

Environment and Coastal Management

Coastal Zone Management in Buenos Aires, Argentina

José R. Dadon*

CONICET, Gestión de Espacios Costeros, Facultad de Arquitectura, Diseño y Urbanismo, and Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Buenos Aires, Argentina

Silvia D. Matteucci

CONICET; Grupo de Ecología del Paisaje y Medio Ambiente, Universidad de Buenos Aires, Buenos Aires, Argentina

INTRODUCTION

Argentina is located in the southeastern extreme of South America and its coastal zone is bathed by the Atlantic Ocean. The national economy is based on the export of commodities. The most productive region extends on a sedimentary plain (the Pampa), the eastern boundary of which continues along the coast of the Paraná River, the Río de la Plata, and finally, the Atlantic Ocean. This fluvial/maritime coast is diverse in natural and artificial landscapes, ecological resources, and human activities. The major key ports, industrial establishments, infrastructure, administrative and financial centers, universities, and cities are located there. The Pampa is divided into several provinces (states), the largest being the Province of Buenos Aires. The Buenos Aires Autonomous City, the national capital city, is located on the Río de la Plata coast. Altogether, the Province of Buenos Aires and the Autonomous City coast are considered the Buenos Aires Coastal Zone.

The capital and its surrounding counties is one of the most populated and dense megacities of the world, the Buenos Aires Metropolitan Area. One out of three inhabitants of the country lives in the Buenos Aires Coastal Zone, while more than 7,500,000 visitors spend their holidays at its beach

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resorts. Within this context, we 1) analyze the main physical, geomorphological, and biological characteristics related to the most important economic coastal uses and activities; 2) identify the pressures, the conflicts and the observed impacts; 3) study some examples in order to analyze the resource management model; and 4) propose and discuss different alternatives to consider through a more integrated, long-term sustainable coastal management.

PHYSICAL AND GEOMORPHOLOGICAL FEATURES

The Buenos Aires Coastal Zone extends from 33°21' S and 60°13' W to 41°03' S and 63°23' W, covering 84,602 km² in area. It comprises both fluvial and maritime coasts. The oceanic portion is the Exclusive Economic Zone (EEZ), and the oceanic boundary is delimited according to the Maritime Space and Baselines Law (Law 23968/1991), in accordance with the United Nations Convention on the Law of the Sea (UNCLOS). Since the coastal zone lacks a juridical definition, it is convenient for management purposes to include in the continental portion all the counties that border the coastline.¹ The present article follows these conventional limits (Fig. 1).

The climate is temperate (annual mean temperature 17.4° C in the Autonomous City; 15.7° C in the Province of Buenos Aires), and the oceanic water masses are under the influence of the cold subantarctic Malvinas (Falkland) Current. However, from a biogeographical point of view, the northeastern fluvial portion is located at the crossroads between the tropical-subtropical regions of the "Mata Atlantica" of Amazonian lineage, and the Chaco forests. The tropical forests reach the temperate latitudes of the Province of Buenos Aires through the corridor of the Paraná River. Thus, unexpectedly rich riparian forests are found in the northern Buenos Aires Coastal Zones, in a climate tempered by the large water masses of the Paraná River and the Río de la Plata.

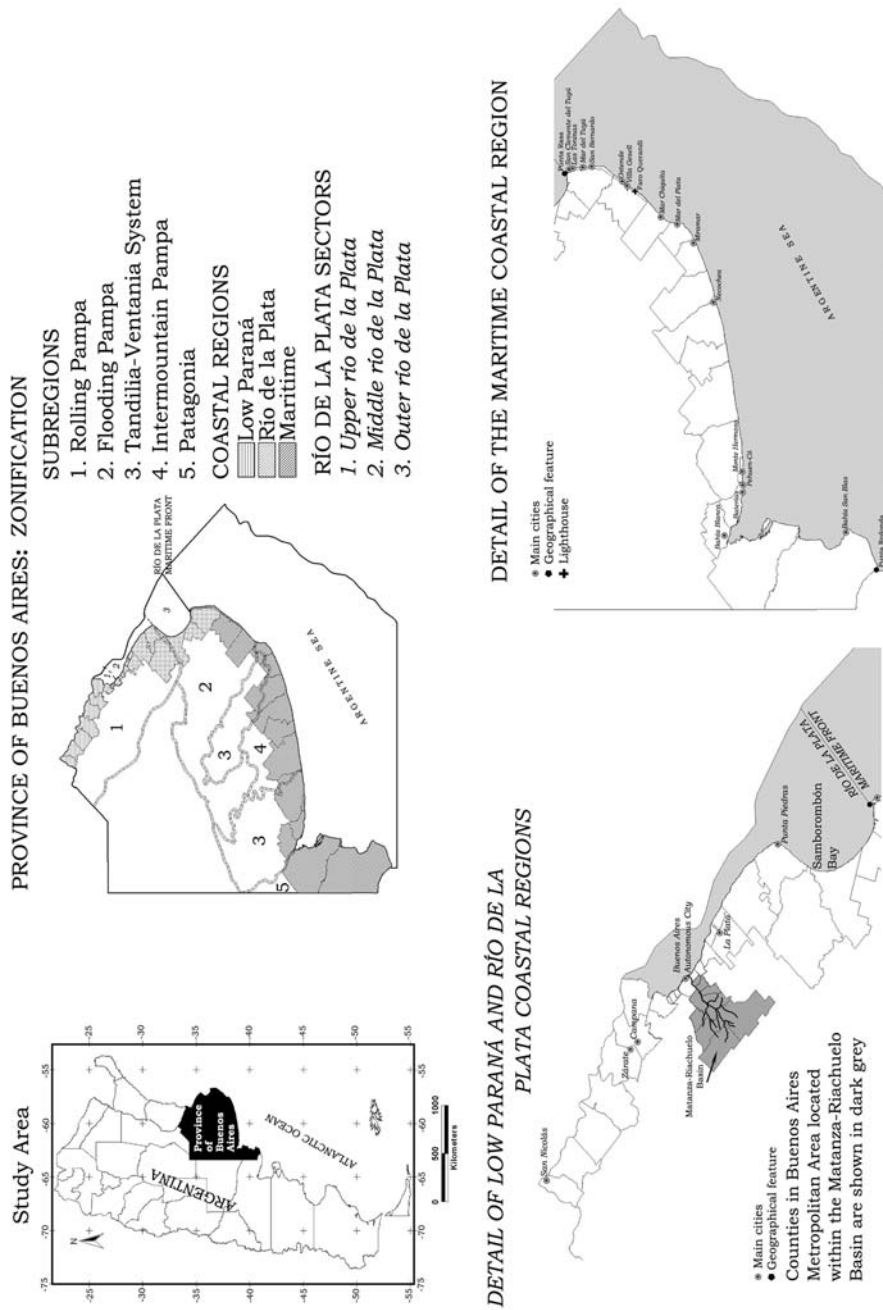
The Río de la Plata covers an area of about 38,000 km² and it drains a 3,170,000 km² basin, being the second largest one on the continent.²

The Río de la Plata is usually divided into three sectors: upper, from its origin to the Autonomous City-Colonia City; middle, up to Punta Piedras-Montevideo City; and outer, up to Punta Rasa-Punta del Este City (Figure 1).

1. J.M. Barragán Muñoz, J.R. Dadon, S.D. Matteucci, J.H. Morello, C. Baxendale and A. Rodríguez, "Preliminary basis for an integrated management program for the coastal zone of Argentina," *Coastal Management* 31(1) (2003): 55-77.

2. J. López Laborde, "Marco geomorfológico y geológico del Río de la Plata," in *The Río de la Plata. An Environmental Overview. An EcoPlata Project Background Report*, ed. P.G. Wells and G.R. Daborn (Halifax: Dalhousie University, 1998), pp. 1-16.

FIG. 1.—The Buenos Aires Coastal Zone and the Surrounding Area



The Paraná and Río de la Plata Coastal Zone

The Low Paraná and Río de la Plata coastal zone includes two different physiographic units: the lower terrace (coastal floodplain), bordering the river under the 5-m contour; and the high terrace (Pampean plateau) 5 m above sea level. The coastal plain was formed by successive marine incursions and regressions during the Holocene. The high terrace shows a well-defined, irregular border at the river front, in stretches of several kilometers with slopy bluffs that may reach a little more than 10 m high over the lower terrace. These escarpments are interrupted by deep entrances through which the streams discharge in the Río de la Plata. The lower terrace is a long fringe that stretches to the south, with a varying width of up to 10 km towards its southern end. Its slope is very gentle (0.5:1000); it is large and swampy, with a mean height of 2 m above sea level. Its original plain topography became undulated with the deposition of sand dunes, the natural levees of the rivers that cut the plain, and successive narrow littoral ridges parallel to the coast. The latter were formed by deposits of seashell debris during marine incursions and regressions.³ The low topography and a local climatic event, the “sudestadas” (storms coming from the south-east), cause severe periodic flooding events.

