Ocean & Coastal Management 93 (2014) 76–87

Contents lists available at ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

# Behind the increasing erosion problem: The role of local institutions and social capital on coastal management in Argentina☆

Mara L. Rojas [a], Marina Y. Recalde [b,*], Silvia London [c], Gerardo M.E. Perillo [d], Mariana I. Zilio [c], M. Cintia Piccolo [d]

[a] Departamento de Economía, Universidad Nacional del Sur, 12 de Octubre y San Juan piso 7, B8000CTX Bahía Blanca, Argentina
[b] Fundación Bariloche – Programa de Medio Ambiente y Desarrollo/CONICET, Argentina
[c] Instituto de Investigaciones Económicas y Sociales Del Sur (IIESS) (CONICET-UNS), 12 de Octubre y San Juan piso 3, B8000CTX Bahía Blanca, Argentina
[d] Instituto Argentino de Oceanografía (CONICET-UNS), Complejo CCT CONICET Bahía Blanca, Florida 8000 (Camino La Carrindanga km 7,5), Edificio E1, B8000FWB Bahía Blanca, Argentina

ARTICLE INFO

*Article history:*
Available online

ABSTRACT

Coastal ecosystems are one of the most impacted and altered regions worldwide, both because of natural reasons and because of the large population that is concentrated along the coasts. In Argentina, the problem of coastal erosion is very important as these areas represent the 18.33% of the whole territory with 36% of population living in this area. The objective of the present article is to characterize the main problems related to the use of resources and coastal management, leading to coastal erosion, from the perceptions of stakeholders and decision makers in the coastal zone of Pehuén Co and Monte Hermoso, Argentina. The fieldwork was performed by participative methodologies, while the results were analyzed under the institutional and social capital theoretical framework. One of the main results of the paper is that the lack of a strong social capital in the region and the existence of formal monitoring and sanctioning procedures developed by distant governmental institutions have increased the overexploitation of coast and beaches. Notwithstanding, the current and future relevance of coastal erosion for the region will demand the elaboration of bottom-up policies to reduce the vulnerability of the region and the performance of the adaptation policies.



## 1. Introduction

Coastal ecosystems are one of the most impacted and altered regions worldwide because of the large population that is concentrated along the coasts (Adger et al., 2005). These regions have been historically exposed to coastal erosion, a natural process that occurs through the actions of currents and waves and results in the loss of sediment in some places and accretion in others. However according to the Center for Ocean Solutions,[1] the phenomena of Climate Change seems to have boosted the impact of coastal erosion, as it has dramatically increased during the last two decades (Morton et al., 2004; Zhang et al., 2004) and it is expected to continue as sea level rises and storm frequency and severity increase (Brown and McLachlan, 2002). Nevertheless, the variability of local and regional meteorological and oceanographic conditions most likely have a much higher and evident impact to the coast and to the perception of the stakeholders (Bustos et al., 2009a, 2011).

Maximum vulnerability is detected in delta areas where the strong reduction in the input of water and sediments (Syvitski, 2008; Perillo et al., 2010) demonstrate that deltas are in strong reduction and even, in some places, sinking at a faster rate than the mean sea level (msl) increase. Most of the water/sediment reduction is due to the increase in large dams inland (especially after 1950) that retain them in the continent, while sinking is also exacerbated due to water and oil pumping (Syvitski, 2008).

These processes boost the vulnerability of communities located in coastal regions along the world. According to a recent report by ECLAC (2012), the most vulnerable countries regarding the existence of linear infrastructure in the coasts of the Latin American and Caribbean Countries (LAC) are Mexico, Brazil, Cuba, Bahamas and Argentina.

☆ This paper has been written in the frame of the international project *Community-based management of environmental challenges in Latin America* (COMET-LA), financed by the 7th Framework Program of the European Community.

* Corresponding author. Tel.: +54 0291 4595138; fax: +54 0291 4595139.
*E-mail addresses:* mrecalde@uns.edu.ar, myrecalde@gmail.com (M.Y. Recalde).

