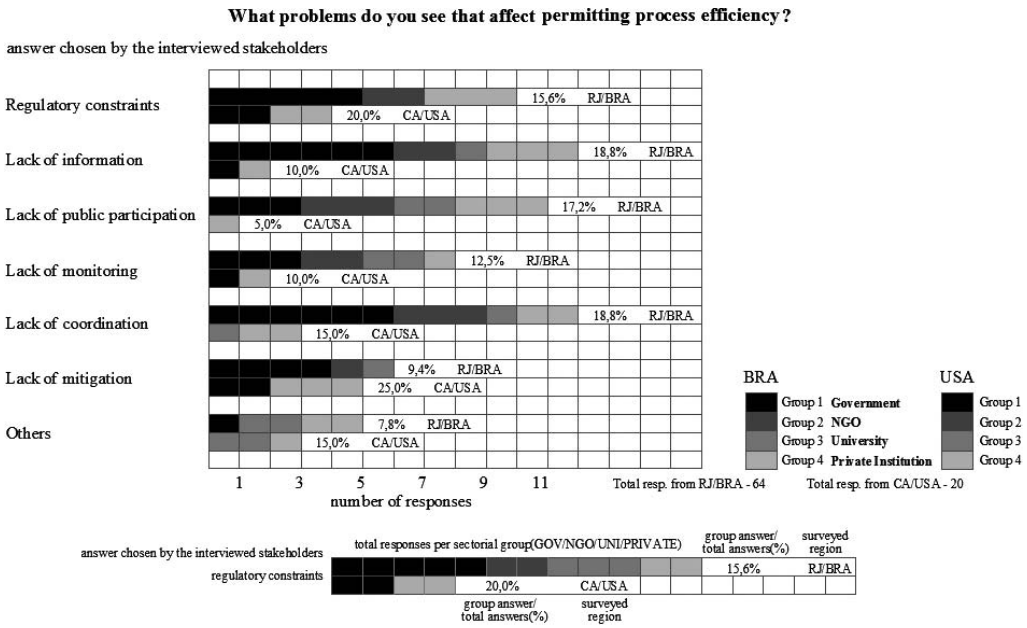

Figure 3. Main problems with current licensing/permitting systems and processes in California and Rio de Janeiro as identified by the survey. In regard to the question "What problems do you see that affect permitting process efficiency?" Rio de Janeiro respondents focused on the lack of information, enough access to data, public participation, and coordination among agencies involved, while stakeholders in California highlight other aspects such as the lack of mitigation and regulatory constraints.

relevant qualitative questions are summarized in Figures 3, 5, and 6.

As for quantitative questions, results are summarized in the form of graphs. Respondents were asked to assign scores from 0 to 5, ranging from less to more effective (see Figure 4 and Tables A1, A2 in Appendix).

In the Buzios/Rio de Janeiro, 21 survey responses were received, and interviews were conducted with 7 individuals. For Santa Cruz/California, 11 survey responses were received, and interviews were conducted with 7 individuals. The response rate for the Buzios/Rio de Janeiro electronic survey was 40% (21 out of 52), and the response rate for the Santa Cruz/California survey was 46% (11 out of 24).

Most of the differences identified between the coastal and environmental management systems in Buzios and Santa Cruz relate to the need for additional and higher quality information, as well as more opportunities for stakeholder and citizen participation.

Although the strongest dissatisfaction with the system in Buzios derives from the nongovernmental groups—who reported a limited influence and access to both the permitting and approval process and project information—the private sector responses mentioned problems with both the time and expenses involved. In addition, respondents pointed out other significant problems such as (1) the lack of provisions for environmental impacts mitigation, (2) the absence of integration among public agencies responsible for permitting and project monitoring, and (3) the deficiencies of the regulatory process.

In California, the key informants identified the following limitations in the current system: (1) deficiencies in the coordination of actions among agencies and stakeholders, (2) limitations of the regulatory process, and (3) uneven implementation of mitigation and monitoring requirements (Figure 3).

One possible explanation for the respondents' answers may be the lack of resources for the general public participation and, in the case of Rio de Janeiro, the absence of adequate access to information, even with the technology and tools presently available (Figure 4).

In Rio de Janeiro, presently, project information is mostly obtained when there is a public hearing (a single event usually), which takes place when the approving agency requires the preparation of an environmental impact statement (EIS) or an environmental impact report (EIR)—known as Environmental Impact Assessment/Environmental Impact Assessment Report (EIA/RIMA) in Brazil. Unfortunately, a public hearing most often occurs at later stages of the process, when the main aspects of the project have already been approved, or sometimes (even worse) after the *whole* project has been approved.