The hinterland lies in the Rolling Pampa subregion, comprising several geomorphological landscapes with a highly modified drainage network due to urbanization, and with water tables at variable depths. Soils correspond to two physiographic units: the undulated plain, and the lower alluvial terrace.⁴ The most productive agricultural lands in Argentina are encountered on the undulated plain of the Rolling Pampas. It is one of the five extensive areas of loessic fertile soils in the world. It has enough rainfall to produce sustained high yields of soybeans, wheat, sunflower, and corn, representing 52 percent of the national agricultural production value.

The traditional crops, maize and wheat, as well as cattle-raising, have been superseded by soybean crops in the last few decades, since international soybean prices rose in the 1980s. The natural grassland has been converted into croplands, and only very few isolated relics remain. On the coast of the upper Río de la Plata lies the Metropolitan Area. Urban growth has triggered a fierce conflict with agriculture and considerable extensions of farmland have been irreversibly lost.⁵

3. C.L. Herrera, “Evolución Holocena en sectores de la costa bonaerense del estuario del Río de la Plata” (Licenciatura in Geological Sciences diss., Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, 1993).

4. Global Environmental Outlook, “*Perspectivas del Medio Ambiente Urbano: Buenos Aires*” (Buenos Aires: PNUMA-ORPALC, 2004).

5. J. Morello, S.D. Matteucci and G.D. Buzai, “Urban Sprawl and Landscape Perturbation in High Quality Farmland Ecosystems. The Case of Buenos Aires Metropolitan Region,” in *Globalization and the Rural Environment*, ed. R. Paarlberg,

The outer Río de la Plata comprises the Samborombón Bay (Figure 1), chosen as a Ramsar site in 1997. It is characterized by the presence of barrier islands and a tidal plain. The barrier islands lay subparallel to the present coastline, at 2 to 30 km from the coast. They are separated by depressions and littoral ridges of 3 m high above sea level. The tidal plain is low and covered with marshlands, whose conservation status is still good.

The hinterland is a transition zone between the Rolling Pampa and the Flooding Pampa, and changes gradually in a northwest-southeast direction from the rolling relief formed by alternating hillocks and streams to a flooding depression, spotted by small ponds and lakes. Soils change in the same direction from sandy loam to clay loam, and grassland species composition changes as well, with an increase in halotolerant species. The main economic activity is cattle-raising, mainly for milk production. Crops are restricted to the few high spots within and around the lowlands.

The Maritime Pampean Coastal Zone

The maritime Pampean coastal zone extends from Punta Rasa to the southern end of the Province of Buenos Aires. The dominant landscape originated 3,500 years ago, due to a fall in relative sea level of 1.5 m from the mean sea level, and the formation of barrier spits seaward.⁶ It is formed by coastal littoral ridges, interrupted in places by relatively low cliffs. Along the coast, sandy beaches alternate with sand dune fields of variable widths and heights, and with rocky or erodible cliffs. The coastal zone characteristics show a strong association with the hinterland, which falls within three of the Province of Buenos Aires subregions (the Flooding Pampa, the Tandilia-Ventania System, and the Intermountain Pampa), and the Patagonian ecoregion.

The Flooding Pampa is formed largely by a low plain (La Plata-Salado basin), covered by natural grasslands in 80 percent of its extension. Its flat topography, lack of a well-developed drainage system, and low hydraulic conductivity of soils, cause the occurrence of floods in late winter and spring, while droughts are frequent in summer. The Flooding Pampa is skirted by the sandy Eastern Barrier, between Punta Rasa and Mar Chiquita.⁷

O. Solbrig, and F. Di Castri (Harvard: Rockefeller Center for Latin-American Studies, Harvard University Press, 2001), pp. 443–477.

6. J.O. Codignotto and M.L. Aguirre, “Coastal Evolution, Changes in Sea Level and Molluscan Fauna in Northeastern Argentina During the Late Quaternary,” *Marine Ecology* 110 (1993): 163–175.

7. F.I. Isla, “Erosión y defensas costeras,” in *Manual de manejo costero para la Provincia de Buenos Aires*, ed. F.I. Isla and C.A. Lasta (Mar del Plata: EUDEM, 2006), pp. 125–147.

The beaches are sandy, continuous, open and without cliffs, and are of an intermediate or bar type, more of the dissipative than the reflexive type, with no clear borders and of variable extension. The dunes obstruct partially or totally the fluvial drainage, generating ponds and swamps of salty soils with high levels of acidity. At the same time, they increase groundwater availability. As the sea level has been stable for 5,000 years, in this barrier the foredunes became as scarps or undernourished dunes.⁸ The vegetation cover is sparse on the moving dunes, and increases on the fixed dunes. Fast-growing herbs and halophytes (mainly “espartillares” of *Spartina* sp.) form the vegetation cover.

The Tandilia-Ventania System comprises two mountain ranges laying perpendicular to the coast, and separated by the continental plain of the Intermountain Pampa. The northern range (Tandilia) is formed by a chain of isolated hills of no more than 500 m elevation, with old rock outcrops on top. The foothills, occupying most of the extension, are covered by well-developed soils, where an important potato production center is found.

The Tandilia range reaches the coast forming orthoquartzite outcrops. The cliffs are from 10 to 30 m high and the beach width ranges from 50 to 100 m. Due to marine action, the coastline is retreating noticeably. The human activities and uses induced erosion; for example, the construction of the Mar del Plata harbor and its southern breakwater changed the sedimentary pattern causing accumulation at the harbor entrance and draught reduction. It also produced strong beach erosion down the littoral drift.⁹

The Ventania range is higher than the Tandilia range, with maximum elevation of 1,200 m and is 100 km long. Rock outcrops and shallow soils predominate. Here the coast is low and with dunes. The Bahía Blanca estuary coast is a large tide plain with marshlands and crab wetlands. The beaches are not used and they show a high potential for future urban growth.

The Intermountain Pampa is located between the Ventania and Tandilia ranges. It is a continental undulated plain formed by aeolian-loessic sediments lying on a clayey hard substratum. The coast is low and with a sandbank. The Southern Barrier is found here, from Miramar to Pehuen-co.¹⁰ It is cut across by the mouths of rivers and streams, which are prone to obstruction. In great part the dunes hang from the cliffs.¹¹

8. F.I. Isla, L.C. Cortizo and E.J. Schnack, “Pleistocene and Holocene Beaches and Estuaries Along the Southern Barrier of Buenos Aires, Argentina,” *Quaternary Science Reviews* 15 (1996): 833–841.

9. See Isla, n. 7 above.

10. See Isla et al., n. 8 above.

11. See Isla et al., n. 8 and Isla, n. 7 above.

In the Southern Barrier, beaches began to erode and old cliffs were exhumed, with sand remaining as cliff-top dunes.¹² The southern end of the Province of Buenos Aires falls within the Patagonian ecoregion. It is an arid zone characterized by a plateau bordered by low, elongated hills parallel to the coast. It is skirted by a continuous dune barrier that stretches from Bahía San Blas to Punta Redonda.¹³ In some portions (San Blas Bay), there are gravel beaches, and moving and fixed dunes of fine sand.¹⁴ The main economic activity in this Patagonian sector is sheep raising.

THE JURIDICAL AND ADMINISTRATIVE SYSTEM RELATED TO THE COASTAL ZONE

The coastal zone is under the jurisdiction of three administrative levels: national, provincial, and municipal. Argentina's provinces are responsible for managing their territories and their natural resources (Articles 121 and 124 of the National Constitution). The Province of Buenos Aires is divided up into counties ("partidos" in Spanish) managed by local governments, under the regime established by the Province Constitution. The provincial capital city is La Plata, located in the hinterland.

The capital city of Buenos Aires was granted the right of self-government in 1994, and it became an Autonomous City. It has its own constitution and the executive and legislative authorities are elected directly by the resident citizens.

The Buenos Aires Coastal Zone comprises 39 counties (under the Province of Buenos Aires dominion), and also the national (federal) Autonomous City. In addition to the Low Paraná and the Río de la Plata, it includes the inner portion of the Economic Exclusive Zone, under the Province of Buenos Aires jurisdiction. The Article 2340 of the Argentine Republic Civil Code (Law 340), defines as public assets 'the territorial seas. . . up to 3 miles, the interior seas, bays, inlets, ports, anchorage sites... the rivers, their beds... ocean beaches and interior river banks, understanding as such the land space that water bathes or clears out during the usual high tides or the ordinary medium floods... the existing islands or those arising in the territorial sea or in any river type...' Article 2343 establishes the possibility of private appropriation of some living seashore resources, such as fish, plants, and weeds. With regards to the share of responsibilities, maritime beaches and internal river banks belong primarily to the

12. See Isla, n. 7 above.

13. *Id.*

14. *Id.*

provincial public domain (Article 124 of the National Constitution), but some of those responsibilities were delegated to the nation.