[1] See http://centerforoceansolutions.org/climate/impacts/cumulative-impacts/coastal-erosion/.

http://dx.doi.org/10.1016/j.ocecoaman.2014.03.010
0964-5691/


**Fig. 1.** Location map of Monte Hermoso and Pehuén Co in the Buenos Aires Province.

Indeed, the problem of coastal erosion is very relevant for Argentina, as coastal areas represents the 18.33% of the whole territory (514,621 km$^2$) extending along 11 provinces and the Autonomous City of Buenos Aires, with 36% of population living in this area and accounting for the most important capitals of the coastal provinces, a relevant infrastructure, industries, commerce and financial centers (Dadon, 2010). Moreover, as stated by the Second National Communication of the Argentina to the UNFCCC (2° Argentine NC) coastal zones are potentially within the most vulnerable areas of the country because of erosion. This situation may be even worse in some coastal areas of the province of Buenos Aires Province due to the urbanization process along the coast, increasing the risk of floods with the consequent loss of high extensions of the beach.[2] This is the case of the zone of Monte Hermoso-Bahía Blanca Estuary, which includes the towns of Pehuén Co and Monte Hermoso[3] (Fig. 1).

Even though it has been mainly attributed to ecological factors, the coastal vulnerability (associated to erosion) is also related to socio-economical processes and governance institutions. Adger et al. (2005) argue that understanding the relation between ecosystems and human societies is crucial to reduce vulnerability and enhance resilience in coastal areas.

The role of institutions in socio-economic development has been widely discussed in the economic literature.[4] On the one hand, as pointed out by Acemoglu and Robinson (2008), the gaps in economic growth and development between countries can be explained by differences in institutions and their degree of maturity. On the other hand, Chang and Evans (2005) stress institutions are lightering instruments for different economic activities. The role of institution in restricting some negative behaviors is particularly important in collective action problems. Moreover, as argued by Ostrom (1990), institution may highly contribute to deal with the well-known *tragedy of commons*[5] (Hardin, 1968) and then, ever

[2] Argentina Republic. Second National Communication of the Argentine Republic to the Conference of the Parties to the UNFCCC, Buenos Aires City, October 2007.

[3] See also: Perillo (1997) and Perillo and Piccolo (2011).

[4] For a complete survey on this topic we recommend: London and Santos (2007).

[5] The tragedy of commons "has been used as a metaphor for the problems of overuse and degradation of natural resources including the destruction of fisheries, the overharvesting of timber, and the degradation of water resources" (Ostrom, 1999: 493). For Hardin (1968), the tragedy is understood as the ruin of the common resource because of the excessive freedom in the access and use.

that a group attempts to manage a common resource for optimal sustainable production, it will necessarily create institutions in order to solve some collective *action problems.*

In order to guarantee the sustainability of social–ecological systems some rules for managing the resource are needed (Ostrom, 2009). Moral and ethical standards sheared, norms of reciprocity, trust in one another to keep agreements, among others, keep low the cost of transaction, monitoring and sanctioning (Ostrom, 2009; Basurto and Ostrom, 2009). How institutions related on access and use controls operate once they are in place or how new rules can replace old rules depends, ultimately, on *social capital*.

The institutional and social capital weakness can be of extremely relevance for the Argentine coastal zones, where the absence of a clear building plan and the "open access resource" characteristic of the beach has promoted its overexploitation. Barragán et al. (2003) highlight that some of the problems that increase coastal vulnerability in Argentina are coastal urbanization; urban and industrial pollution; coastal management; over-exploitation of natural resources and biodiversity loss. The authors state that, to some extent, this situation is due to the lack of clear legal norms and tools for the management of coastal zones. This absence of national coastal planning clearly contrasts to the situation of other LAC countries, like Brazil (Brandani, 1990).

Although there is some governmental legislation with respect to the use of sand and beaches, basically there are no exclusive using rights that work well in excluding users from the use of these resources. Moreover, legislation becomes old and useless in view of the current expansion of towns, whereas new laws are unknown to stakeholders because they have been developed with a *top-down* approach and *without collective participation*. Hence, some questions emerge: How far can a rule or institution change the predatory behavior if it is not supported by the community? Why have collective actions failed to form a set of norms to ensure the sustainability of beaches? What is behind of the absence of monitoring and sanctioning community rules, even when citizens recognize the problem of erosion and vulnerability?