According to the respondents in California, the environmental review process involves significant legal obligations and commitments, with requirements for public participation at several stages of the assessment, review, and approval process. While enforcement in California is rated positively, the stakeholders in Rio de Janeiro rated "inspection" and "enforcement" poorly (Figure 3).

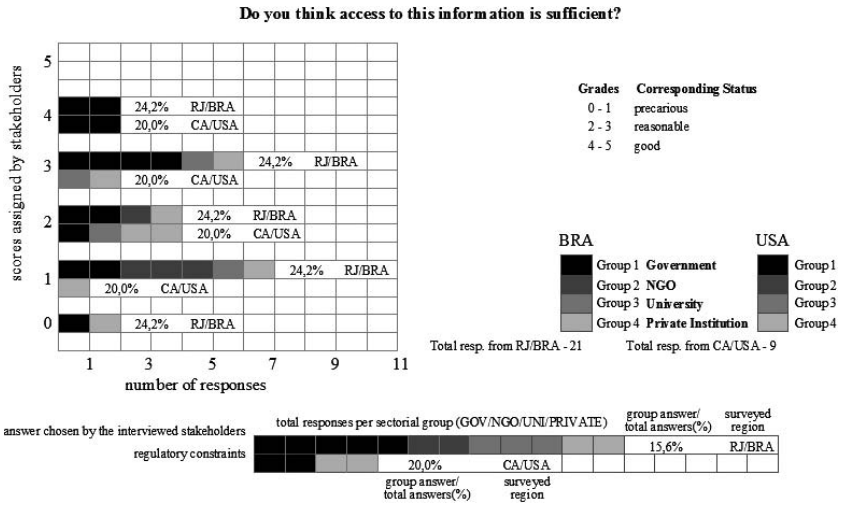

Figure 4. Evaluation of data/information accessibility and project transparency of current environmental and coastal management systems and permitting process in California and Rio de Janeiro: concerning the question "Do you think access to the information is sufficient?" almost 43% and 48% of the surveyed stakeholders in Rio de Janeiro ranked this important aspect as "precarious" and "reasonable," respectively, although the majority of the better evaluation came from the government, who turns to be the responsible for providing it. On the other hand, almost all of the respondents from California evaluated it as "reasonable" or "good," showing an important differentiating aspect between the two systems.

