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The Brazilian National Plan for Coastal Management (PNGC)

JUAN M. BARRAGÁN MUÑOZ

Ordenación del Espacio Litoral
Facultad de Ciencias del Mar
Universidad de Cádiz
Cádiz, España

The article is divided into three clearly defined sections. The first outlines the Brazilian National Coastal Zone Management Plan. The second offers a critical assessment of its introduction. To conclude, some general considerations are made. In this way, the author aims to achieve two objectives: to disseminate the aforementioned plan and offer a critical opinion of it.

Keywords Brazil, coast, Latin America, management, planning

Introduction

This document has two main aims: first, to contribute to the diffusion of one of the most interesting experiences in shoreline management being developed at present: the *Plano Nacional do Gerenciamento Costeiro* in Brazil, known by the acronym PNGC[1]; second, to outline our opinion of a process that due to its environmental importance, is challenging and difficult. The value of this piece of work therefore lies in both its synthetic capacity and its potential critical analysis.

The PNGC has been developed in a rather varied context. Yañez-Arancibia (1999) defined Latin America as a "mosaic" of experiences, ecosystems, cultural roots, etc. In spite of these obvious differences, a review of the initiatives or programs for coastal management (Barragán, 2000) reveals a certain homogeneity in terms of (a) relative backwardness as regards other geographical areas of the world; (b) great external influence (in the design of the programs, in their implementation, in their financing, etc.)[2]; (c) the existence of at least three different levels of development of coastal management within the Latin American region; and especially (d) the lack of a specifically Latin American model of coastal management.

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Address correspondence to Juan M. Barragán Muñoz, Ordenación del Espacio Litoral, Facultad de Ciencias del Mar, Universidad de Cádiz, España, Apdo. 40, Puerto Real, Cádiz, España. E-mail: juan.barragan@uca.es.

In general terms, it can be said that coastal zones play a very important role in the majority of the Latin American countries. There are several reasons for this: (a) a considerable proportion of the population of some countries (over 50% in some cases) live in coastal zones; (b) many of the large metropolises and capital cities are situated on the coast or less than 100 km away (Buenos Aires, Montevideo, La Habana, Sao Paulo, Rio de Janeiro, Lima, Caracas, etc.); (c) most of them are nationally important ports or have ports associated to them (Sao Paulo-Santos, Lima-Callao, Caracas-La Guaiza, Santiago de Chile-Valparaiso, and so on); (d) a large part of the industrial production and the trade of valuable products is usually to be found in these metropolises and ports; (e) the coastal zones are the main tourist destinations of these countries (The Dominican Republic, Coasta Rica, Brazil, etc.).

All the above leads us to believe that the pressure on coastal resources, which is already significant, will increase in the future. Any initiative that can contribute to a more rational use of coastal resources should therefore be very welcome and given full support.

Using data presented by Gubbay (1996), the situation in Latin America can be summarized as follows: of the 26 Caribbean countries, at least 8 have Coastal Management Plans or Programs (CMPs); of the 7 Central American countries, 4 have developed this type of instrument, and of the 11 coastal states of South America, only 5 have a CMP.

As far as quality is concerned, we can make the following observations, based on information provided by some of these countries:

1. In the Caribbean islands, many of the projects are centered on two areas of great interest: the vulnerability of the coasts with regard to natural risks and the impact of tourism. Cuba is a good example of this situation (Pérez, 1993).[3]
2. In Central America, Costa Rica is one of the countries that has been working for the longest period of time on a specific *Programa de Gestión Costera* (Sorensen, 1990). Recently, Belize presented a complete report on its new Project for *Gestión de Zonas Costeras* (UNDP, 1996; Price, Heinanen, Gibson, & Young, 1992). Also in Nicaragua the first stages of the *Programa sobre Manejo Integral de Zonas Costeras* (MARENA, 1996) are being developed with the help of Danish and Dutch experts. The basic subject area being dealt with is different in each case. In Belize, it is related to the various habitats, natural resources, and threatened species, while in Nicaragua, the problems arise from the loss of common ownership of land.
3. In South America the situation is also fairly variable. In Argentina (Barragán, 1996) and Peru, for example, institutional initiatives for the integrated management of coastal zones are negligible. In the case of Argentina, we have only found one interesting initiative at the national level. It is a bill for the implementation of a "National Program of Coastal Management." The idea has been led by Senator Cafiero, President of the Senate Commission of Ecology and Human Development. The first draft of the bill was presented in June 1997, but it was not published in the "Diary of Incoming Matters" of the National Senate until March 1999 and did not prosper.

This bill not only established the basis for creating a National Program of Coastal Management but also created an interesting legal mechanism: the "Critical or Vulnerable Coastal Area" (Chapter III). Today the bill still has an uncertain future due to the change of government in November 1999. One of the more outstanding regional initiatives is the "Program for the Management of Patagonia," an initiative that was carried out between 1996 and 1999.

In Ecuador (CRC-URI, 1995; Maldonado & Arriaga, 1993) and Brazil, specific programs for the management of coastal areas have been running for more than a decade. In Chile and Colombia, coastal management programs are more recent.

In the case of Chile, the groundwork for a national coastal management program was established in Supreme Decree 475 for the design of the future *National Policy for*

the Use of the Coastline of the Republic and Creation of a National Commission (Ministerio de Defensa Nacional, 1995). There are also regional programs such as that of Biobio in central Chile which could enrich experiences at the national level (Gallardo, Parra, & Cid, 1993).

Some of the most interesting achievements of the Chilean program up to 1999 are (a) creation of the Regional Commissions of the Coastal Border to control land use; (b) establishment of an official census of "Small Bays of Traditional Fishing"[4]; (c) modification of the regulation governing maritime concessions, and (d) introduction of decrees affecting the construction of coastal routes and guidelines for coastal urban development and land use.