The objective of the present article is to characterize the main problems related to coastal management and the use of resources, leading to coastal erosion, from the perceptions of stakeholders (SH) and decision makers (DM) in the coastal zone of Pehuén Co and Monte Hermoso (Argentina) using participative methodologies, and to interpret these conflicts under the institutional and social capital theoretical framework. The key hypothesis driving the paper is that *in these two coastal cities, the institutional failures and the lack of a strong social capital have been crucial for the (in) existence of a community-based management of the coast and beaches, enhancing the vulnerability of these zones.*

The relevance of this issue is twofold. On the one hand, studying the actual role and the potential contribution of local institutions and social capital, as well as alternative natural resources management systems, may be helpful to deal with the problems related to the tragedy of commons. On the other hand, the use of participative methodologies is very useful to understand the logic of the system from the point of view of local stakeholders, and may constitute a starting point to delineate some future bottom-up adaptation policies in order to reduce the vulnerability of local communities to coastal erosion.

As follows the paper is structured in five sections. Section 2 summarizes a brief literature review on institutions and social capital literature. Section 3 presents the socio-economic, institutional and geographical main characteristics of the area under study. Section 4 addresses the field methodological approach for the study. The last three sections present the preliminary results of this first stage of fieldwork, the main discussions of the results and the final considerations.

## 2. Institutions and social capital

According to North (1990) institutions can be categorized in formal, comprising constitutions, laws and property rights; or informal, consisting of sanctions, traditions and codes of conduct. Both types of institutions may differently contribute to socio-economic development if there is a clear enforcement mechanism that makes people behave (or not behave) in a particular way. In this sense, the author distinguishes between institutions and organizations, and argues that the latter are crucial in order to facilitate human interaction and the fulfilling of the rules established by the former. In their strict definition, institutions are abstract orders, which main objective is to facilitate the aim of individuals and organizations. Otherwise, organizations are concrete orders, particularly created by individuals to reach some objectives. Both institutions and organizations jointly form the social system of incentives and constrictions and consequently the economic development rests over them.

Even though the study of institutions on the economic literature has increased during the last decades, there is still no a unique and clear definition of the concept. According to Bowles and Jayadev (2004: 7) institutions "are the laws, informal rules and conventions which give a durable structure to social interactions among the members of a population". For North (1990), institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. Institutions can also be seen as facilitating and restringing instruments, having a symbolic dimension for population and being responsible of transmitting social values among people. As restriction instruments, norms and rules could work like tools that limit the overuse and vulnerability of *commons*.

Institutions are hierarchically nested in a pyramidal structure, being the rules and social habits in the base (Tohmé and London, 1998). Social norms maintain the validity of formal rules. A society which supports some conducts opposed to formal norms along time, cannot keep the institutional quality since formal rules are not in accordance with social behavior. In other words, the enforcement of contracts that promote the development of a social–ecological system depends on informal rules and social capital, besides of formal coercitive mechanisms. At the same time, the social capital formation is conditional on the dynamic between formal and informal institutions.

Social capital was defined by Putnam (1995, 1) as those "features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit". Social capital is also conformed by tacit knowledge. Stakeholders of a region share information and knowledge about the SES behavior, which external people do not have (Stiglitz, 2000). The improvement in social capital may contribute to a better management of natural resources since a collection of intra-community networks and the sharing information helps in keeping the coherency of community-based rules, while intra and extra-community networks are needed in order to have a better acceptance of external rules.

The study of the role of social capital in development process has gained as much relevance as institutions. The importance of this concept relies on its indirect impact through its role in institutions and enforcement process. As argued by Bowles and Gintis (2002: F421): "(t)he social capital boom reflected a heightened awareness in policy and academic circles of real people's values, (rather than the empirically implausible utility functions of *homo economicus*), of how people interact in their daily lives, in families, neighborhoods, and work groups, not just as buyers, sellers, and citizens".