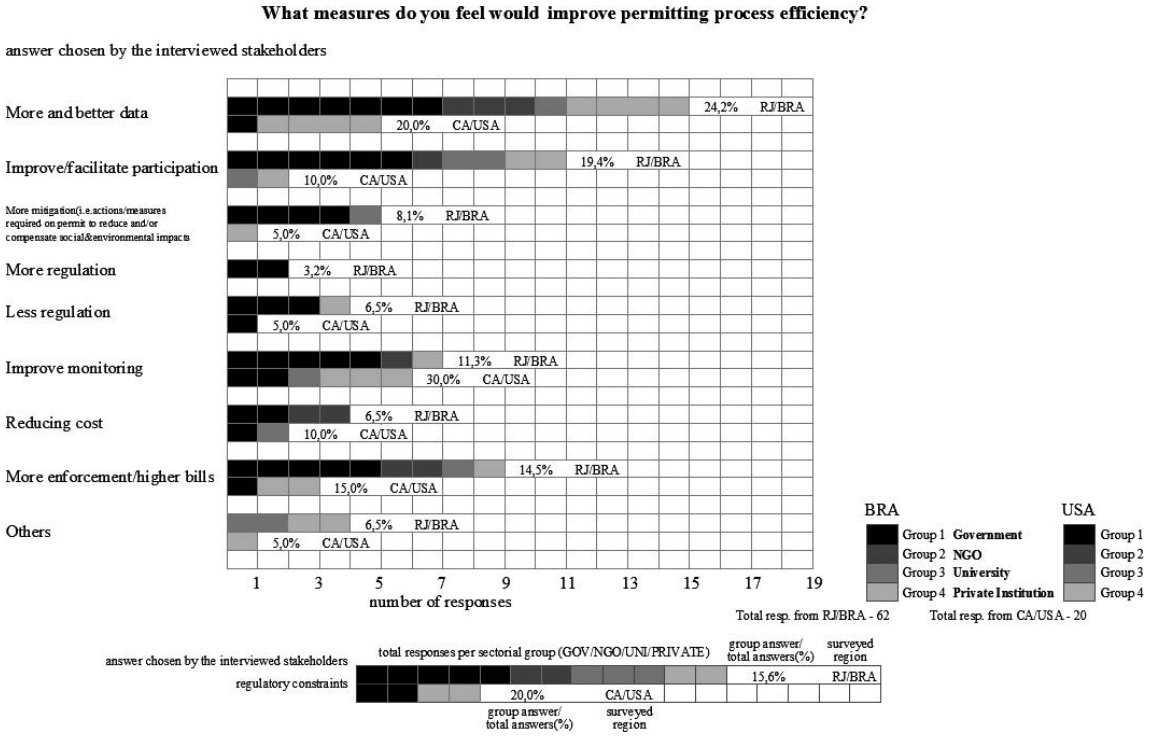

Figure 5. Main improvements suggested by the surveyed stakeholders for the current environmental, coastal management, and permitting systems to achieve more efficiency in California and Rio de Janeiro: to the question "What improvements would you recommend to provide more and better information and access to information?" respondents from Rio de Janeiro highlight the need to increase the amount of publicly available data (*e.g.*, through the media, including the Internet) as well as the quality of available information. Although mentioned by California stakeholders, data availability was not a major concern.

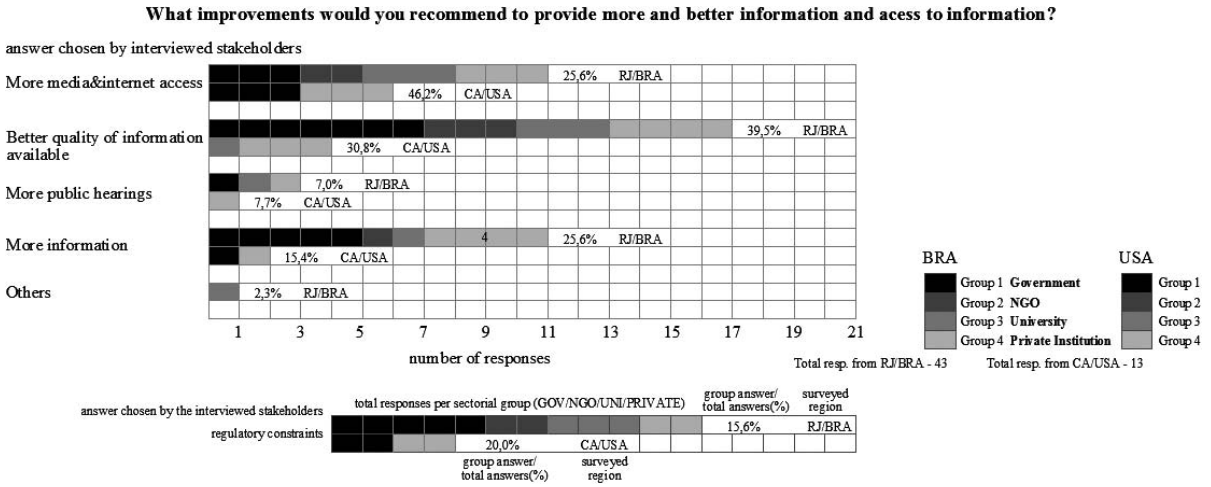

Figure 6. Information improvements recommended by the surveyed stakeholders for current environmental, coastal management, and permitting systems and process in California and Rio de Janeiro: to the question "What improvements would you recommend to provide more and better information and access to information?" respondents from Rio de Janeiro highlight the need to increase the amount of publicly available data (*e.g.*, through the media, including the Internet) as well as the quality of available information. Although mentioned by California stakeholders, data availability was not a major concern.

Several measures to improve the present process have been identified, as Figure 5 shows. Those most mentioned are more information, with higher quality; development and facilitation of social participation; better monitoring; and more enforcement. In California, state legislation in 2015 approved increased enforcement actions available to the Coastal Commission.

However, respondents offer little support for additional regulation. Both in Rio de Janeiro and California several respondents identified the need to reduce the time and costs involved in the regulatory system. On the other hand, they consider of fundamental importance an increase in the capabilities of local staff, along with an increase in their number.

Most of the responses consider that those changes should be carried out through the provision of additional and higher quality information, *e.g.*, using different media, in particular the Internet (Figure 6).

Under the current system, community members in Rio de Janeiro often feel alienated from the process because they do not have the necessary means to participate effectively.

In Rio de Janeiro, postpermitting monitoring was considered by most of the stakeholders as one of the weakest aspects of the current system (Figure 3). The main reason is the lack of adequate personnel and financial resources devoted to these activities. Permit compliance was considered rather precarious in Rio de Janeiro. Respondents in Rio de Janeiro identified access to the data and the transparency of the process as precarious, unlike the California experience (Figure 4).