In Venezuela and Uruguay, there are no specific integrated coastal zone management (ICZM) programs to date. In the case of Venezuela, an attempt has been made, at least in the areas that are most affected by tourism (Isle Margarita, for example), to implement integrated management through the Regional Planning Acts (MARNR, 1994a, 1994b). Finally, in Uruguay, increasing interest is being shown in the specific management of coastal areas through environmental management.

One of the most recent advances in Latin American CZM can be found in Colombia. In December 2000, the National Environment Council, which depends on the Presidency of the Republic, passed the National Policy for Coastal Zones. In addition, a "Wetlands and Coastal Zone" office has been set up within the Ministry of the Environment. The Marine Research Institute (INVEMAR) has prepared a guide called *Integrated Management of Coastal Zones: Concept and Methodological Guide* (INVEMAR, 1999) to help the specialists responsible for coastal zone management in Colombia.

Sources of Information and Basic Characteristics of the Brazilian Coastal Zone

Various sources were used to review coastal management in Brazil:

1. A bibliography, compiled particularly using a series of studies published by the Ministry of the Environment about the GERCO; the studies are quoted on the following pages.
2. Fieldwork in several coastal states as well as interviews with experts and political representatives of the environmental bodies in Sâo Paulo, Rio de Janeiro, Alagoas, Paraíba, Ceará, Río Grande do Norte, and Santa Catarina.[5]
3. Participation in the Seventh National Conference on Coastal Management (ENCOGERCO) held in Natal in 1996, in which all the states involved presented and evaluated the work undertaken in their respective states.

The information obtained from these sources was used as the basis of this piece of work. The significance of the Brazilian initiative was one of the main factors to evaluate. We consider it vital for three reasons: territory, population, and environment. The first is endorsed by the size of the Brazilian coastline[6]: over 8,700 km in length[7] with 426 municipalities classed as coastal, which adds up to a total surface area of almost 420,000 km^2. Second, the population inhabiting the coastal strip as defined by the abovementioned municipalities amounts to nearly 38 million people and is characterized by a very dynamic natural growth rate.

Third, it should be pointed out that the Natural Protected Areas (NPAs) considered to be coastal exceed 18 million hectares (Table 1). These figures give some idea of the importance of the Brazilian coastal zone, in environmental terms, for Brazil and for the rest of the world. This is particularly true if we take into account the fact that all the ecosystems found in tropical and warm climates are found here, due to the fact that the coast runs between 4° latitude north and 33° latitude south.

Table 1
Characteristics of the coastal area of Brazil

State	Litoral length (km)	Coastal municipalities	Area (km^2)	Coastal population	Density (inhabitants/ km^2)	NPA (has)
Amapá	698	9	69,843	284,000	4	2,483,000
Pará	1,200	36	82,596	2,539,000	31	5,059,000
Maranhâo	640	32	59,066	1,540,000	38	428,000
Piauí	66	6	4,634	193,000	42	270,000
Ceará	573	29	28,173	3,046,000	108	21,000
R.G. Norte	410	29	11,888	1,284,000	108	41,000
Paraiba	137	12	2,640	3,201,000	300	54,000
Pernamb.	187	19	4,410	3,117,000	707	49,000
Alagoas	228	23	2,279	1,061,000	105	37,000
Sergipe	168	20	4,793	735,000	153	272,000
Bahia	1,181	55	41,409	3,919,000	95	457,000
E. Santo	411	18	10,547	1,531,000	145	152,000
R. Janeiro	850	27	18,292	10,713,000	586	478,000
Sâo Paulo	700	34	20,891	1,647,000	79	3,624,000
Paraná	98	6	5,594	175,000	31	629,000
S. Catarina	561	34	9,250	1,545,000	167	186,000
R.G. Do Sul	620	37	42,650	1,111,000	26	4,163,000
Brazil	8,728	426	418,955	37,641,000	89,9	18,403,000

Source: MMA, 1996.

The Need for a New Management Model for the Brazilian Coastal Zone

Various sectorial reports point out the urgent need for organized and coordinated intervention on the Brazilian coast. The effects of urban migration, which has been spontaneous and extremely rapid in most cases (Moraes, 1995a), the impact of federal transport policies (Messias da Costa, 1995) and industrial growth (Gonçalvez Egler, 1995), and the consequences of tourist policies (Becker, 1995) all call for a new model for the planning and management of the coastal area.

This model should curb certain phenomena which have been described, quite rightly, as "self-devouring" (Madruga, 1992). This refers to the huge attraction that the Brazilian coastline holds for many activities, especially those related to nonintegrated urban initiatives such as tourism, second residences, industry, etc., which make a sustainable and balanced use of coastal resources unfeasible.

The main objective of the PNGC, as established in section 4, is "to lay the foundations for the establishment of state and municipal policies, plans and programs for coastal management" and, in a general way, in section 4.1, "to plan and manage the socioeconomic activities on the coast in an integrated, decentralized and participative manner, in order to guarantee the use, control, conservation, protection, preservation and recuperation of natural resources and coastal ecosystems."

The specific aims can be interpreted as providing technical guidelines for the implementation of the plan, but at the same time they represent the theoretical structure of a specific policy for a particular area. As worded in the plan, "to obtain an precise idea of the potential and vulnerability of the coastal zone; to ensure the use of the coast's

natural resources, bearing in mind their continued existence; to make any form of human activity compatible with the dynamics of the coastal systems, in order to achieve ecologically sustainable economic and social development and an increase in standards of living; to take steps towards the preservation, conservation and rehabilitation of coastal ecosystems; to carry out an effective control of the causes of any type of pollution and/or environmental degradation which has, or may have, an effect on the coastal zone."