In addition to the national, provincial, and municipal administration, some international agreements are relevant to the management of the Buenos Aires Coastal Zone. The Río de la Plata is the terminal portion of the international Río de la Plata Basin. The hydrological regime, the water quality and the biological productivity depend on the upstream management, which is partially regulated through several international committees.¹⁵

Argentina and Uruguay share fisheries management and the pollution control of the fluvial environments. The *Tratado del Río de la Plata y su Frente Marítimo* (Río de la Plata and its Maritime Front Treaty) was signed by Argentina and Uruguay in 1973. It established that the river waters are common between both countries, excepting two coastal fringes under exclusive jurisdiction. The States commit themselves to protect and maintain the water quality with adequate regulations and see to its enforcement for navigation, commercial fishing, scientific research, and pollution control.¹⁶ Two bi-national committees were created for administration, management, and preservation of interests and resources: the *Comisión Administradora del Río de la Plata* (CARP) (Río de la Plata Management Commission) and the *Comisión Técnica Mixta del Frente Marítimo* (Maritime Front Technical Commission). The Treaty has proved to be an excellent tool for bi-national coastal management.¹⁷

ECONOMIC USES AND ACTIVITIES IN THE BUENOS AIRES COASTAL ZONE

The Fluvial Coastal Zone

The port-based economic power of the city of Buenos Aires is crucial to understanding the urban development and the political history of the whole country.¹⁸ Since the Spanish conquest, the coastal population in Argentina

15. See Barragán Muñoz et al., n. 1 above.

16. R. Rey Balmaceda, "La porción oceánica y la porción antártica, dos espacios en cuestión", in *La Argentina. Geografía general y los marcos regionales*, 2d ed., coord. J. Roccatagliata (Buenos Aires: Planeta, 1992), pp. 749–781.

17. E. González Lepeyre, "The Maritime Front of the Río de la Plata as an Instrument for Binational Fisheries Management," *Ocean and Coastal Management* 42 (1999): 155–164.

18. A.L. Lara, "Los espacios litorales y el Mar Argentino," in *Argentina. Una visión actual y prospectiva desde la dimensión territorial*, coord. J. Roccatagliata (Buenos Aires: Emecé, 2008), pp. 923–984.

concentrates on the large riverbanks of the Río de la Plata basin. The capital city and its port were founded in 1536 and re-founded in 1580. During the colonial period and extending up to the end of the 18th century, it served as a strategic settlement to prevent Portuguese expansion and as the Atlantic gateway for commercial exchange between Cádiz (Spain) and Lima (Peru), within the context of the closed economy monopolized by the Spanish crown.¹⁹ After the independence from Spain in 1816, cattle raising for leather and jerked beef production consolidated as the traditional economic activity in the Province of Buenos Aires.²⁰ The coastal population cores grew around the harbors from which those commodities were exported, being the city of Buenos Aires, which concentrated most of the economic power. The Buenos Aires port monopoly of commercial exchange greatly affected the internal political conflicts. In 1819, there was an unsuccessful attempt to constitutional and political organization of the country pioneered by Bernardino Rivadavia. The city of Buenos Aires held some civil wars against the other provinces which kept her isolated from the rest of the country in several periods throughout the 19th century, up to the final unification of the republic in 1862. Institutional conflicts ended when the city was constituted as a federal district within its own limits, and separated from the provincial capital, a new city (La Plata) in 1880, together with the definitive institutional consolidation of the country as a modern republic. The commercial exchange with Great Britain increased, based on the export of commodities and the import of machinery and tools. Large Pampean natural prairies underwent extensive agriculture. The agricultural frontier moved southward, together with the annihilation of native indigenous nations to occupy new territories. Between 1857 and 1900, 24,742 km of railway were laid from the main production centers to the Buenos Aires port for the transport of agricultural products.²¹ The increase in export commodities (in order of importance: wheat, corn, wool, and refrigerated meat), with the concurrent advance of the agricultural frontier on natural grasslands demanded large labor forces, provided by massive immigration from Europe. Small- and medium-scale agricultural activities, such as horticulture, fruit growing, and flower production, started around larger cities. In the hinterland, most of the area under agricultural production was covered by cereal grains, oil grains, and forages. Maize, wheat, soybean,

19. H.J. Pando and O. Vitalli, "El Río de la Plata en la historia," in *El Río de la Plata como territorio*, comp. J.M. Borthagaray (Buenos Aires: Facultad de Arquitectura, Diseño y Urbanismo and Fundación Urbanismo, 2002), pp. 125–148.

20. Dalto (1966) in L.A. Coria, "Guerra civil, depresión y desintegración económica en el Oeste Argentino (1829–1852). El caso mendocino," *Anales de la Asociación Argentina de Economía Política* (2001): 1–37.

21. See Pando and Vitalli, n. 19 above.

sunflower, flax, and alfalfa were the prevailing crops. Farming concentrated on cattle-raising, especially in Shorthorn and Aberdeen Angus.

By the middle of the 20th century, new urban centers were established as a consequence of the industrial development, mainly around the capital city and in the neighboring counties.²² From the 1940s to the 1970s, diverse industrial activity became important in the upper Rio de la Plata coastal area, including textiles, pharmaceuticals, chemicals, petrochemicals, plastics, paper and cellulose, meat, tobacco, automobiles, clothes and shoe industries, meat processing factories together with distilleries and mills. From 1976, the industrialization process was disrupted and diminished due to several economic, political, and social crises.²³ In 1988, the extensive urban complex became a megacity, the Metropolitan Area (see below). From 1991 to 2001, a fixed exchange rate tied the local currency (peso) to the U.S. dollar, ending decades of high inflation. Together with deregulation and privatization of state-owned companies, this economic plan attracted extensive foreign investment, which brought an economic boom. However, industrialization decreased with high unemployment rates as a consequence. The recession aggravated in 2001, and in the midst of one of the worst political and economic crises in Argentine history, the fixed exchange rate was abandoned and the default of the government debt to Argentine and foreign private lenders was determined.²⁴ As a result of the increment of the world commodities demand, an economic recovery has been occurring since 2003.

The economic changes during the 1990s produced important modifications in the urban growth pattern, differing significantly from that of the previous decades,²⁵ such as low density urban projects (country clubs), private urban developments, and residential complexes following a leapfrog urban growth pattern around the Metropolitan Area.²⁶

22. D. Kullock, "Transformaciones en la Región Metropolitana de Buenos Aires. Reflexiones sobre los procesos en marcha," in *La cuestión urbana en los '90 en la Región Metropolitana de Buenos Aires*, comp. A. Catenazzi and J. D. Lombardo (Los Polvorines: Universidad Nacional de General Sarmiento, 2003), pp. 105–118.

23. H. Bozzano, "Buenos Aires desde sus orígenes. Transformaciones territoriales y mutaciones productivas," in *Aproximaciones al mundo productivo de la Región Metropolitana de Buenos Aires*, coord. J.A. Borello (Los Polvorines: Universidad Nacional de General Sarmiento, 2007), pp. 29–58; L. Pesci and R. Pesci, "La región urbana de Buenos Aires, hacia la conformación de una metápolis," in *Argentina. Una visión actual y prospectiva desde la dimensión territorial*, coord. J.A. Roccatagliata (Buenos Aires: Emecé, 2008), pp. 495–539.

24. A.M. Cerro and O. Meloni. "Crises in Argentina: 1823–2002. The Same Old Story?" *Anales de la Asociación Argentina de Economía Política* (2003): 1–27.

25. See Kullock, n. 22 above.

26. S.D. Matteucci and J. Morello, "Efectos ecológicos de los emprendimientos urbanísticos privados en la Provincia de Buenos Aires, Argentina," in *Crecimiento urbano y sus consecuencias sobre el entorno rural*, ed. S.D. Matteucci, J. Morello, G.D.

At present, the Metropolitan Area occupies only 0.1 percent (3,827 km²) of the landmass of the country, but 31.6 percent of the total population (11,461,000 inhabitants) lives here; the mean density is 2,995 per square kilometer.²⁷ Its economic importance is remarkable. Within its territory there are 45 percent of the manufacturing industries, 38 percent of the commercial establishments, 44 percent of the service companies, and 39 percent of the financial institutions in the country. It contributes 40 percent of the Gross National Product and the mean annual income is 30 percent over the national average.²⁸

The Autonomous City port was moved paralleling the city changes. The present port (named New Port) extends 470 ha on land and nearly 2,000,000 m² over water. It is connected worldwide with a weekly frequency of 70 vessel calls devoted to international trade and transports the 70 percent of the total cargo.²⁹ Other fluvial ports are situated in the Paraná coast (Campana, Zárate and San Nicolás) and on the Río de la Plata (La Plata and San Clemente del Tuyú).