Considering the range of the quantitative questions posed, three distinct issues and themes for analysis (clusters) were identified, namely, (1) participation and social control; (2) monitoring, enforcement, and inspection; and (3) efficiency and efficacy of the process (Tables A1 and A2, in Appendix, present in a tabular form a summary of the results concerning qualitative questions and answers).

For Cluster 1 (participation and social control), the nongovernmental stakeholders were most dissatisfied. For Cluster 2 (monitoring, enforcement and inspection), only the public sector respondents in Rio de Janeiro reported some satisfaction with the current process, emphasizing yet again that the permitting process is more satisfactory to the governmental sector than to other stakeholder groups. In California, most respondents reported satisfaction with the "sufficiency of participation mechanisms," while the issue "parity and opportunity of influencing the decisions of the permitting process" was less satisfactory.

As far as the performance and efficiency of the current system is concerned, all respondent groups reported some level of dissatisfaction with the performance of the permitting system in Rio de Janeiro, as well as with its capacity to address the environmental impacts resulting from development projects. This contrasts with responses in California, where current practices were reported as "reasonable to good." Most recently however, environmental and community stakeholders have decried the firing of the commission's executive director as a threat to transparency and the commission's goals of resource protection and public access to the coast.

The results obtained from the respondents in California (Table A2, Appendix) present greater agreement among them, although the private sector respondents reported greater dissatisfaction with the workings of the current system caused mostly by the frequently time-consuming and costly review and approval processes. Similarly to Rio de Janeiro, the most dissatisfaction results from the inadequate amount of resources devoted to postpermitting monitoring, as well as questions about the adequacy of impacts mitigation measures/actions imposed by the permitting process/system.

DISCUSSION

Results from this research add important insight into coastal and environmental management systems. In fact, the current study corroborates recommendations made in previous work, suggesting that continuing the decentralization of the coastal and environmental permitting process is critical to improve the performance of Brazil's coastal management. Coastal management in Brazil is still incipient throughout the country, where environmental assessment still is the main planning tool for marine and coastal resource protection and conservation. Despite the existence of integrated management instruments for the coastal zone, such as the PNGC (1977, 1988, and 2004), National Action Plan for the Coastal Zone (PAF), ZEEC, and Rio de Janeiro State Coastal Management Plan, current institutional structures are both ineffective and inefficient. In general, the Brazilian approach continues to reflect a more top down hierarchical structure of governance, *i.e.* federal to local implementation, basically through command and control measures. The prevailing model in Rio de Janeiro and in most of the other 17 coastal states in Brazil remains a more centralized one, characterized by relatively low stakeholder and public participation. Despite the current process to implement the environmental system decentralization, Rio de Janeiro's only environmental (and coastal) agency (INEA) is responsible for almost all the environmental management activities. Such activities range from enforcement, scoping, and examining EIR/EIS to issuing permits and establishing the types of enterprises/projects likely to be licensed by the local authority. INEA is also the main agency responsible for most of the coastal management activities and responsibilities in the state.

Some of the main limitations associated with Rio de Janeiro's and Brazil's coastal and environmental management systems identified by this research include inadequate transparency and social participation, lack of information, lack of adequate coordination and integration among agencies and stakeholders, and inadequate resources to carry out and enforce permitting requirements.

As demonstrated by the results presented here, the success of California's coastal and environmental management model is due mainly to additional policies and mechanisms that incentivize more effective participation and define clear strategies and program goals.

Rio de Janeiro's land management system as a whole does not focus sufficiently on coastal issues. One of the recommendations of this study is to reimplement the state's coastal environmental management/EIA policy in a decentralized fashion. To this end, the capacities and competencies of local municipalities must be upgraded and significantly improved to effectively carry out their future responsibilities. To produce the expected results, however, the recommended decentralization process must do more than simply transfer authority and responsibility to the local level: newly tasked agencies must receive adequate professional capabilities, financial resources, and political support.

More recently, new approaches and institutional instruments for environmental, coastal, and natural resources management are being developed to better deal with new challenges brought by the combination of hazardous effects of industrialization and urbanization, especially in coastal sites.

Notable examples in California include integrated coastal zone management (ICZM); integrated watershed management; integrated regional water management planning; regional coastal wetland restoration management; and ecosystem-based fisheries and habitat management. Importantly, habitat restoration has been identified as a key component of all of these ecosystem approaches to coastal and ocean management. Currently, a combination of ICZM and ecosystem-based management supports adaptive management approaches that better integrate government and community, science, policy, management, and private and public interests. An important outcome of this approach is that the goals of restoration can be tailored to local and regional needs. To this end, public and local participation become an even more strategic issue to be addressed.