The origins and development of the PNGC have been discussed in various technical studies. In short, it can be said that to date substantial changes have been made have modified the philosophical conception of the program. This is particularly true as far as methodology is concerned.

In the preface of the Plan, Moraes (1995b) emphasizes the creation of the *Interministerial Commission for Marine Resources (C.I.R.M.)* in the mid-1970s. There was notable concern for marine resources at the institutional level, brought about by the creation of a strategic policy under the protection of international negotiations to determine the new jurisdiction of the 200-mile exclusive economic zone. The shoreline was simply another part, albeit an important one, of an area of notable strategic value.

As a result, it is not surprising that geopolitics and development policies stigmatized the beginnings of the new model for coastal management. Subsequently, the Sectorial Plans for Marine Resources remained valid[8] but separate from the development of the GERCO. Well into the 1980s, the GERCO itself was refocused toward environmental management, and its design was outlined in university departments, as the government and the Navy handed over these functions to academics. There was an obvious structural change in institutional policy toward the coastal zone.

The proposed methodology reflects the environmental awareness that existed at the time and is inadequate in some aspects (Moraes, 1995c). Its aims are only partially defined, it has an excessively conservationist slant, the technical aspects of the methodology are treated more thoroughly than the philosophical ones, its analytical scales are too rigid, the purpose of the mapping process as a means to an end has been lost from sight, thematic information is too sectorialized and its integration is insufficient, and there is no dynamic treatment of the phenomena.

It is very likely that the aforementioned problems arose from the results of the experiences in the six states that implemented the program (1987–1990) with international financial support (the World Bank). These were Rio Grande do Norte, Bahia, Rio de Janeiro, Sâo Paulo, Santa Catarina, and Rio Grande do Sul. Thus, the basis was established for the search for an alternative planning and management model for the Brazilian coast.

This part of the process can be summed up as follows: an initial phase, decisive but with some methodological shortcomings, was followed by a second phase which aimed to solve these problems as well as establish the PNGC in Brazilian institutions and society in a much more practical way.

Legal Framework, Institutional and Administrative Organization

One of the main landmarks in Brazilian environmental policy took place in 1988, when the new constitution (art. 225.4) reinforced and gave legal and institutional weight to this incipient initiative whose objective was to design a new model of coastal management. There are three main reasons to justify this statement, in our opinion. The first is related to the specific inclusion of the coastal zone[9] in the National Heritage. This can only be interpreted as a true institutional declaration of intent.

Second, it extends the Union Lands (Federal Maritime Terrestrial Zone) that figured in the 1967 constitution to incorporate the latest changes in international maritime law:

islands, territorial seas, coastal beaches, natural resources of the continental shelf and the exclusive economic zone, and coastal lands[10] (art. 20).

The third reason is that it responds to environmental protectionist concerns for the coastal zone in a more comprehensive way than previous constitutions. From then on, "it will be used, in accordance with the law, in a way that ensures the preservation of the environment, including the use of natural resources."[11]

These three reasons together constitute a new framework for coastal management. This is in spite of certain difficulties that arise from, on the one hand, the lack of precision as regards the limits of some of these areas,[12] and on the other hand, from the difficulties inherent in the management of an area that is under such great pressure from human activity.

At about the same time as the constitution was passed, the PNGC[13] as established by law 7.661/88. Leme Machado (1995) stated that this was the second time the project had reached the National Congress. Four years earlier the new Government of the Republic withdrew the initial bill. Its brief text (13 articles) set out, in perhaps a very generic and occasionally even vague way, the basic objectives and the explicit acknowledgment that the three administrative levels (Federal Union, states, and municipalities) must participate in its implementation. It should also be pointed out that the preparation of the corresponding state and municipal plans for coastal management (art. 5. 1) are one of the main objectives.

Theoretically, by the end of the 1990s most of the state plans were to have been established. In reality, there are great differences between states. While in some, such as Sao Paulo, Santa Catarina, and Rio de Janeiro, state laws for coastal management have been, or are about to be, passed by their own parliaments, in others, mostly in the northeast, progress has been more limited. At the local level, little progress has been made: the vast majority of coastal municipalities still do not have local plans for coastal management. Finally, as far as the PNGC is concerned, the special interest shown toward beaches as "public property for common use by the people" (art. 10) is worth mentioning.

We agree with Carvalho and Rizzo (1994) and Leme Machado (1995) that one of the most noteworthy aspects, which could indicate serious shortcomings in the design of the national coastal policy, is that the aforementioned law has still not been regulated. This situation is not unknown in Spain: the 1969 Shores Act was not regulated for more than 10 years. This fact was justifiably criticized (Barragán Muñoz, 1997b) as it was seen to indicate lack of real interest or capacity of a political-administrative system toward a public responsibility.

The greatest legislative development of the PNGC has been brought about by the Coastal Management Coordination Group[14] (COGERCO). In July 1990, a document was drawn up in which certain practical aspects were specified. These included the limits of the coastal zone, management guidelines and tools, jurisdictional division, and sources of finance. Although this document is also somewhat generic, it undoubtedly represents a considerable step forward in providing an administrative framework for the PNGC.

It would, however, be a mistake to believe that it is only the parliament or federal government that is responsible for the creation of a legal framework for coastal planning and management, either in an integrated way or through specific measures for environmental protection. The states also participate actively, particularly as far as environmental protection is concerned. Thus, some ecosystems are considered *areas of permanent conservation* in the state constitutions of 1989 (Leme Machado, 1995): mangrove swamps (Espírito Santo, Maranhâo, Paraiba, Piauí, Rio de Janeiro, Sergipe), dunes (Bahia, Espírito Santo, Maranhâo, Paraiba, Rio de Janeiro, Sergipe), estuaries (Bahia, Paraiba, Rio de Janeiro, Sâo Paulo), sandbars (Bahia, Espírito Santo, Paraiba, Rio de Janeiro), reefs (Bahia, Paraiba, Maranhâo[15]), and beaches (Paraiba, Rio de Janeiro).