The relevance of institutions, organizations and different forms of social capital on development process also extends to natural

resource management (Ostrom, 1999; Koku and Gustafsson, 2001; Basurto and Ostrom, 2009; Berkes, 2009; Fehr and Leibbrandt, 2011; among many others). As stated by Koku and Gustafsson (2003) some experiences gathered from different studies show that in many developing regions the *governing mechanisms* of *local institutions* have often had an influence on sustainable use of natural resources. This influence can be either by creating structures that restrict access to natural resources or by giving rise to a tendency of overexploitation. To some extent, this argument is directly related to Ostrom (1990) analysis on commons and common-pool resources (CPRs).[6] For this author social capital also plays a key role on the management of common goods. Natural resources are surely one of the most important examples.

The role of institutions and social capital in the management and use of commons may be even more significant for those resources under vulnerability conditions and exposure to climate change. Even when it is not possible to assert that improving social capital will *necessarily* solve the problem of natural resources management, it is very possible that a higher (and stronger) stock of social capital could contribute in guiding policy design and enforce its accomplishment.

## 3. Characterization of the study area

### 3.1. Socio-economic characteristics

Monte Hermoso and Pehuén Co belong to the coastal zone of the Monte Hermoso-Bahia Blanca Estuary region located on the southwestern coast of the Buenos Aires Province, Argentina (Fig. 1). They are two neighboring cities, 27 km apart from each other, located along an E–W stretch on the coast. The region constitutes an ecological worldwide unique system because of the existence of archeological footprints (Perillo and Iribarne, 2003). Indeed, the area located between the 17 km at the West of Pehuén Co to the eastern border of Monte Hermoso was established as a Geological, Paleontological and Archeological Provincial Reserve and is currently in the last stages to be declared a World Heritage by UNESCO. The key feature of the zone is that it includes the places where Charles Darwin made his first discovery of the megatherium fauna in 1832 and which, from his own account, the beginning of his Evolution of Species Theory took place (Fig. 2). The reserve contains footprints from a 12,000 yrs old shallow lake of the typical fauna of the period and some human footprints dated 6500–7000 yrs BP, one of oldest examples of human evidences in Argentina. Although it has not been confirmed yet, there may be some human footprint that may date in 12,000 yrs BP. That could be the oldest example of humans in South America (London et al., 2012).

Even though similar in many aspects, such as geomorphological features, natural resources endowments and economic activities, these two cities are very different in dimension and population. Monte Hermoso is a medium size city of with many front beach buildings which have completely modified and covered the coastline dune. Pehuén Co is still known as “a forest beside the sea”, a small town that has fully preserved the original, although artificial, forested design with unpaved street.

According to the Census of 2010, the number of inhabitants in Pehuén Co was 681, nearly ten times smaller than the permanent population of Monte Hermoso, which was of 6 495 with a total of 10 127 homes. However, a key characteristic of these beach cities is the estacionality of populations. The difference between permanent and occasional (summery) population is very significant. According to Vaquero et al. (2011), in Monte Hermoso, during the peak season, population increases from 6000 up to 60,000 persons. The authors highlight that there has been a clear trend of residential tourist during the last years, which explains the difference between intercensal population growth (16% in the period of 2001–2010) and the increase on houses in the same period (23.3%) (London et al., 2012).

Regarding the economic structure of this zone, both Monte Hermoso and Pehuén Co are coastal localities with their economy mainly based on the exploitation of marine and coastal resources, firstly touristic activities and, secondly, artisanal fishery. Nearly the entire economy of Pehuén Co and Monte Hermoso is based on tourist affluence, directly related to the use of beach, and therefore for both communities coastal erosion is a key environmental problem.

The tourism type in both places is characterized by small and medium projects. “Beach and sun” tourism is developed through family-based projects coordinated with municipal activities, especially in Pehuén Co, that still remains as a near-rustic ecotourism place. Even though in Monte Hermoso there are some medium hotels and restaurants, there are no large touristic entrepreneurships. However, the profile of Monte Hermoso has been changing during the last years due to the population growth and the increasing in leisure supply for tourists.