Impacts and Conflicts

Urban growth in the Metropolitan Area was promoted by land demands linked with residential, commercial, and industrial development, and by malfunction of the land market evident in real estate speculation,³⁰ such that most of the natural landscapes have been lost in the Autonomous City. Such expansion consisted of the parceling of the surrounding rural area, followed by a slow, inefficient, and insufficient supply of infrastructure, equipment, and services, their quantity and quality decreasing with the distance to downtown. While the Autonomous City provides practically 100 percent of residents with drinking water and sewerage services, only 37 percent have drinking water and 20 percent have sewer services in the peripheral counties.³¹ The demand for housing paralleled the demand for labor as a consequence of economic diversification and increased non-rural

Buzai, C. Baxendale, M. Silva, N. Mendoza, W. Pengue and A. Rodríguez (Buenos Aires: Orientación, 2006), pp. 197–221.

27. INDEC, *Censo nacional de población y vivienda 2001. Serie 2. Resultados generales. Provincia de Buenos Aires* (Buenos Aires: Ministerio de Economía, Instituto Nacional de Estadística y Censo, 2003) (CD ROM), also available online: <<http://www.indec.mecon.gov.ar>>.

28. See Pesci and Pesci, n. 23 above.

29. O. Vicente, “El puerto de Buenos Aires,” in *Atlas de Buenos Aires*, available online: <<http://www.atlasdebuenosaires.gov.ar>>.

30. See Morello et al., n. 5 above.

31. See Kullock, n. 22 above.

activities that do not require agricultural lands. For this reason, the people settled both above and below flooding altitudes, and later on public lands. There is evidence suggesting that occupation of flood-prone lands has occurred since the 18th century.³² With the tremendous urban growth from 1880, occupation occurred at the beginning on the highest topographic axis, towards the west, but since the 1940s and 1950s the lower lands were gradually converted, both on the Río de la Plata riverbanks and in the minor tributary basins. The piping of streams, and the elevation of the coastline caused by the infrastructure and building construction on the coastal zone, increases flooding risks in the city. The present coastline is artificial due to the port infrastructure and successive infilling of land along the river to increase the elevation reading at the mouth of the streams that traverse the city. At present, in the Autonomous City downtown the coastal borderline progressed 500 m into the river from the natural cliff where the city was founded.

Habitat destruction, soil imperviousness, modification of geomorphological processes by road construction, and the invasion of the low areas have changed the surface runoff, increasing the frequency and extent of flooding events.³³ The flooding continues, worsening the consequences and increasing the economic and social losses.³⁴

Up to the mid-20th century, recreational river bathing was allowed, but at present it is banned due to pollution in the coastal fringe. La Plata city coastal zone bears the most serious problem of chronic water pollution, as a consequence of the high industrial and urban concentration in the low basin. There are 23,997 industrial establishments on the Metropolitan Area coastal zone; 65.75 percent of them are located in the Autonomous City.³⁵ Two other important pollution sources are the Buenos Aires and La Plata ports, and the raw sewage pouring from both cities. Shipping is another source of pollution. In fact, 10,000 large vessels, 11,000 small sport craft, and 2,000 fast ships sail yearly,³⁶ together with an incipient international tourist

32. A. Brailovsky, "Buenos Aires, ciudad inundable," *Todo es Historia* 332 (1995): 82–92.

33. See Barragán Muñoz, n. 1 above; V. Burijson, *El Área Metropolitana de Buenos Aires: Problemática del desarrollo urbano en el espacio costero*. FREPLATA, Report (Buenos Aires: Proyecto FREPLATA, 2004), p. 92, also available online: <<http://www.freplata.org>>.

34. J. Morello, S.D. Matteucci and A. Rodríguez, "Sustainable Development and Urban Growth in the Argentine Pampas Region," *Annals of the American Academy of Political and Social Science* 590 (2003): 116–130.

35. Anon., *Uso sostenible de la Ribera Metropolitana. Propuestas consensuadas 1998, 2000, 2001*, Fundación Ciudad, Report (Buenos Aires: Fundación Ciudad, 2001), p. 20, also available online: <<http://www.fundacionciudadflpar.org.ar/publicaciones.htm>>.

36. E.E. Molina Pico, "Grandes obras en el río. Puente Buenos Aires / Colonia," in *El Río de la Plata como Territorio*, comp. J.M. Borthagaray (Buenos Aires:

activity. The pollution plume, visible at a single glance, shows peaks in the coast of the Autonomous City and diminishes progressively southwards.³⁷ The highest pollution concentrates in the first 50 m offshore. The self-depurating capacity is evident at 1.5 km offshore and beyond 3 km water quality falls within acceptable standards for all uses.³⁸

The Maritime Coastal Zone

The maritime region joined the economic activity of the Province of Buenos Aires relatively recently. Fisheries had little development through the first half of the 20th century. Since the coastal barriers cover most of the Flooding Pampas and Intermountain Pampas coast, urbanization there faced serious problems. Those coastal areas are mostly occupied by dune fields, but they are located on the border of very valuable agricultural lands. Thus, by contrast, they were considered barren and useless, comparable to deserts.³⁹

The coastal urbanization grew exponentially since the end of the 19th century, promoted mostly by domestic tourism. The first resorts (Mar del Plata, Miramar and Necochea) imitated sound European resorts like Trouville, Bristol, and others. The only consolidated substrates on the shore (the Tandilia and Ventania coastal areas) were chosen as the most convenient locations for their settlement, a decision that gave those cities a considerable advantage over other possible competitors. In fact, the resort Ostende was founded on the Eastern Barrier in 1900, but in less than 20 years it had been abandoned due to the environmental and economic problems. New resorts would be founded on the dune barriers only 50 years later, after successful methods to consolidate sandy substrate were developed. Presently, the three above-mentioned resorts concentrate more than 50 percent of the national tourism, as a consequence of the favorable environmental characteristics at their locations.

In the 1970s, domestic tourism demands caused exponential growth of the initial urban nuclei, while during the following two decades the activity

Ediciones Infinito, Facultad de Arquitectura, Diseño y Urbanismo and Fundación Urbanismo, 2002), pp. 457–480.

37. See Global Environmental Outlook, n. 4 above.

38. D.A. Sabsay, M. del C. García, A. Nápoli and D. Ryan, *Región Metropolitana de Buenos Aires. Aporte jurídico-institucional para su construcción*, Fundación Ambiente y Recursos Naturales, Report (Buenos Aires: Fundación Ambiente y Recursos Naturales, 2002), p. 111.

39. J.R. Dadon, “Gestión de sistemas con baja biodiversidad: Las playas arenosas del Noreste de la Provincia de Buenos Aires,” in *Biodiversidad y uso de la tierra. Conceptos y ejemplos de Latinoamérica*, ed. S.D. Matteucci, O.T. Solbrig, J. Morello and G. Halffter (Buenos Aires: EUDEBA, 1999), pp. 529–548.

level fell deeply due to the pegging of the local currency to the US dollar. In 2002, a period of stagnation ended, and since then, a sustained growth of demand persists. At present, the Atlantic tourist coast occupies more than 1,300 km and hosts 7,500,000 arrivals per year. There are over a million lodging vacancies available, of which 85 percent is offered as tourist housing.⁴⁰

Three tourism corridors can be found in the maritime Pampean coastal zone. The Northern Corridor is on the eastern coastal barrier, from Punta Rasa to Mar Chiquita (Figure 1). Several resorts are found here, none of which show a clear dominance. Only urban and natural landscapes are present, rural land uses are not found. Tourism is the main (and almost exclusive) economic activity.

Most of the resorts are located in the Central Corridor, which runs on the coast of the Tandilia System and its neighborhood. Mar del Plata and Miramar have grown beyond the exponential phase and both have reached the saturation point. Mar del Plata is the most visited city for the national beach tourists (3,199,000 arrivals in summer 2005–2006).⁴¹ It has the largest number of hotel accommodations and second residences in Argentina, and it is an important regional cultural centre. Miramar is visited by 220,000 tourists per year.⁴²

Necochea and Monte Hermoso are in the Southern Corridor. The region is rural and lacks a highway network interconnecting the resorts; consequently, the corridor is not functionally structured. The most important fishing harbors are in Mar del Plata, Quequén-Necochea, and Bahía Blanca. The first two, especially Mar del Plata, concentrate more than a third of the total landings of the country.⁴³ Coastal fishing prevailed from the 1920s to the 1960s, when it was superseded by the industrial fleet. The Quequén-Necochea harbor also exports agricultural products. The main navy base of Argentina is in the maritime coastal zone of the Province of Buenos Aires, in the Bahía Blanca harbor, and there is another navy base in

40. F. Tauber, L. Bognanni and D. Delucchi, *Villa Gesell. Reflexiones para una estrategia de desarrollo* (La Plata: Universidad Nacional de La Plata, 1998).