In these state constitutions the treatment given to the coastal zone varies from simple administrative authorization prior to any type of use, to the promotion of its management for a specific use. The latter, unfortunately, is very rare in the state of Río Grande do Sul. Legal requirements for the control of urban development in coastal areas were only found in the state of Paraíba. The possibilities of the Local Planning Laws are similar to the relation established by the Shores Act 22/88 in Spain, as regards the way that programmed and nonprogrammed building land is dealt with, although in the case of Paraiba it is less restrictive.

The situation described above has resulted in, on the one hand, a legal structure that assigns various degrees of environmental protection to the different coastal ecosystems. Priority among them is not established by the hierarchy of territorial administrative levels but according to the level of restrictions imposed.[16] On the other hand, the outline can be seen of an ambitious program for shoreline regulation that goes beyond the simple aim of environmental protection and includes in the planning process concepts such as administrative decentralization, social participation, sustainable growth, and an integrated program.

The importance of institutional and administrative organization in an initiative of this nature is obvious. At present, the Ministry for the Environment, Water Resources and the Legal Amazon is responsible for the coordination of the PNGC. In other words, the federal administration is the first to act. Then, the various states take a leading role in overseeing the implementation of the measures and transfer the general results to the municipalities.

The institutional division of the tasks and responsibilities of the PNGC is as follows:

1. The federal administration must, on a national scale, draw up the basic methodological framework and promote, organize, and coordinate projects, which it must then supervise and evaluate. It should also oversee the level of progress in the different states, the training of technical teams, the regular allocation of funds, etc. In theory, the functions that have been described are all directed toward the development of a specific government policy for the coastal zone.
2. Within the wide context of its environmental and territorial competence, each state takes responsibility for carrying out the tasks assigned to it by the PNGC by means of the corresponding tools, which are described below. Thus, the state Departments of the Environment have a unique model for the management of their coastal zones incorporated into their organic and functional structure. It is a case of adapting, assuming and taking responsibility for the political initiative of the union on this intermediate administrative level.
3. The municipalities, with far fewer technical and material resources, should, theoretically at least, incorporate the principles and proposals set out in the state program into their local management. The municipal management plans should reflect the results obtained in the PNGC.

Demarcation, Methods, and Tools

One of the first aspects of interest was to set the limits of the coastal zone in which it was necessary to act. In the absence of any more consistent technical criteria, the PNGC suggested various possibilities to guide each state: on land, the use of topographic criteria was recommended (mountain peak system), and for extensive coastal plains, the influence of the sea (tides or salinity of estuaries). In the maritime zone, the main criteria depend on natural phenomena that can shape the morphology of the coast (waves, tides, or currents that can affect sedimentation or shoreline erosion).

In addition, for both the land and sea zone, the intensity of human activities was another criterion that had to be considered in the demarcation process. In view of the lack of studies to provide this information, the aforementioned zones were established parallel to the shoreline at a distance of 20 kilometers and 6 nautical miles, respectively.

Once the demarcation of the area had been assigned, the mechanisms and tools that would facilitate the design and enforcement of the PNGC had to be prepared. Initially, it was thought that this could be done by means of a series of tools of a legal nature (regulations, legal requirements, etc.) and of a financial nature (investments, taxes, etc.). Later, without discarding the above, the PNGC also established a methodological framework that involved the use of the following four basic tools:

1. *Coastal Macrozoning*: The mapping of large areas that make up a dynamic socioenvironmental unit, along with proposals for the use and occupation of land and the use of water.
2. *Coastal Management Computer System (SIGERCO)*: A database created using information gathered during the proceeding and following processes.[17]
3. *Monitoring System*: The continual updating of the initial phase and control of the enforcement of regulations and environmental criteria. This involves monitoring and following upon the proposals made for each environmental unit.
4. *Management Plans*: Prepared using the results of the above-mentioned tools, they are aimed at specific coastal management projects. All administrative levels and civil organizations, such as (NGOs), participate in them.

Regarding the first tool, reference was made earlier to a series of shortcomings in the initial method of the so-called "coastal macrozoning." These were corrected at the beginning of the current decade (Moraes, 1995b) and new guidelines were established aimed at flexibility and adaptation to the natural and social realities of each state, both in terms of the scale of work and the central subjects[18] to be dealt with.

The methodology that was finally proposed in the revised document (1992–1993) for this first tool was, according to Gravina Ogata (1995), the following:

1. Definition of the physical and socioeconomic variables about which information must be gathered.
2. Preparation of partial summaries through the diagnoses of the physical and socioeconomic media.
3. Preparation of the final or "socio-environmental" diagnosis.
4. Definition of homogeneous environmental units.
5. Scenario composition.
6. Proposal for territorial/environmental planning (planned use).

As regards the second tool, SIGERCO, its work has intensified since 1994 following an initial phase of stagnation. In fact, the lack of a general model which could be used by COGERCO and by the different coastal states explains the belated development by the state government of the corresponding databank (Delphi for Access). All the available information on the other three management tools (macrozoning, monitoring, and management plans) is stored in this databank.

The states were even further behind in this respect. It was not until 1996 that the National Environment Program was able to finance the implementation of the system with the backing of a private company. Seven states (Bahia, Espírito Santo, Maranhâo, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, and Sâo Paulo) have developed a computer system (Delphi for the Oracle databases). COGERCO envisages the Arc-View 3.0 Geographic Information System by ESRI. The next phase will ensure the implementation of SIGERCO in the remaining states. Various objectives have been set, including connection to the internet and preparation of a manual on access to SIGERCO (Calixto, 1997).