Another new approach is focused on the role that local communities, local governments, and public agencies have to play in successful climate change adaptation as well as creating and ensuring greater resilience in both projects and on-going practices. In fact, several issues and social demands raised here indicate that adaptations should be local, especially in urban geographies. Additionally, adaptations should include disaster management to limit the vulnerability deriving from current and future hazards such as severe storms, flooding, and water supply shortages. Urban governance of climate change offers a number of unique advantages in the design and implementation of responses. These include (1) the ability to work closely with local stakeholders and in context-specific ways to make climate change more tractable for decision makers, (2) the possibility to incorporate climate change into reform of preexisting local policies and practices (*e.g.*, land use and urban planning), and (3) the ability to experiment with and learn from a range of possible responses to cost-effectively adapt to inevitable climate changes.

There is also a significant opportunity for integrating measures to deal with climate change into urban planning and management, including transportation and land use planning, public housing for the poor, or disaster prevention and response. Cities and other subnational centers of governance also provide opportunities for experimentation and learning about climate change, thus acting as laboratories for testing new approaches.

CONCLUSIONS

This paper reported on an in-depth study comparing the urban coastal environmental planning, governance, and management systems of two regions, namely, the locality of Buzios in the state of Rio de Janeiro and Santa Cruz in California.

Using the Santa Cruz case as a comparison baseline, some key deficiencies were identified in the Buzios case. The resulting assessment has provided the necessary basis for proposing guidelines for improving and strengthening the Brazilian system. It is essential that coastal zone and ecosystem-based management, as well as climate change management, focuses on coastal sea level rise impacts and

adaptation planning and involves broadly representative stakeholders.

Availability of expanded and better quality environmental and planning information for regional and local decision-makers and the general public remains critical. This is an issue that needs to be addressed as a priority. In fact, one of the main results from the recent (Brazilian) National Seminar on Coastal Intervention (Projeto ORLA) has shown that enhancing popular participation and civil entities mobilization is a precondition to implement local coastal management effectively.

Along those lines, greater transparency and increased stakeholder participation has been identified as a foundation for more representative, more equitable, and more sustainable coastal environmental management systems and processes globally, in both developed and developing coastal locations.

Another important subject that should be further addressed is the study of which preconditions are required to support increased public and stakeholder participation in coastal environmental management. To understand better the consequences of such an increased participation, it is recommended that additional survey research and institutional analysis be undertaken.

In any case, coastal management tools and mechanisms—such as the creation of protected areas and zoning legislation—must be fully integrated into the local management and permitting system and legislation (*e.g.*, the Local Master Plan and Local Land Use Act).

As shown by the California experience, many positive opportunities and outcomes can result from including boundary agency activities linked to community-level citizen's associations, such as Community Land Trusts. This helps state, regional, and local agencies plan, coordinate, and implement land conservation, restoration, and coastal protection projects. It also offers adequate conditions for the development of regional and local capabilities and competencies with the goal of implementing more sustainable coastal environmental management in both developing and developed locations.

To date, institutional initiatives and capacities at the subnational level have not been adequately investigated or analyzed. To this end, the role of nonregulatory structures and elements—including boundary organizations—should be studied to increase the knowledge of which are the best practices and which are the most promising institutional models employed so far. Finally, the experience with sustainable models should help in the development of integrated coastal zone environmental management, as well as ecosystem-based management and global climate adaptation.

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APPENDIX

Table A1. *Scores assigned by the Brazilian stakeholders (RJ), by sectorial groups, to the quantitative questions from Clusters 1, 2, and 3.*