41. Anon., *Estudio de demanda. Temporada de verano 2005/2006*, Ente Municipal de Turismo, Municipalidad del Partido de General Pueyrredón, Report (Mar del Plata, Ente Municipal de Turismo, Municipalidad del Partido de General Pueyrredón, 2006), p. 35.

42. J.C. Mantero and J. Cañueto, "Miramar: Dimensiones Críticas y Estrategias de Desarrollo Turístico," *Aportes y Transferencias—Tiempo Libre, Turismo y Recreación* 1 (1) (1997): 25–46.

43. V. Burijsón, *La actividad pesquera en la República Argentina*. FREPLATA, Report (Buenos Aires: FREPLATA, 2003), p. 49, also available online: <<http://www.freplata.org>>.

Mar del Plata. The Bahía Blanca harbor has a surface of 110 ha and it is the most important maritime port in the country.⁴⁴

Impacts and Conflicts

During the cyclic economic booms, local county budgets are boosted by beach tourism. Seven marine coastal counties are strongly dependent on this activity; the other six are rural counties. In the latter, the population has remained stable or has diminished during the last decades. On the contrary, in the former the resident population has increased, in some cases doubling in the last decade.⁴⁵

The anthropogenic activities related to urbanization and tourism may produce severe impacts on coastal ecosystems. Environmental degradation has resulted from pressure by real estate development, especially for residential use together with a lack of integrated urban planning. Some irreversible modifications of the ecological processes that maintain renewable natural resources, and even the extinction of native species and/or the introduction of new invasive species and plagues, may remain undetected for a long time.

Natural erosion is a recurrent problem in several resorts, but the unplanned urban sprawl induces higher erosion rates. In the Central Corridor, roads or buildings are established on the cliff frontline. Frequently, the foredune is removed and replaced by a coastal avenue. Sand mining is banned by provincial norms and laws, but sometimes it is tolerated by the county authorities as a means to reduce local building costs.⁴⁶ Such practices shift the sedimentary balance from positive to negative, as occurred in some resorts of the Central Corridor, where the coastline retreated 130 m in 23 years and 10 forested blocks of private land were lost.⁴⁷

The impervious surfaces (both in fluvial and marine coastlines) and the rainwater runoff into the sea or river, alter the natural hydrological condition by increasing the volume and rate of surface runoff, and decreasing groundwater recharge and base flow. This leads to larger and

44. J.A. Roccatagliata, "La Pampa Bonaerense y sus extensiones," in *Argentina. Una visión actual y prospectiva desde la dimensión territorial*, coord. J.A. Roccatagliata (Buenos Aires: Emecé, 2008), pp. 641–712.

45. See INDEC, n. 27 above.

46. F.I. Isla and M.C. Villar, *Ambiente costero. Pacto Ecológico*. Senado de la Provincia de Buenos Aires, Report (Buenos Aires: Universidad Nacional de Mar del Plata—Senado de la Provincia de Buenos Aires, 1992, mimeographed), p. 24.

47. E.J. Schnack, "Argentina," in *The World's Coastline*, ed. E.C.F. Bird and M.L. Schwartz (New York: Van Nostrand Reinhold Co., 1985), pp. 69–78; See Isla, n. 7 above.

more frequent local flooding and in many cases turns localities that never flooded into flooding areas. Consequently, groundwater becomes scarce at the end of summer.⁴⁸ In many urban areas, aquifer recharge rates have been reduced even in the wet season due to asphalt and concrete surfaces, since most of the rainwater is channeled directly into the sea rather than infiltrated.

Water pollution due to urban raw sewage and solid waste disposal, and to port and industrial activities⁴⁹ threatens nautical sports, recreational fisheries, and beach tourism, which require high environmental quality values. Algal blooms are frequent on sandy beaches during the summer.⁵⁰

Recreational activities related to tourism, such as excursions, traffic, bivalve catch, sand and shell mining, bathing facilities, and beach services, etc., are intensive in downtown beaches. The impoverishment of the native vegetation and fauna is strong and the landscape shows a strong anthropogenic influence, which is not restricted to the urban sectors. Frequently, it continues beyond the outskirts of the resorts and exceeds the city boundaries reaching the natural dunes, where the relative impact affecting the remnant natural communities is stronger.⁵¹

Land Uses in the Fluvial and Maritime Coastal Zones

According to our own estimates based on analyses of satellite images taken from 1993 to 2005 (unpublished data), in the Rolling and Intermountain Pampas coastal counties respectively, 78 percent and 74 percent of the area is cultivated with annual crops, and only 20 percent and 15 percent respectively are covered by natural grasslands. In the counties within the Tandilia-Ventania System, 50 percent of the area is covered by natural grasslands and 44 percent by crops: annual crops (17 percent), annual forage crops (17 percent), and permanent forage crops (10 percent). The counties within the Flooding Pampas and the Patagonian ecoregions respectively, have 72 percent and 68 percent of their territory under natural grasslands and only 10 percent with permanent forage crops and 27 percent with annual crops.

48. See Isla and Villar, n. 46 above.

49. *Id.*; see Burijson, n. 33 above..

50. J.R. Dadon, G. Chiappini and M.C. Rodríguez, "Impactos ambientales del turismo costero en la Provincia de Buenos Aires," *Gerencia Ambiental* 9(88) (2002): 552–560; Anon., "Análisis diagnóstico transfronterizo del Río de la Plata y su Frente Marítimo," FREPLATA, Report (Montevideo: Fondo para el Medio Ambiente Mundial, Programa de Naciones Unidas para el Desarrollo), p. 311, also available online: <<http://www.freplata.org>>.

51. See Dadon, n. 39 above.

The traditional polarity of urban and rural land uses has been easily recognized in the coastal counties. However, when the natural areas under low human pressure are considered as a separate class, the detection of land change patterns may improve, and hence, the design of land-use change policies. The coastal counties' total area is so distributed in 65 percent of rural lands, 28 percent of natural lands and only 7 percent of urban lands.⁵² Most coastal counties in the Province of Buenos Aires may be classified in three groups according to social and economic indicators and to landscape metrics.⁵³ The most extensively urbanized counties have high population density (up to 14,000 per km²), better economic conditions (higher employment rate and higher production values), and better social conditions (lower illiteracy, drinking water availability, electricity, sewer system).⁵⁴ However, environmental problems abound, and natural and rural areas are scarce. The urban counties with incipient urban development show high landscape pattern heterogeneity, and they keep up a large proportion of open, natural, or lightly altered spaces. The rural counties have a low proportion of urban and periurban areas (from 22 percent to 1 percent), higher rates of illiteracy and less availability of basic services.

The Province of Buenos Aires land-use policy traditionally discriminates between rural and urban land uses, with no special conditions for the urbanization of the coastal zone except those referred to as public dominion established by the National Civil Code. The law for the Establishment of New Population Centers and Extension of Common Land (BAP Law 3487/1913) facilitated the settling of coastal urban centers, especially in response to the increasing demand for new tourist destinations arising as a consequence of the social ascent of the national urban class since 1930. Subsequent regulations tried to establish limits to the public lands privatization, in particular along the coastline of the incipient urban centers. A first step of management promoted the creation of new urban centers as part of a population policy and country modernization. Once this stage ended, regulations were exclusively corrective and reactive, in order to mend mistakes and abuses, acting in response to pressures and needs of real estate activity. The negative consequences of the first step were foreseeable, but they had not been taken into account. The law for Beaches and

52. J.R. Dadon and S.D. Matteucci, "Socioeconomic Driving Forces in the Natural, Rural and Urban Coastal Land Uses of Buenos Aires (Argentina)," in *Evaluation in Land Use and Planning*.

53. J.R. Dadon and S.D. Matteucci, "Patrones de desarrollo costero en la Provincia de Buenos Aires, Argentina," in *Crecimiento urbano y sus consecuencias sobre el entorno rural. El caso de la ecorregión pampeana*, ed. S.D. Matteucci, J. Morello, G.D. Buzai, C. Baxendale, M. Silva, N. Mendoza, W. Pengue and A. Rodríguez (Buenos Aires: Orientación, 2006), pp. 251–279.