A monitoring program is being prepared for the third tool.[19] A brief summary of the outline is as follows, according to Agra and Viegas (1995):

- subprogram of environmental heritage,
- subprogram of projects involving major environmental impact,
- managerial-institutional subprogram.

An implementation plan has been assigned to each one, to monitor those environmental management resources, activities, or tools that could be involved in the development of the three subprograms mentioned above.

Finally, the fourth tool, the management plans, are undertaken by means of action plans, which have specific aims related to

1. control of activities involving major environmental impact,
2. recovery and conservation of areas and species,
3. promotion of sustainable activities,
4. the use of appropriate technology,
5. public participation.

In addition, the PNGC has other ways to apply this fourth tool, initially at least. Development plans for units of conservation, environmental education, scientific development, ecotourism, recovery of degraded zones, investment for the treatment of liquid and solid waste, and management of small hydrographic basins are specifically mentioned.

Finally, another interesting aspect should be mentioned. The National Conference on Coastal Management (ENCOGERCO), which is held every two years, is the forum in which the work carried out in each state and by the National Coordination Group is presented and debated. Structural aspects of the program are also discussed, as are plans of action for the future. These meetings are attended by the National Coordination Group of the GERCO (Ministry of the Environment), representatives of other federal ministries (belonging to different sectors and activities such as the Navy, transport, or tourism), and representatives from all the coastal states in Brazil. NGOs, ecologists, employers, and international experts, among others, are also invited to attend the conference and participate in the debates.

The Fifth ENCOGERCO (held in Florianópolis in 1992) focused on methodological problems of zonification, the Sixth ENCOGERCO (in Vitória, 1994) dealt with the impact of sectorial federal policies, while the Seventh ENCOGERCO (in Nata, 1996) looked into the need for interinstitutional and intersectorial coordination.[20]

Main Problems in the Implementation Process of the PNGC

Our review of the PNGC is based on consultation of sources in the bibliography and technical visits made to various coastal zones, environmental agencies, and universities.[21] The sample chosen (six coastal states out of a total of seventeen) includes both large and relatively industrialized southern states (São Paulo, Rio de Janeiro, Santa Catarina) and small, less-developed northeastern states (Paraiba, Ceará, Alagoas).

Our purpose was to make a modest contribution to one of the most important tasks, or necessities, of any coastal management program: the assessment which provides feedback that can be used in the later stages of the program (Barragán, 1997a). The intrinsic characteristics of modern and relatively new tools for coastal management require that they be constantly redesigned and adapted. We would like to repeat here that our analysis and evaluation refer to the implementation of the GERCO as a process of planning and management, rather than to the practical results obtained.

Although we dwell on the most problematic aspects, the general impression is very positive. This initiative, as a political decision and project directed toward action, is of great importance. It should not be forgotten that it makes a considerable contribution to the design of the administrative apparatus to manage coastal areas in the future.

First, we shall look at the conclusions reached after our visits to the institutions responsible for the program and the interviews with the officials in charge of program

implementation in each state. In all five cases we were able to see in detail the work that had been carried out. Table 2 presents a summary of our assessment.

Table 3 shows the main problems of the implementation process of the GERCO in the opinion of the officials responsible for the state programs.[22] While they do not coincide entirely, some aspects are common to both assessments. Brief comment will be made on each.

Methodology Used

We observed great differences in the methodology used in the various states. Even if we accept the suggestion of Moraes (1993) that the method should be adapted to fit the real needs of each state, there is no doubt that the use of excessively disparate criteria (salinity of estuary waters, hydrographic basins, municipal administrative limits, topography, etc.) can lead to processes of territorial delimitation with extremely unequal results. Another perhaps more striking point is that the marine area of the coastal zone is seldom taken into account.

Information Available

We have observed serious deficiencies in basic information about certain natural resources and phenomena related to the occupation or exploitation by man. While this was mostly true in the maritime strip, it was also the case inland and in intertidal areas. These deficiencies are more frequently found in the less developed northeastern states.

Financial Resources

The shortcomings noted include the fact that continued allocation of funds is not guaranteed, the amounts granted are insufficient for the established needs (computer equipment, cartography, aerial photography, satellite images, etc.), and payments are not received on a regular basis. The lack of equality between states once again characterizes the situation, regarding both absolute amounts (Table 4) and figures calculated according to coastal municipalities or number of hectares of Natural Protected Areas (Table 5). These financial problems explain to a large extent the different rates of progress in each state. It is not by chance that the states that are most dependent on federal funds to cover the costs of their state coastal management programs are precisely those that are the least dynamic and the most behind in their implementation of the GERCO. They also tend to be the poorest and least developed northeastern states.

Technical Standardization

While some states (Santa Catarina, Sâo Paulo, Rio de Janeiro) have powerful technical means (geographic information systems, or GIS) for mapping, others (Paraiba, Alagoas, Ceará) use more rudimentary methods or are still learning to use such tools. It was even noted that different GIS were used in some states. The system patented in Brazil by the national aerospacial agency is used by some, while others process information with vectorial programs (ARC-VIEW) and some even work with raster-type software (SPANS or IDRISI). Although the National Coordination Group is making an effort to solve this problem, it is no easy task due to the high cost of the equipment and the training needed to handle it.

Table 2
Problems of the GERCO detected during visits to some states

Problem	Methodology	Information	Specialist work groups	Resources	Political support	Administrative coordination	Sectorial integration	Legal updating
São Paulo			X	X	X			X
Paraíba	X	X	X	X		X	X	
Ceará			X	X		X		
Alagoas	X	X	X	X		X	X	
R. Janeiro				X	X	X		X
Sta. Catarina			X	X		X	X	

Source: Author's own data.