Respondents per surveyed region/country		Cluster 1 - Enforcement/Command and control					Cluster 2 - Participation/Social control				Cluster3-Permitting goals/efficacy			
Sectorial Group	RJ/BRAZIL	Question 13	Question 14	Question 16	Question 18	Question 19	Question 21	Question 23	Question 25	Question 26	Question 28	Question 29	Gen. Aver. per the question	Respondents
		Score					Score				Score			
	Sec_Estado_M_Amb	2	2	2	3	1	2	2	2	1	2	1	1,8	Rio de Janeiro State Secretary of Environment
	Pref_Cabo_Frio	0	1	1	1	1	0	1	0	0	0	3	0,7	City of Cabo Frio
	Pref_Local	2	2	1	2	1	0	1	2	2	1	1	1,4	City of Araruama
	Pref_Arm_Buzios	3	2	*	4	0	*	2	*	*	1	2	2,0	City of A. dos Buzios
Group A	Inea	3	2	3	4	2	2	1	3	3	3	1	2,5	Rio de Janeiro State Environmental Institute
(Public)	Sec_Amb_S_Pe_Al	3	2	3	3	3	4	3	3	3	3	1	2,8	Environmental Secretary of S.P. d'Aldeia
	Inst_Estad_Amb	2	2	3	3	2	4	2	4	4	3	3	2,9	Rio de Janeiro State Environmental Institute
	Sec_Amb_Arr_Cab	3	3	3	4	3	3	3	2	3	2	3	2,9	Environmental Secretary of A. do Cabo
	Sec_M_Amb_Ar_Bz	1	0	1	2	0	1	1	1	1	2	3	1,2	Environmental Secretary of A. dos Buzios
	Sec_M_Amb_Cb_Fr	4	3	4	4	3	3	4	4	4	3	1	3,4	Environmental Secretary of Cabo Frio
General Average per question per Group		2,3	1,9	2,3	3,0	1,8	2,1	2,0	2,3	2,3	2,0	1,9	2,2	General Average Group A
Group B	Inst_Ecobuzios	1	1	0	1	1	1	1	1	1	2	2	1,1	EcoBuzios Institute
(NGO)	Ativa_buzios	1	0	1	1	0	1	0	1	1	*	*	0,7	NGO Ativa Buzios
	Lebma	3	2	2	2	3	1	1	*	1	3	3	2,1	Buzios M. Atlantica Ecologic Institute
		1,7	1,0	1,0	1,3	1,0	1,0	0,7	1,0	1,0	2,5	2,5	1,4	Average Group B
Group C	Faetec	1	1	1	2	1	1	0	1	1	1	2	1,1	Technical School Support Foundation of the State of RJ
(University)	PPE_Coppe_Ufrj	3	3	3	4	3	3	2	3	3	*	2	2,9	Environmental and Energy Planning Program COPPE/UFRJ
		2,0	2,0	2,0	3,0	2,0	2,0	1,0	2,0	2,0	1,0	2,0	1,9	Average Group C
	Muniz_Sp_Eng_Cs	2	1	3	3	1	2	2	1	1	2	1	1,7	Muniz Spada Engineers and Consultants
Group D	Antonio_A_Arq	*	0	2	*	*	*	0	0	0	*	*	0,4	AA Associated Architects
(Private)	Pousada_Corais	1	1	0	1	0	1	0	1	0	1	2	0,7	Corais e Conchas Inn
	Amb_Eng_Consult	3	2	2	4	3	3	2	3	3	3	0	2,5	Ambiental Engineering and Consultory
		2,0	1,0	1,8	2,7	1,3	2,0	1,0	1,3	1,0	2,0	1,0	1,5	Average Group D
		GenAverQ13	GenAverQ14	GenAverQ16	GenAverQ18	GenAverQ19	GenAverQ21	GenAverQ23	GenAverQ25	GenAverQ26	GenAverQ28	GenAverQ29	1,7	General average

RANGE		Corresponding Status
0	1	PRECARIOUS
2	3	FAIR
4	5	GOOD
	*	no answer

Table A2. *Scores assigned by the American stakeholders (CA), by sectorial group, to the quantitative questions of Clusters 1, 2, and 3.*

Respondents per surveyed region/country		Cluster 1 - Enforcement/Command and control					Cluster 2 - Participation/Social control				Cluster3-Permitting goals/efficacy			
Sectorial Group	CA / UNITED STATES	Question 13	Question 14	Question 16	Question 18	Question 19	Question 21	Question 23	Question 25	Question 26	Question 28	Question 29	Gen. average per respondent	Respondents
		Score					Score				Score			
Group A (Public)	Count_S_Cruz	*	2	4	4	3	4	2	4	4	4	1	3,2	County of Santa Cruz
	City_S_Cruz	*	3	3	3	3	4	5	4	4	1	4	3,4	City of Santa Cruz
	S_Cruz_Pln_Dep	*	3	3	2	2	3	3	2	2	4	1	2,5	Santa Cruz Planning Departament
General Average per question per Group			2,7	3,3	3,0	2,7	3,7	3,3	3,3	3,3	3,0	2,0	3,0	General Average Group A
Group C (University)	Test_Tiff	*	4	*	3	*	1	1	3	*	1	*	2,2	Doctoral student ENVS Dept/UCSC
	UCSC	*	*	*	3	3	4	0	3	3	3	3	2,8	Professor ENVS Dept/UCSC
			4	*	3	3	2,5	0,5	3	3	2	3	2,7	Average Group C
Group D (Private)	MBA_Consult	*	2	3	3	2	2	1	3	2	2	0	2,0	Consultant
	Witt_Park_Law	*	1	1	2	2	2	0	2	2	4	0	1,6	Law firm
	ESA_PWA	*	0	2	4	0	4	3	4	2	2	1	2,2	Consultant
	MBA_Consut	*	1	2	2	2	4	2	2	3	*	*	2,3	Consultant
	Lisa_Wise	*	3	3	3	3	3	2	3	3	4	2	2,9	Consultant
			1,4	2,2	2,8	1,8	3,0	1,6	2,8	2,4	3,0	0,8	2,2	Average Group D
		GenAverQ13	GenAverQ14	GenAverQ16	GenAverQ18	GenAverQ19	GenAverQ21	GenAverQ23	GenAverQ25	GenAverQ26	GenAverQ28	GenAverQ29	2,6	General average