54. *Id.*

Riverside Urbanization (BAP Law 4739/1939) banned building between the coastal avenue and the beach, if they were less than 100 meters apart. In its foundations, the BAP decree 9196/1950 pointed out the existence of two problems: coastline owners pushing forward on public beach and real estate speculators parceling out land on the dunes, where it is very difficult and costly to build houses free from sand encroachment. This decree establishes that urbanization should place a coastal avenue contiguous to the public domain as defined in the Civil Code, the prohibition of lot division on virgin dunes and the requirement to forest the areas previous to their urbanization.

A fundamental law unifying regulation on land uses was the Land Use Code, in Decree-Law 8912/1977. Only two articles specifically refer to coastal areas, but they are considered very important since they extend the coastal public domain width. Article 58 establishes that 'in the creation or enlargement of urban cores next to the Atlantic Ocean, a parallel fringe 100 m wide from the foot of dunes or cliff should be demarcated for uses complementary to those of the beach; this fringe of fixed dunes should be given to the Provincial Treasury, properly forested, converted to a park, and provided with parking lots.' According to Article 59, for urban cores limiting with permanent natural or artificial water courses, such fringe should be "of fifty (50) metres from the maximum flood in the case of water courses and of a hundred (100) m measured from the border of the water body. . ." This applies to various places, especially in densely populated areas or tourist or leisure-time sites,⁵⁵ generally appropriated before law approval.

The rapid development of tourist urbanizations during the 1970s caused the creation of new coastal counties by division of rural coastal counties into two. The new, smaller portion comprises the entire coastal dune fields (BAP Decree-Law 9024/1978). The promised promotion and development measures were never implemented and this division generated new problems. The new counties are strongly dependant on their rural neighbors for the provision of raw materials, food, and potable water, and for solid and liquid urban sewage management. Due to the landscape monotony and the lack of agricultural lands, the development of these counties and their economic success are indissolubly linked to the urbanization process, which expands local economies as population grows. At the same time, urban growth and its consequences are the only means local administrations have to keep their accounts balanced, since the property tax is the only income. The lack of economic options favors and promotes urban expansion, but the counties with long-standing urban tourist growth show chronic environmental problems, caused by high

55. R. Bertoncello, "Configuración socioespacial de los balnearios del Partido de la Costa (Provincia de Buenos Aires)," *Territorio* 5 (1993): 1-95.

population density, the advance on the shoreline, coastal erosion, the exhaustion of underground water supply, and sewage pollution.⁵⁶ As seen before, erosion is a major problem in the most developed tourist resorts as a result of dune fixation for house building, which interferes with the natural dynamic equilibrium among dune, beach and subtidal sand banks.⁵⁷

In the absence of provincial planning and urban development policy for the maritime region, organizations in charge of urban planning have employed different tools to limit urban advance and to stop erosion. One of the most important is the Water Code, under Law 12257/1998. It has a direct bearing on the coastal border, for it delegates to the municipalities the primary responsibility on the matter (Articles 161 and 162), and prohibits “the division of lands into lots and building within a 150-m wide fringe next to the Atlantic Ocean, as well as building on the dunes and dune ranges reaching the sea even when farther away.”

Even though the Land Use Code and the Water Code have been used to restrict the advance of urbanization on the coastal fringe, both have demonstrated to be insufficient to face real estate pressure. In fact, economic development and urbanization processes will not only turn pre-existent usage conflicts more serious, but add new ones as well.⁵⁸

In view of this, restrictions to new urban land use were established by the Decree 3202/2006, which was the first specific regulation for coastal land uses in the province. It proposes maximum acceptable areas for new urbanization, taking into account the total percentage of the urban land cover of the county. The urban areas should not increase significantly in urban counties, but can do so moderately in natural and rural municipalities. The decree can be a useful tool for preventing the settlement of a complete urban continuum along the Province of Buenos Aires coastline. However, its effectiveness is unclear since: 1) it is not of compulsory application, and 2) in case of application, it is expected that real estate pressures will be redirected from natural, tourist counties to rural municipalities, where only few small resorts exist at present.

56. J.R. Dadon, “El impacto del turismo sobre los recursos naturales costeros en la costa pampeana,” in *Zona Costera de la Pampa Argentina*, ed. J.R. Dadon and S.D. Matteucci (Buenos Aires: Lugar Editorial, 2002), pp. 101–121; See Barragán Muñoz, n. 1 above.

57. See Isla and Villar, n. 46 above.

58. J.R. Dadon, “Argentina, de espaldas al mar,” *Le Monde Diplomatique, Cono Sur edition* (Noviembre, 2003).

Resources and Landscape Conservation

There are 29 protected areas in 26 of the 39 coastal zone counties of the Province of Buenos Aires.⁵⁹ That is, 35 percent of the counties lack protection of natural landscapes, ecosystems, and species. The total protected area in the coastal counties is of 6,023 km², which represents 10 percent of the area occupied by the 26 counties, but only 0.07 percent the coastal zone area. Only 23 units, comprising 4631 km², protect coastal ecosystems and landscapes, in 25 counties. Of these, 14 units (135,379 ha) protect fluvial and estuarine coastal zones, while 9 units (324,483 ha) protect marine coastal landscapes, ecosystems, and species. The rest (6 units) are located in the hinterland, and protect natural grasslands, lake borders, and their aquatic species of flora and fauna.

Most of the protected areas (17 of 29) belong to category VI in the IUCN classification (managed protected areas); they are managed mainly for the sustainable use of natural ecosystems and resources. Eight of the protected areas belong to class I in the IUCN classification, that is, they are managed mainly for science or for wilderness protection. There is only one national park (Category I), and two protected landscapes (Category II); both categories include protected areas managed mainly for landscape/seascape conservation and recreation.

The situations of the fluvial and marine reserves differ in extension, nature of the surrounding land use and cover, and status. The 14 protected areas in the fluvial coastal zone at the north of the Province of Buenos Aires were established between 1958 and 2000, by municipal or provincial initiatives, with the aim of conserving relicts of landscapes and ecosystems that have been degraded by urban and industrial development; they include delta landscapes and river banks. Other objects of conservation are vegetation types, mainly riparian forests, and plant and animal species restricted to those environments. The two largest protected areas are 35,000 and 87,000 ha, and were created to conserve the Río de la Plata delta. The fluvial protected areas are under great pressure due to urban and industrial development, and most of them show a very low level of management. Most of the units created by municipal or private initiatives are small (under 1200 ha and down to 14 ha), they lack control, and only those in the proximity of urban areas that are visited on a daily basis or during weekends by urban dwellers, have management plans, and technical and financial means and research facilities. Part of their income comes from an entrance fee. Among the fluvial protected areas only a National Park stands out in the Province of Buenos Aires, which has a laboratory, a herbarium, research infrastructure,

59. Sistema Federal de Áreas Protegidas (Federal System of Protected Areas), 2007, available online: <<http://www.sib.gov.ar/sifap/default.htm>>.

management plans, educational programs, guided visits, and it interacts with the local community through various activities. In May 2008 it was designated for inclusion in the Ramsar List of Wetlands of International Importance.

The nine protected areas located in the marine fringe are distributed between the Pampas ecoregion (seven units comprising 92,575 ha), and the Patagonian coast of the Province of Buenos Aires (two units with 7,386 ha). The nine areas were established between 1984 and 2001 to conserve marine landscapes and ecosystems, such as coastal and oceanic islands/archipelagoes, lagoons, salt marshes, and dunes. Some of them include the wilderness protection of highland fauna that use the coastal zone, such as the Pampas deer (*Ozotoceros bezoarticus*), and scrublands and grasslands growing on maritime calcareous deposits around the marine wetlands. Some emphasize the conservation of migratory species sites. Most of the units are over 10,000 ha, reaching 224,000 ha. Most of the protected areas have some kind of control, and three of the largest ones have become of international interest: two units have been declared UNESCO Biosphere Reserves in 1984 and 1996, and the third a Ramsar site in 1997.

Even though the establishment of fluvial and marine protected areas is an important tool for coastal management, the municipal governments have not shown interest in including protected areas in their master plans for land and resources assignment, as shown by a low rate of creation initiatives at the municipal level; only 20 percent of the protected areas were created by municipal legislation, while 60 percent were created by the province. The private initiatives (13 percent of the protected areas) have very little support, and thus, they are difficult to maintain. The local communities do not seem to be aware of the importance of protected areas, or of the threats to native biodiversity and ecosystems posed by development.

Most of the counties with protected areas located in the maritime region (55 percent) have been classified as rural, because of the areal predominance of agricultural land uses. The rest has been classified as natural (32 percent) or as urban (14 percent). This indicates that the rural counties concentrate the largest extension of marine protected areas (401,000 ha), followed by the natural counties (100,000 ha).