Table 3
Main problems of the GERCO detected by the National Coordination Group

Problem	Information	Specialist work groups	Resources	Political support	Administrative coordination	Sectorial integration	Legal updating
Amapá				X		X	
Maranhâo	X	X	X		X		
R.G. Norte			X	X	X		
Paraíba	X		X				
E. Santo		X	X	X	X		X
R. Janeiro			X		X		
Sâo Paulo			X	X	X	X	X
R.G. Sul		X	X	X	X		X

Source: MMA, 1996.

Table 4
Basic resources for coastal management in Brazil

	Human resources in 1994 (no. of people)	Financial resources of the Environment Agency in 1995 (in reales*)
Amapá	8	1,757,000
Pará	N/A	5,181,000
Maranhâo	18	3,960,000
Piauí	N/A	4,295,000
Ceará	5	9,733,000
R.G. Norte	12	N/A
Paraíba	6	1,281,000
Pernamb.	4	10,010,000
Alagoas	2	1,005,000
Sergipe	N/A	N/A
Bahia	15	13,144,000
E. Santo	15	N/A
R. Janeiro	17	15,875,000
Sâo Paulo	20	37,619,000 (1994)
Paraná	N/A	39,927,000
S. Catarina	4	6,744,000
R.G. Do Sul	7	12,050,000
Brazil	133	162,581,000

*In 1996 one real was approximately equivalent to one U.S. dollar.
Source: Perfil dos Estados Litoráneos do Brasil, 1994 and 1996.

Need for Specialists

This is an extremely important point, as is shown by the fact that the United Nations Development Program has a specific program for this, the "Plan of Action for the Development of Human Resources for the planning and management of marine and coastal areas. 1993–1997" (1993). By human resources we mean all personnel who are permanently involved, or at least have a minimum of continuity with, the GERCO. In this case, our personal perception does not coincide with that of the states in their biannual reports. In our opinion, a structural problem exists here, for the following reasons.

Marked Inequality in the Number of Specialists. In some states there is only a minimal number of staff available, both in absolute numbers (Table 4) and in figures adjusted according to the length of coast, the number of coastal municipalities, or the surface area covered (Table 5). It has even been observed that the official figures for those dedicated to the GERCO and the real figures do not coincide, as some people also have other responsibilities within their respective environmental agencies. In addition, staff redeployments in public agencies in some states have brought about a substantial reduction in the number of officials working on the program (Sao Paulo, for example, now has 5 specialists instead of 20).

Need to Improve Composition and Specialization. We have been able to observe that the composition of the teams of specialists is fairly disparate. There is frequently an imbalance between the number of specialists qualified in social sciences and physical-natural sciences, and very few real specialists in coastal matters. When such specialists

Table 5
Resource indicators for coastal management in Brazil

State	Length/ human resources[a]	Surface area/ human resources[b]	Financial resources/ no. municipalities[c]	Financial resources/ population[d]	Financial resources/ NPA[e]
Amapá	87.3	8,730	195	6.2	0.7
Pará	—	—	144	2.0	1.0
Maranhâo	35.6	3,281	124	2.6	9.3
Piauí	—	—	716	22.3	15.9
Ceará	115	5,635	336	3.2	463.5
R.G. Norte	34.2	991	—	—	—
Paraíba	22.8	440	107	0.4	23.7
Pernamb.	46.8	1,103	527	3.2	204.3
Alagoas	114	1,140	44	0.9	27.2
Sergipe	—	—	—	—	—
Bahia	78.7	2,761	239	0.3	28.8
E. Santo	27.4	703	—	—	—
R. Janeiro	50	1,076	588	1.5	33.2
Sâo Paulo	35	1,045	1,106	22.8	10.4
Paraná	—	—	6,655	228.2	63.5
S. Catarina	140.3	2,313	198	4.4	36.3
R.G. Do Sul	88.6	6,093	326	10.8	2.9
Brazil	54.1	2,416	453	4.8	9.1

[a]Length of coast (km)/number of GEROC officials.
[b]Area of coastal municipalities (km^2)/number of GERCO officials.
[c]Thousands of reales of GERCO (1995) per coastal municipality.
[d]Thousands of reales of GERCO (1995) per inhabitant of coastal municipality.
[e]Thousands of reales of GERCO (1995)/number of hectares of NPA.
Source: MMA, 1996.

have taken part, they have been brought in from universities or private consultancies. The National Coordination Group is also working to improve this situation. It should be pointed out here that traditional university courses[23] (which the majority of specialists and public officials studied) were only adapted a few years ago to include the specific type of training needed for coastal management.

Ensuring the Continuity of Staff. Another frequent problem is the lack of continuity of the people who make up the technical staff, either because no funds are available to renew their contracts or because the environmental agency they work for assigns them to another post. It is not at all beneficial for such specific work when the team members change too often.

Shortcomings in the System of Control and Assessment of Work. Another noteworthy aspect is the deficiency of the system used by each state to monitor the work carried out. In theory, a team from the National Coordination Group visits each state every two months in order to evaluate the progress made. An assessment of the rate of progress and the quality of the results obtained is fundamental in the initial stages. We refer here not to the supervision of certain public funds, but to the task of making sure that technical projects are carried out correctly. In other words, in situ controls should be improved in order to obtain a greater level of coordination and information about the tasks that are performed.[24]

Political Support or Backing

Although this aspect did not stand out in our interviews, it is evident in the problems that the states themselves point out in their biannual reports. Such an observation is not surprising. Any CMP is a political-administrative process, and firm political support is therefore vital. Achieving this requires the awareness and consensus of the representatives of the federal, state, and municipal administrations involved.