The rest of the economic activities are also related either to tourism or marine and coastal exploitation. In Monte Hermoso fishing and building (related to tourism) are secondary sources of income for population. During winter time, commerce exclusively depends on the income of permanent population. Contrarily, in summer the affluence of tourists plays a crucial role into commercial performance. Retirement subsidies have a great relevance in Pehuén Co, mainly because of the average age of stable population. In this case, 80% of commercial activity comes from tourism. Regarding fishery, around 400 to 500 families depend on that activity in Pehuén Co and Monte Hermoso.

### 3.2. Local institutions and rules

To understand how formal rules were determined in a society, a previous comprehension of the organizational structures where rules are born is required.

Along the Argentine territory, the political power is exercised through a representative democracy. There is neither self-governed community with general assembly nor public decision power over the use of resources or land destination. Unlike too many cases of the literature of CPRs (Basurto, 2005; Basurto and Ostrom, 2009; Cinner et al., 2009; Farah et al., 2012; Escalante Semerena et al., 2012), there are no formal governance rules arisen from historical norms or traditional ecological knowledge of users in our case.

The communities of Monte Hermoso and Pehuén Co also lack of clear community-based informal rules governing their behavior. On the contrary, the formal legislation which regulates the use and control over common resources emanates from a very complex structure of organisms corresponding to the three levels of political jurisdictions: local, provincial and national (London et al., 2012). At local level, Monte Hermoso and Pehuén Co belong to two different geo-political orders. While Pehuén Co is under the Coronel Rosales jurisdiction, Monte Hermoso represents an autonomous municipality.

Decisions regarding public investment in environment and land use, as well as mineral resources such as water and sand, are made

[6] CPRs are natural or human made resources where one person’s use subtracts from another’s use and where it is often necessary, but difficult and costly, to exclude other users outside the group from using the resource. The majority of the CPR research to date has been in the areas of fisheries, forests, grazing systems, wildlife, water resources, irrigation systems, agriculture, land tenure and use, social organization, and global commons (climate change, etc).