In the maritime counties, one of the most urgent and extended menaces for coastal biodiversity is the inadequate long-term planning of urban development, specifically the real estate sector's claims for land especially along the seaside. With the present soft regulations and taking into account the growth rate of urban areas, it is expected that in only two decades almost all of the maritime Province of Buenos Aires coastline will become a continuous, uninterrupted urban front. The environmental consequences of this unregulated sprawl will include the loss of the renewable natural resource turnover capacity (fisheries, water supply, and sedimentary balance, etc.), the irreversible deterioration of the natural

landscape quality and its scenic attraction, and the increase of erosion, pollution, and vulnerability, all of them undesirable both aesthetically and for local and regional economies and tourism.⁶⁰ Some of these problems could be avoided through a network of protected areas, which in addition to being essential for the preservation of natural processes of beach, flora, and fauna restoration constitute a tourism attraction in themselves. Nevertheless, strategic planning of coastal counties includes few if any natural protected areas, assigning their whole territory to rural or urban uses.

In almost 2,000 km of the Buenos Aires Coastal Zone, there are only 4 protected areas lying along the coast in 350 km; that is, less than 18 percent of the total coastal length. There are long stretches without protection, and urban development, both in the fluvial and marine coasts, is threatening biodiversity at all scales. The Argentinian Wildlife Foundation has identified several places with natural psammophylous grasslands along the maritime region,⁶¹ including 213 km of vegetated dunes to the southeast (over 70,000 ha), in which there is only one protected area covering 2,000 ha of a transitional zone of sand dunes extending inland along a stream. Several bird and mammal species find habitat and reproduction sites on the coastal beaches and wetlands.⁶² A larger extension of protected areas for landscape conservation, continental and sea species of economic interest, is needed.

PRESENT AND FUTURE STATUS OF BUENOS AIRES COASTAL ZONE MANAGEMENT

Since the 1990s, there has been an increasing tendency to transfer functions from the provincial/national levels to the county level, even though sufficient financing, necessary tools, and basic technical knowledge are rarely simultaneously provided. Such a transference contributes to the wasteful dispersal of efforts. A remarkable heterogeneity in funding availability, local human capacities, and technical background is found among the counties. The national universities and institutes participate in the environmental assessments and eventually in the planning processes of the counties with higher budgets and sounder local economies, but in the smaller counties, neither the local environmental assessments nor the natural resource inventories are available. This diversity of solutions could

60. See Dadon, n. 57 above.

61. D. Bilenca and F. Miñarro, *Áreas valiosas de pastizal* (Buenos Aires: Fundación Vida Silvestre Argentina, 2004).

62. D. Boltovskoy, ed., *Atlas de sensibilidad ambiental de la costa y el Mar Argentino* (Buenos Aires: Secretaría de Ambiente y Desarrollo Sustentable, 2008) (DVD), also available online: <<http://atlas.ambiente.gov.ar>>.

contribute to the multiplication of problems rather than providing their solution.

Some examples can be mentioned in order to clarify this statement. Usually, the counties income and financing sources cannot pay the costs for important infrastructure needed for restoration plans. The sand replenishment of the most eroded beaches of Mar del Plata, as a restoration method recommended by technical analysis,⁶³ was possible only in 1999 after the Province of Buenos Aires administration provided economic support. Counties with the same degradation level but less wealthy budgets cannot afford the artificial sand replenishment costs and looked for alternative, low-cost erosion control methods. Other problems refer to the implementation of conservation initiatives, where some persistent conflicts arose among local non-governmental organizations, residents, tourism operators, and local administrations, as for example, the Faro Querandí (37°27' S and 57°06' W) conservation area protecting 5,757 ha of natural dunes landscape.

There are major differences in the socioeconomical indexes among the counties, and therefore, among the resources and environmental management. The unemployment rate of the Autonomous City is 9 percent, while in the rest of the Metropolitan Area it is 16 percent.⁶⁴ The wealthier counties invest in important private infrastructure developments that allow individuals to enjoy a pollution-free environment, while the poorer counties often put priority on short-term job generation in order to overcome the population poverty, instead of long-term wealth generation and environmental preservation.⁶⁵ The disparity of interests and the absence of provincial or regional coastal management policies prevent the achievement of common solutions and also leads to medium-term environmental deterioration.

Lacking provincial policies for marine coastal development, the municipal initiatives focus on the local, short-term expectations and so, the differences among the counties are evident. Some counties promote the rallies, caravans, and vehicle circulation on the dunes as "ecologic" or "adventure tourism," despite the fact that the neighboring counties banned those amenities because they induce beach erosion and deterioration of biota.⁶⁶ This trend to a growing management divergence creates a sort of paradox: a predominantly lineal, homogeneous coast, with very similar landscape and geomorphological characteristics, gives rise to the prolifera-

63. F.I. Isla and E.J. Schnack, "Repoblamiento artificial de playas. Sus posibilidades de aplicación en la costa marplatense," *Actas de la Asociación Argentina de Geología Aplicada a la Ingeniería* 3 (1986): 202 and 217.

64. See Pesci and Pesci, n. 23 above.

65. See Burijson, n. 33 above.

66. See Dadon et al., n. 50 above.

tion of management strategies, due to empirical, sectoral, and non-integrated administrative decisions.

The clustering of the Province of Buenos Aires counties in regions has been conducted by the provincial government since 2000, but at present they did not prove to be fully operative among the coastal counties. While in the oceanic coast exclusively provincial scope solutions can be adopted, it is necessary to count on solid trans-jurisdictional institutional arrangements for the fluvial-estuary coast. In addition to the collection of national and provincial competences, international treaties concerning the area should be considered.⁶⁷

For the management of the trans-jurisdiction resources of the Metropolitan Area, the institutional system only allows the creation of inter-jurisdiction organizations among the interested parts (nation, the Autonomous City, Province of Buenos Aires and counties). The functions of those organizations are cooperation and policy coordination. The decision-making process requires complex institutional arrangements and final agreements are difficult to reach. For example, even when the first attempts for planning the interjurisdictional issues of Buenos Aires city were carried out in 1963, only some partial goals were achieved. An important step was the creation of the Metropolitan Area through an agreement among the city of Buenos Aires, the Province of Buenos Aires and later on, the nation in 1984. The CONAMBA (Buenos Aires Metropolitan Area National Committee) was created three years later in order to develop the planning strategies for the Metropolitan Area, but it never fulfilled the projected tasks.⁶⁸ Shared measures are only adopted in the face of the most urgent and extended emergencies, such as flooding events, pollution spills, and other hazards.

Thus, conflict resolution in the Metropolitan Area results in fragmentation. A paradigmatic case for the Metropolitan Area public opinion is water and environmental quality of the Matanza-Riachuelo basin. The Matanza-Riachuelo River is the geographic limit between the Province of Buenos Aires and the Autonomous City. The Riachuelo flows in the Río de la Plata transporting industrial wastewater and urban sewage from the high basin. Numerous institutional attempts to control and reduce water pollution were unsuccessful.

At present, the *Autoridad de Cuenca Matanza Riachuelo* (Matanza Riachuelo Basin Authority) is a public inter-jurisdiction body formed by three representatives of the National Executive administration, two of the

67. G.C. de Mahieu, M.M. Lucano and S.G. Willmar, "Grado de protección de los recursos transfronterizos del Río de la Plata," in *El Río de la Plata como Territorio*, comp. J.M. Borthagaray (Buenos Aires: Ediciones Infinito, Facultad de Arquitectura, Diseño y Urbanismo and Fundación Urbanismo, 2002), pp. 481–505.

68. P. Pérez, *Buenos Aires Metropolitana* (Buenos Aires: Centro Editor de América Latina, 1994).

BAP and two of the Autonomous City (National Law 26168/2006; BAP Law 13642/2007 and Buenos Aires Autonomous City Law 2217/2006). Despite its name, the Authority is not a basin authority; its mission is to unify the regulation concerning discharges to receptor water bodies and gaseous emissions, and to plan land use assignment in the basin. It lacks executive or juridical powers. Other inter-jurisdiction organizations possess wider faculties, but their functions are not specifically related to coastal issues, that is, the Coordinación Ecológica del Área Metropolitana Sociedad del Estado (CEAMSE) for the urban solid waste disposal produced by the Metropolitan Area, and the Corporación del Mercado Central de Buenos Aires (Buenos Aires Central Market Corporation) for the commercialization of vegetables, fish, and food services.⁶⁹

As seen before in the examples, each one of the economic uses and activities has its own specific, independent, and tight compartmental management. Although many international experiences proved the integrated approach to be a valuable tool for management, up to now there are neither juridical nor legislative or administrative institutional initiatives to this effect, and no policies, plans, or integrated management programs have been applied to the Buenos Aires Coastal Zone. A few examples of sector planning can be mentioned at an advisory level in very restricted management areas of Argentina,⁷⁰ but at present no extensive national and/or provincial initiative has been discussed. It has been pointed out that national and international management programs and policies are crucial in order to promote the inter-institutional coordination among national, provincial, municipal, and private levels, the international cooperation, the scientific research and the specific technical capacity,⁷¹ but up to now, special regimes with specific regulations and administrative structures have been developed only for high national priority economic activities, such as the fishing and petrochemical sectors.