The GERCO is sometimes seen by the state political agencies simply as a way of obtaining funds. Consequently, when financial resources are cut, or received intermittently, the political interest in and support for the program dwindles accordingly. Also it should be noted that a CMP is conceived as a long-term project, whereas politicians tend to work within a short- to medium-term time scale. For this reason, the political changes that are a natural part of democracy usually affect the development of the CMP. Another important point is that the results of most CMPs are only visible after several years, which makes other projects that produce more immediate results seem more profitable in political terms.

Legal Structure

This refers basically to altering the legal jurisdiction of the public administrations involved in coastal management. This may take the form of reinforcing or making minor changes in the existing legislation, or establishing new regulations or guidelines. In reality, it has not always been possible to adapt the legal framework for managing coastal zones. It does not come as a surprise that only the State of Rio Grande do Norte at present enjoys the benefit of a legal structure designed specifically for this activity.

The State of Sao Paulo, for example, is one of the most advanced in this sense and has even prepared a bill termed "Plano Estadual de Gerenciamento Costeiro" containing 23 articles and a provisional regulation. This Coastal Management Act has not yet been passed.

Interadministrative Coordination

As the GERCO is, on the one hand, a federal initiative, and on the other, many of the environmental and urbanistic responsibilities depend on the states and municipalities, respectively, the need to coordinate between the various public administrations is obvious. While the great effort made to increase understanding at the federal and state level has produced notable results, municipal or local administrations have achieved a lesser degree of integration in the GERCO. The attempts to transfer technical recommendations from state to urban planning have failed. Coastal management at the local level could be improved by transferring more financial and human resources from the federal and state levels to the municipalities.

Intersectorial Integration[25]

The need to increase intersectorial coordination was mentioned by some of the GERCO officials interviewed. The National Coordination Group has been aware of the problem, as can be seen by the prominent participation in the Seventh ENCOGERCO of the Ministries of Marine, Science and Technology, Industry, Commerce and Tourism, the Environment, and the Treasury.[26]

At present there are federal projects of great importance and territorial impact which affect the activities and interests of the GERCO. PRODETUR/NE (Programa de Desenvolvimento do Turismo do Nordeste, or the Northeast Tourism Development Plan) is a good

example of this. With over $1 billion (U.S.) in finance, it is one of the largest inflows of foreign capital (the World Bank) destined to provide the basis for sustainable tourist growth (infrastructure for transport, control and treatment of waste, etc.). The interviews carried out for the purpose of compiling this study revealed that few experts had detailed information about the PRODETUR/NE and its impact on their respective coastal areas.

Final Considerations

The aim of these pages has been to reach the objectives stated at the beginning of this piece of work, namely, to summarize the Brazilian National Plan for Coastal Management and to note the main problems that have arisen during its implementation. As far as the first point is concerned, we would like to emphasize the opportunity that the PNGC represents to design a model for sustainable development in its area of application. This initiative is indeed worthy of merit as the Ministry for the Environment has provided a modern planning tool for the coastal zone, allowing for the consolidation of a sound basis for integrated management.

However, while recognizing the merits of this undertaking, we must also mention the problems inherent in any completely new political and administrative process. It is very likely that many of the problems listed are common to other projects of a similar nature, even when these are located in more highly developed countries.

There is no doubt that the role of the National Coordination Group needs to be reinforced with more resources, especially in terms of staff. In our opinion, tutelage and monitoring should be increased during the implementation phase, particularly in those states in which work is behind schedule. This would be possible with the formation of an "itinerant" independent technical team of consultants who would make onsite visits to the states involved. This team would not only monitor the work carried out, but would also center its efforts on assessment and orientation. This would, for example, make it feasible to provide each state team with a series of guidelines or recommendations issued from the National Coordination Group. Their reports would allow for a more realistic and objective distribution of supplementary funds to ensure that no state falls behind. This team of consultants would, then, provide onsite support for the state technical teams and also improve the work of the National Coordination Group. A specific program to train officials in each state would also be very useful.

From a very generic point of view, it can be said that two different situations can be outlined in the implementation phase (1987–1997) of the GERCO. On the one hand, some states are still in the first stages of design or implementation and are behind schedule with the program. With very few exceptions, these are all states in the northeast region. On the other hand, several more advanced states are carrying out tasks characteristic of a transition period in which the plan that has been designed is put into action.

Consequently, a hypothetical recommendation to the National Coordination Group[27] would be to verify the best way to reduce the differences which could threaten the unity of the Program. In fact, at present it seems to be working at two speeds. This is not compatible with the formal and functional unity of the coastal zones, even though they reflect the north-south socioeconomic contrasts in Brazil.

Finally, we would like to emphasize that the main problems of the National Program of Coastal Management at the moment are economic and financial. In fact, between 1997 and 2000 little progress has been made in spite of the approval of a second version: the PNGC II. This new generation of the GERCO is especially focused on two very concrete aspects. First, coastal area limits are redefined using more flexible criteria that increase the number of coastal municipalities. Second, the area of responsibility of each administrative level (federal, state, and municipal) is more clearly defined.