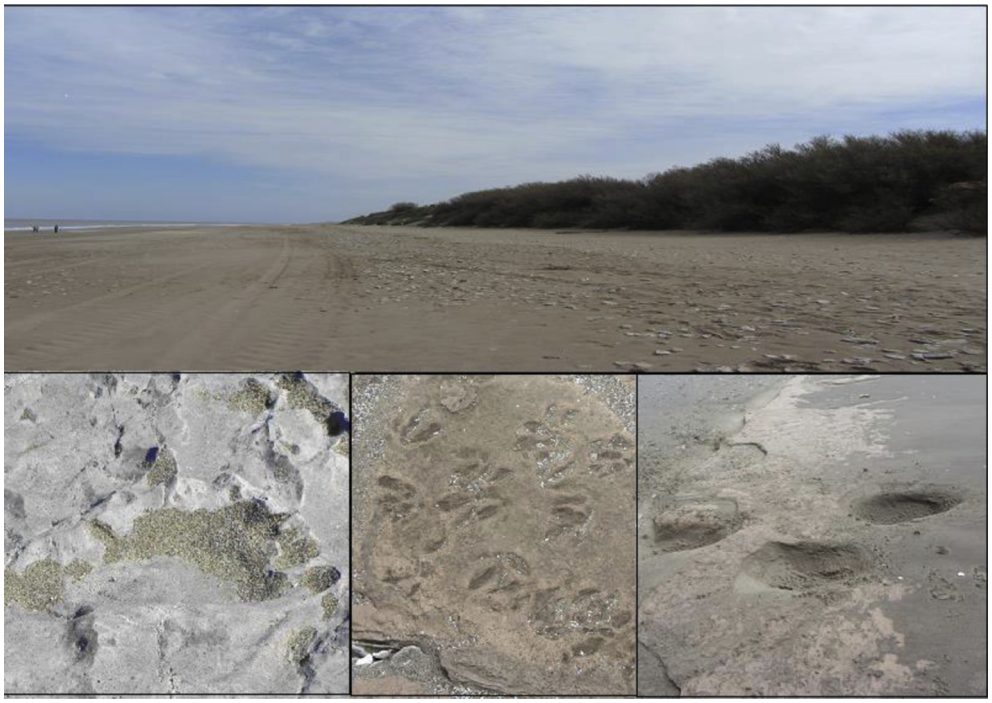

**Fig. 2.** Paleontological and archeological footprints on the beach in Pehuén Co.

in any of the 15 national ministries, for instance: the Ministry of Economy and Public Finances, Ministry of Federal Planning, Public Investment and Services, the Ministry of Social Development and the Ministry of Science, Technology and Innovation, among others. Particularly, the Ministry of Tourism and the National Institute of Research and Development of Fisheries (INIDEP) play a significant role in reference to the use of marine resources. The Ministry of Tourism was created recently in 2010 to impulse the activity, while INIDEP is responsible for preserving the marine ecosystem for future generations since 1977.

Provincial level of government exhibits more than 10 ministries and 10 secretariats. The Under-secretary for Public Works and the Provincial Office for Hydraulic is on charge of analyzing possible solutions for water and coastal erosion problems. The OPDS (Provincial Organism for Sustainable Development) was created in 2010 and constitutes the provincial authority for environmental policy. The main goal of this organization is to guarantee the sustainable and correct management of the environment, the preservation of biodiversity and the implementation of sustainable development planning. None of these institutions have permanent presence in Monte Hermoso and Pehuén Co.

In the case of tourism, the governance structure is decentralized. Each municipality has a secretariat or office of tourism at local level. Hence, the management of tourism seems to be nearer to the local population than the management of fishery resources. Municipalities are also involved in urbanization planning and the control of land and water uses.

The set of formal rules is as complex as formal organizations. National and provincial laws coexist with a considerable number of decrees, resolutions, regulations and agreements.

The main regulation in coastal sustainability falls into the OPDS and the provincial law of Territorial Order and Use of the Land, sanctioned in 1977 and modified in 1983. This reglamentation establishes dunes as “recovery zones” against the erosion and, hence, urbanization cannot be extended on them. According to that norm, building was forbidden 100 m behind from the tide line. In 1999, another norm was sanctioned (the Water Code, Law N° 12 257) and the boundary to build was extended to 150 m from the coast.

In 2006, the Provincial Decree N° 3202 defined a defense band from the foot of the dune slope to 250 or 300 m inland in order to limit the increase of towns and cities on the beach. Additionally, the municipal regulation of Monte Hermoso states that building next to the beach cannot exceed the six stories high. Also vehicular access and traffic along the beach has been prohibited locally.

On the contrary, Pehuén Co allows the vehicular traffic on the beach except in the summer period (within the urban sector) and in the area of the archeological reserve. Nevertheless, the extraction of fossils and archeological elements and any type of mineral is prohibited by a local regulation sanctioned in 1986. According to the norm, the sand needed for leveling private plots must not be taken from the beach.

### 3.3. Coastal erosion problems

Coastal erosion is remarked to be one of the main challenges of the future in different regions of the world. As mentioned in the introduction for Argentina this challenge may be very relevant in the near future, particularly for the province of Buenos Aires, regarding the high infrastructure and urban population near the coast.

The Argentine marine coastal areas have an important strategic and economic value as they are the place for industries and ports, as well as commercial, recreational and touristic activities. According to the estimations of the group of experts for the 2° Argentine NC, the Argentine coasts may be affected both for the increase in ocean levels and temperature as well as erosion caused by different natural conditions. As stated in that report, the vulnerability of the natural coastal erosion in many cities of the Province of Buenos Aires is enhanced by human degradation and the progress of urbanization near the coast. Climate Change may increase the erosion.

In this sense, different authors argue that overexploitation of fishery resources, the inadequate management strategies, and

urban and tourist expansion are the critical reasons for biodiversity changes and coastal erosion in the coastline of the Province of Buenos Aires (Marcomini and López, 1997; Gomez and Toresani, 1998; Dadon, 1999).