RANGE		Corresponding Status
0	1	PRECARIOUS
2	3	FAIR
4	5	GOOD
	*	no answer

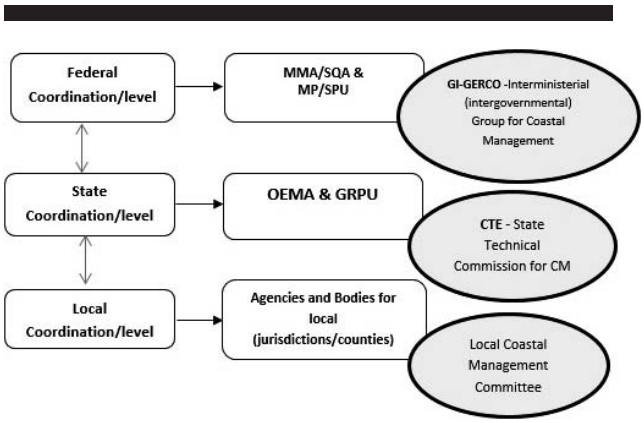

Figure A1. Institutional Arrangement design for Coastal Management in Brazil.

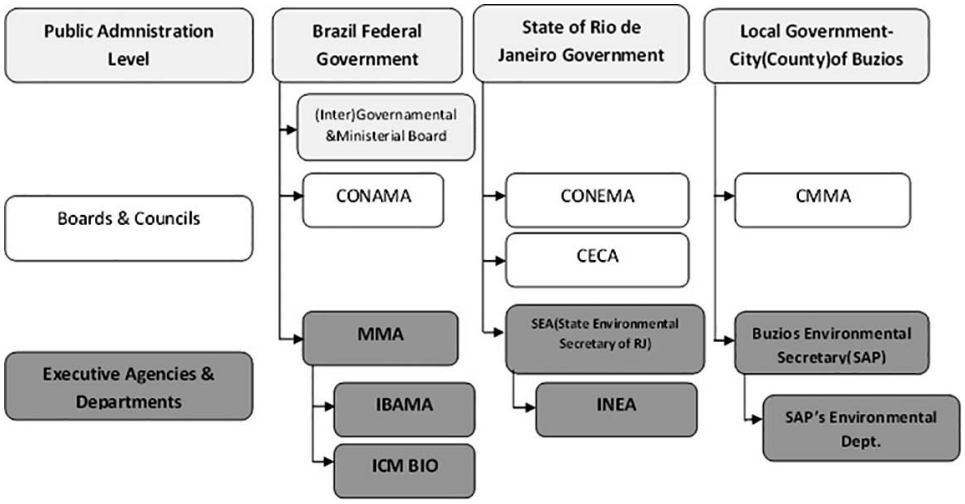

Figure A2. Institutional arrangement (organogram) of the Brazilian Environmental System (SISNAMA), with Rio de Janeiro as the State level and the Buzios County as the local level. Source: Adapted from http://www.mprj.mp.br/areas-de-atuacao/meio-ambiente/orgaos-ambientais/

Table A3. *List of acronyms used*.