The sectoral management of resources camouflages the specific coastal issues and as a consequence, the coastal peculiarities are not taken into account, become diluted, or are underestimated, while other issues were

69. See Sabsay et al., n. 38 above.

70. A. Brandani, "The Coastal Zone of Argentina: Environments and Institutions," *Coastal Management* 15 (1987): 43–59; A. Brandani, "La Zona Costera de Argentina: Perfil Ambiental e Institucional," in *El Manejo de Ambientes y Recursos Costeros en América Latina y el Caribe*, vol. 1 (Washington, D.C.: OAS 3, 1990), pp. 37–53.

71. See Barragán Muñoz, n. 1 above; J.R. Dadon, "Objetivos y Acciones Compartidas para la Integración Regional de los Espacios Costeros Sudamericanos," in *Encuentro Regional Cooperación en el Espacio Costero*, ed. A. Dans and E. Salas (Montevideo: ECOPLATA-UNMP-GAPAS-FREPLATA-PROBIDES, 2005), pp. 125–129.

relegated to non-coastal categories, for example, even the present complex interactions between the port and the rest of city.

Furthermore, some issues that should be considered in an integrated management approach such as sustainable natural resource exploitation, natural, cultural, and historical heritage preservation and the improvement of scenic quality of coastal areas, in order to promote their valuation and to minimize the environmental costs,⁷² are neither in the political agenda of the Province of Buenos Aires nor that of the counties.

Some initiatives can be mentioned as interesting steps toward a new model of coastal management for the Buenos Aires Coastal Zone. In the scientific and academic arena, several papers, meetings, and workshops promoted the discussion and analysis of the integrated management of the Buenos Aires Coastal Zone. As relevant background, the papers by Álvarez and Álvarez,⁷³ Brandani,⁷⁴ Dadon and Matteucci,⁷⁵ Barragán et al.,⁷⁶ the “First Workshop for Coastal Zone Management” (Mar de Ajó, Province of Buenos Aires 2000),⁷⁷ “Strategies for the Development of the Argentine Maritime Interests” (Buenos Aires Autonomous City, 2000),⁷⁸ “Sea Argentine Interests” (Buenos Aires Autonomous City, 2005),⁷⁹ and the participative fora organized by the Fundación Ciudad (Buenos Aires Autonomous City, 1995–2001),⁸⁰ should be mentioned.

Among the projects, the most challenging one was the FREPLATA,⁸¹ an international initiative of Argentina and Uruguay, coordinated by the Río de la Plata Management Commission and the Maritime Front Technical Commission. Its activities were related to coastal matters, with the aim of water pollution prevention and control, and aquatic habitat restoration. The

72. Anon., *Agenda 21, Chapter 17* (Johannesburg: United Nations World Summit on Sustainable Development, 2002).

73. J.A. Álvarez and S.M. Álvarez, *Conceptos básicos sobre manejo costero* (Buenos Aires: Instituto de Publicaciones Navales, 1984).

74. See Brandani, n. 71 above.

75. J.R. Dadon and S.D. Matteucci, ed., *Zona Costera de la Pampa Argentina* (Buenos Aires: Lugar Editorial, 2002).

76. See Barragán Muñoz, n. 1 above.

77. See Dadon and Matteucci, n. 76 above.

78. Workshop dissertations, *Estrategias para el desarrollo de los intereses marítimos argentinos* (VIII Jornadas de Defensa, Universidad de Buenos Aires and Instituto Universitario Naval, Buenos Aires: October 10, 17, 19 and 24, 2000), shorthand transcription, p. 54.

79. Conference *Intereses argentinos en el mar* (Ciclo Almirante Storni 2005, Centro de Estudios Estratégicos de la Armada and Liga Naval Argentina, Buenos Aires: May–November, 2005).

80. See Anon, n. 35 above.

81. *Project for the Environmental Protection of the Río de la Plata and its front: Pollution prevention and control and habitat restoration*. PNUD/GEF, RLA/99/G31.

FREPLATA carried out an exhaustive environmental diagnostic analysis⁸² to identify the main environmental hazards and it defined a Strategic Action Program together with some activities to promote its implementation. Among those activities it can be mentioned the First Workshop for Integrated Coastal Management “Towards a PBA Coastal Plan” (San Clemente del Tuyú, Province of Buenos Aires, 2004), with the assistance of the provincial governor, the mayors of 23 counties, and national Executive, Legislative, Navy, and Prefecture authorities, etc.⁸³

According to the conclusions of the above-mentioned papers, workshops, and conferences, the main problems of the Buenos Aires Coastal Zone are coastline retrogradation, deforestation of the deltaic islands, water pollution, deterioration of biotic resources, urban waste disposal, beach erosion, public domain privatization, unplanned urban sprawl, and a lack of consciousness about coastal social, environmental, and economic importance.

Among them, the most relevant coastal problems (and frequently, the only ones) usually considered are shoreline erosion (for example, in Mar del Plata, Miramar, Villa Gesell, Mar del Tuyú, San Bernardo del Mar, Las Toninas, and other localities) and the hazards on the urban fronts (mostly flooding, in the counties of the Metropolitan Area). Most of the actions promoted as specific initiatives for the Buenos Aires Coastal Zone were those that intended to restore beach quality, to protect the cliffs and to prevent recurrent flooding events. As a consequence, up to now, coastal management consisted of some restoration initiatives intended to regenerate the geomorphologic processes that affect the coastline, instead of planning and managing the human interventions in the coastal system. To complete the whole setting, sector-specific, non-integrated policies for marine resources should be mentioned.

In the light of the present status of the Buenos Aires Coastal Zone, some recommendations can be formulated in order to discuss future efforts for a coastal management plan. We believe that the proposal of management plans with solid technical support is an essential but not sufficient condition, even if they are based on complete coastal system diagnoses. Such planning processes are frequently useless without a wide political and social consensus and they easily turn into academic exercises without further application. The preceding failed planning processes for the strategic development of the Buenos Aires Metropolitan Area (see above) can serve as relevant but not unique examples.

Taking this into account, we consider that some general recommendations defining outlines to follow and calling for action are preferable. These

82. See Anon, n. 51 above.

83. See Lara, n. 18 above.

suggestions are recommendations to be pondered for application to a broad spectrum of social, economic, and political situations that can derive from the present status, as follows:

- 1) Specific provincial policies for coastal issues are needed to facilitate sustainable management of coastal resources.
- 2) The local diagnoses and inventory of resources should be completed in every coastal county in order to establish regional baselines and goals for their integrated coastal management plans.
- 3) The provincial government should promote and facilitate technical support to the counties provided by universities and research institutes.
- 4) Serious efforts are needed to achieve regional integration, at least, within fluvial and marine regions.
- 5) Efficient coordination among the three administrative levels (county, province and nation), the Buenos Aires Autonomous City administration and the representatives of the different sectoral interests should be accomplished.
- 6) Specific provincial policies are also needed for specific issues such as landscape and resource conservation, urban planning, and tourism development.

At the same time, it is necessary to develop a more accurate juridical and normative definition of the coastal zone, acknowledging its particular features and defining specific tools for the protection of resource sustainability.

Until now, coastal management has centered on sectoral aspects due to the relevance of uses and activities related to ports, industries and urban areas in the fluvial zone, and ports, fisheries, and tourism in the maritime zone. Due to the promotion of productive goals and the attraction of financial investment, the repeatedly noted problems result as a direct consequence of sectoral, non-integrated management policies. A change from a geomorphological conception of the coastline as a geophysical system managed under sectoral mandates to a more integrated conception of the whole coastal zone, including both its socioeconomic and ecological support, is necessary.

However, beyond an inevitable enthusiastic willingness that can trigger critical political decisions to follow an integrated management planning process, some warnings should be made. The integrated model may look attractive as a final objective, but the course to accomplish it may be tortuous in developing countries. The country economy seems to follow cyclic patterns of rises and falls (see above) and the institutional system has suffered several breakdowns during the last 70 years. The recovery of several economic activities in the Buenos Aires Coastal Zone after the 2001 crisis

was very dynamic, and it cannot easily be rejected that such an adaptative and opportunistic response might have been facilitated by the present sectoral management system. Among the alternatives for the Buenos Aires Coastal Zone, it should be seriously considered that, instead of transplanting a foreign management program (even if it proved to be successful in another country), a controlled shift from the present sectoral coastal management towards a gradual integration among administrative levels and economic sectors, with a growing social consensus, would probably turn out to be a more viable option.