Notes

1. In this text three main tools for the planning and management of the Brazilian coastal areas are referred to:
    1. National Plan for Coastal Management (PNGC): a series of general regulations and guidelines;
    2. National Program for Coastal Management (GERCO): a series of projects for the implementation and development of the PNGC;
    3. State Programs for Coastal Management: a series of projects and tasks carried out at state level relating to the PNGC.
2. This final aspect is easily understood if we bear in mind that we are dealing with underdeveloped and structurally dependent societies. This external influence is usually channeled through a United Nations Program (United Nations Development Program, United Nations Environment Program, etc.), international financial institutions (the World Bank, the Inter-American Development Bank, etc.) or simply under the coverage of foreign cooperation from some developed country (United States Agency for International Development, Denmark, Holland, etc.).
3. Other articles that may be consulted on the subject of marine contamination of land origin can be found in the United Nations Environment Program (PNUMA, 1994).
4. Areas of shoreline designated as residential, which also permit some infrastructure development related to fishery activities.
5. Sincere thanks to the universities and environmental agencies of the above-mentioned states and the National Coordination Group of the GERCO of the Ministry of the Environment for their kind invitations. The visits which took place in October and November 1995, June 1996, November 1997, and November 1999, along with all the comments and observations received, have allowed us to form an approximate idea of the real situation regarding the planning and management of the Brazilian coast.
6. These figures were offered by the states themselves in the last ENCOGERCO and differ from those published by Carvalho and Rizzo (1994).
7. Calculated without taking detailed account of the sinuosity of some coastal forms.
8. Three four-year plans between 1982 and 1993.
9. Together with the relatively well conserved great ecosystems: Floresta or Selva Amazónica, Pantanal, Mata Atlántica and Sierra do Mar.
10. A strip extending 33 meters landward from the high-tide line. It is also applied to edges of rivers and lakes.
11. A certain similarity can be seen here with the Spanish Constitution, in which article 132.2 refers to the goods that are always public state property (maritime-land zone, beaches, territorial sea, and the natural resources of the economic zone and the continental shelf). The following paragraph of the same article even indicates that the administration, defense, and conservation of the State and National Patrimony shall be regulated by law.
12. It is worth mentioning, for example, the limits that arise from the definition of a beach. Leme Machado (1995) described that of article 10°3 of Act 7.661, which establishes the National Plan for Coastal Management: “an area periodically covered and uncovered by water, to which is added the adjoining zone of detritus material such as sand, gravel, pebbles, and stones up to the growth line of natural vegetation, or, in its absence, where another ecosystem begins.”

    From the point of view of ecosystems, the interaction between beaches and dunes is well known. With the above definition of beaches, the extent of public domain belonging to dune systems will not depend on the existence of the latter. “Natural vegetation” is often interpreted as a paltry herbaceous stratum that can be easily implanted or removed. This largely explains the urbanization of a large part of the dune lands in some states in northeast Brazil for second residences and hotel complexes.

    The Spanish Shoreline Act 22/88 has an obvious difference, in that dunes are considered public maritime-land domain “whether or not there is vegetation.” We do not mean to suggest by this that the definition in Spanish law should be applied in a country like Brazil, as there are states such as Ceará where the dunes continue inland for dozens, even hundreds, of kilometers, making such a proposal unviable. However, an intermediate solution could be found between these two possibilities, as the laws to protect and conserve the environment should take into account the nature of the ecosystem in question.

13. It was sanctioned by the Government of the Republic on 16 May 1988 and published in the Official Gazette of the Union two days later. The Act of the National Plan for Coastal Management was included in the context of National Policy for Marine and Environmental Resources.

14. Created by article 4 of Act 7.661

15. Pernambuco declared reefs to be *areas of environmental interest.*

16. Article 5.2 of Act 7.661/88.

17. Vid. Covre & Calixto (1995).

18. The extremely heterogeneous socioenvironmental dimensions and characteristics of the Brazilian coastal states means that the scale (1:100,000) and the list of subjects (12 thematic maps) suggested in section 6.1.1 of the PNGC are too rigid. However, the exact terms used in the PNGC should be noted. The text indicates that for the first aspect, it is "a minimum scale of reference," and for the second, "the following subjects are suggested, among others."

It can be deduced from this that desired uniformity in the diagnosis for all the states clashed with the spirit of the PNGC. In other words, it is likely that the rigidity was not in the text written by the COGERCO but in the biased application of some recommendations or suggestions.

19. The methodology for the second instrument is adapted to the needs and structure of the first. When the availability of technical and human resources permits it, a geographic information system is used.

20. Vid. bibliographical reference M.M.A. (24).

21. Practically all the experts of the environmental agencies with whom the various activities were carried out (conferences in which European models for coastal planning and management were compared, technical interviews about the GERCO, etc.) were in charge of and directly involved in the program in their respective states. In addition, some of the university colleagues with whom we worked are consultants for the basic texts used by the federal coordination group to prepare the methodological guidelines (Moraes, Viegas, etc.) or have made a notable contribution to the specialist staff (Madruga). This allows us to assert that the information and the impressions gained are fully verified, independently of whether or not our personal opinions coincide with those of the people involved with the program in one way or another.

22. Expressed in the biannual report that each state must send to the National Coordination Group: "Profile of the Brazilian Coastal States: Aids to the Implementation of the GERCO, 1994." In the 1996 report, no explicit mention is made of problems that have arisen.

23. This situation also occurs in more developed countries. In Spain, for example, there have only been specific classes on coastal management in the programs of some degrees (e.g., maritime sciences) since the beginning of the 1990s. Before then, only occasional postgraduate or doctorate courses were available in some universities.

24. At present, this is done by the National Coordination Group by means of a very synthetic report which the technicians in each state prepare every two years.

25. An interesting attempt to improve insectorial coordination can be seen in the composition of the Interministerial Commission for Maritime Resources (CIRM). This commission includes the Ministries of Maritime, Foreign Relations, Transport, Education and Sport, Industry, Commerce and Tourism, Mines and Energy, Science and Technology, Environment. Planning and Finance, as well as two qualified representatives of the President of the Republic.

26. The presence of the Secretary for the Patrimony of the Union is more than justified if it is borne in mind that the so-called *terrenos de marinha* (marine lands) are part of the Federal Patrimony.

27. It should be recognized that the coordination group is doubling its efforts to solve structural problems such as those already mentioned: administrative integration, intersectorial integration, etc.

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