Acronym	English	Portuguese
APA	Environmental Protected Area	Área de Proteção Ambienta
CAPES	Coordination for the Improvement of High Education Personnel	Coordenação de Aperfeiçoamento de Pessoal de Ensino Superior
CCC	California Coastal Commission	
CCRWQCB	Central Coast Regional Water Quality Control Board	
CDP	Coastal Development Permit	
CDFG	California Department of Fish and Game	
CECA	Rio de Janeiro State Board of Environmental Control	Comissão Estadual de Controle Ambiental do Rio de Janeiro
CEQA	California Environmental Quality Act	
CERHI	Rio de Janeiro State Water Resources Control Board	Conselho Estadual de Recursos Hídricos do Rio de Janeiro
CIRM	Interministerial Board for Ocean Resources	Conselho Interministerial de Recursos do Mar
CILSJ	Lagos and Sao Joao River Environmental Consortia of Municipalities	Consórcio Ambiental Intermunicipal da Região dos Lagos e Rio São João
CM	Coastal Management	Gerenciamento Costeiro
CMMA	Municipal Environmental Board	Conselho Municipal de Meio Ambiente
CNDDB	The California Natural Diversity Database	
CNI	National Confederation of Industries	Confederação Nacional da Indústria
CNPS	California Native Plant Society	
CONAMA	National Environmental Board	Conselho Nacional do Meio Ambiente
CONEMA	Rio de Janeiro State Environmental Board	Conselho Estadual do Meio Ambiente do Rio de Janeiro
CSCC	California State Coastal Conservancy	
CTE	State Technical Comission	Comissão Técnica Estadual
CZMA	Coastal Zone Management Plan	
EA	Environmental Assessment	
EIA/RIMA	Environmental Impact Assessment/Report (Brazil)	Estudo de Impacto Ambiental/Relatório de Impacto ao Meio Ambiente
EIR	Environmental Impact Report	
EIS	Environmental Impact Study	
EIU	The Economist Intelligence Unit	
U.S. EPA	U.S. Environmental Protection Agency	
FEEMA	Rio de Janeiro State Environment Engineering Agency	Fundação Estadual de Engenharia do Meio Ambiente do Rio de Janeiro
GI-GERCO	Integration Group of Coastal Management	Grupo de Integração do Gerenciamento Costeiro
GP	General Plan	
GRPU	Rio de Janeiro State Department	Gerência Regional de Patrimônio da União do Rio de Janeiro

Table A3 (continued). *List of acronyms used.*

APA	Environmental Protected Area	Area de Proteção Ambiental
IBAMA	Federal Institute of Environment and Renewable Natural Resources	Instituto Brasileiro do Meio Ambiente e Recursos Renováveis
ICM BIO	Chico Mendes Federal Institute for Biodiversity Conservation	Instituto Chico Mendes de Biodiversidade
IBGE	Brazilian Institute of Geography and Statistics	Instituto Brasileiro de Geografia e Estatística
ICZM	Integrated Coastal Zone Management	
INEA	Rio de Janeiro State Environmental Institute	Instituto Estadual do Ambiente do Rio de Janeiro
INEPAC	Rio de Janeiro State Institute of Cultural and Artistic Heritage	Instituto Estadual do Patrimônio Artístico e Cultural do Rio de Janeiro
LCP	City Local Coastal Plan	
MMA	Brazilian Ministry of Environment	Ministério do Meio Ambiente
MP	Brazilian Ministry of Planning	Ministério do Planejamento
MPCOG	Monterrey Peninsula Council Government	
NEPA	National Environmental Policy Act	
ND	Negative Declaration	
NOAA	National Oceanic and Atmospheric Administration	
NPDES	National Pollutant Discharge Elimination System	
OEMA	Environmental Agency/Institute in a Brazilian State	Órgão Estadual de Meio Ambiente
OPR	Office of Planning and Research	
ORLA	Integrated Coastal Zone Management Project	Projeto de Gestão Integrada da Orla Marítima
PAF	National Action Plan for the Coastal Zone	Plano Federal de Ação da Zona Costeira
PNGC I and II	National Coastal Management Plans I and II	Plano Nacional de Gerenciamento Costeiro I e II
PNMA	Brazilian Federal Environmental Policy Act	Política Nacional de Meio Ambiente
RDA	Resource Description and Access	
RIMA	Environmental Impact Report	Relatório de Impacto ao Meio Ambiente
RJ	Rio de Janeiro	
SB	Senate Bill	
SEA	Rio de Janeiro State Secretary of Environment	Secretaria Estadual do Ambiente do Rio de Janeiro
SEA	Strategic Environmental Assessment	
SECPLAN	Rio de Janeiro State Secretary of Planning	Secretaria Estadual de Planejamento do Rio de Janeiro
SISNAMA	Brazilian Environmental System	Sistema Nacional de Meio Ambiente
SNUC	National Protected Areas System	Sistema Nacional de Unidades de Conservação
SPU	Federal Estate Department	Secretaria do Patrimônio da União
SQA	Federal Secretary of Environmental Quality	
SWRCB	State Water Resources Control Board	
TMDL	Total Maximum Daily Load	
UCSC	University of California, Santa Cruz	
UFRJ	Federal University of Rio de Janeiro	Universidade Federal do Rio de Janeiro
ZEE	Rio de Janeiro State Economic and Ecological Zoning	Zoneamento Ecológico Econômico do Rio de Janeiro
ZEEC	Federal Coastal Economic and Ecological Zoning	Zoneamento Ecológico Econômico da Costa do Brasil