This is the case of Monte Hermoso and Pehuén Co, where natural and anthropic causes coexist resulting in a continue process of coastal erosion. Even though the economic loses of coastal erosion have not been officially assessed yet, the yearly impacts of coastal erosion are clear for neighbors and are causing loss in private capital and risking the archeological reserves. Fig. 3 shows some examples of the current situation of the beaches and the consequent alteration of the coast in both towns. It can be clearly noted that coastal erosion is causing important problems to some of local residents whose houses are located near the coast, with the consequent economic impact (Fig 3B). The existence of several small houses and buildings along the coast reinforce the natural erosion and increases the vulnerability of local population to this problem.

However, the characteristics and risks related to this erosion are quite different between the cities under study. Huamantinco Cisneros (2012) studied the problem of coastal erosion in the city of Monte Hermoso, dividing the region in three sectors, and found that this problem is highly related to anthropic elements, as two of the three sectors studied in the beach are directly influenced by urbanization.

In contrast, Bustos et al. (2009a,b; 2011) and (Bustos, 2012) argue that the problem of erosion in Pehuén Co is more related to natural forces, because this town is settled on a ledge of the coast. However, these "natural causes" have been reinforced by the anthropic pressure of urbanization. The authors stress that the existence of infrastructure over the vegetated front dune in the West and Central zones of the town have affected the free exchange of sediment between the dune and the sea. Therefore, during the climatic events along the year there is an exchange of sediment (resulting from the human made changes on the beach) and the increase in the building in the Western and Central zones result in the loss of sediment, while it increases in the East zone that has less infrastructure.

## 4. Methods

Based on the recognition of the relevance of institutions and social capital in the management of natural resources, as well as in the performance of actions to reduce vulnerability to Climate Change, bottom-up policies are becoming more common. The bottom-up viewpoint focuses on the local implementation structures and considers that a policy must be implemented by interactions between constituents of implementing organizations and groups targeted by the policy rather than by controls through laws and regulations (Wakita and Yagi, 2013). In this framework of policies, the dialog between policy makers and stakeholders becomes crucial, and scientists can play an important role to facilitate this situation. As Scott et al. (2012) have argued the science-policy network can help to increase the capacity of institutions to mitigate the vulnerability of different regions. For this purpose, four elements will be required: inclusivity, involvement, interaction and influence. These *four-i* can be promoted through the use of participative techniques.

In this framework, the fieldwork performed along this research (which greatly exceeds this paper), was developed using participative techniques with the objective of appraising the perception of local agents on natural problems and the existence of some kind of social capital. The work was performed along several workshops in order to capture the main characteristics of the social–ecological system. Two selection criteria were used to identify key informants to participate in workshops: pertinence and representativeness. Pertinence was assessed by the relationships between users and resources, and their capacity to affect the socio-ecological system as well as their knowledge about it. Representativeness was defined


**Fig. 3.** Examples of buildings and erosional processes observed in Monte Hermoso (A and B) and Pehuén Co (C and D).

according to the level of how well or how accurately someone reflects upon the group.

The perception about conflicts was dealt with brainstorming techniques. The brainstorming technique is a method of eliciting ideas without judgment or filtering, often used in the early stages of futures workshops and in many other contexts, which involves encouraging wild and unconstrained suggestions and listing ideas as they emerge (London et al., 2012). As stated by Geilfus (2002), one of the advantages of brainstorming is that it allows collecting ideas and perceptions in a broad group of people, and it is very appropriate to be used when firstly inquiring about living characteristics of a community or when trying to catch people's perceptions and reaction on some proposals and events. Usually brainstorming consists of four steps: first, introducing a question, problem, or topic both orally and in writing on chart paper; second, inviting participants to respond; third, writing the responses on chart paper; and finally, prioritizing, analyzing, or using the list to generate discussion or problem solving.

The fieldwork was developed in two stages. In a first step we developed separate workshops with SH and DM from both communities. So as to have responses on the same direction, we used the same triggering questions in the meetings. These queries asked the participants to differentiate the perceived changes in their socio-economic conditions, related to ecological changes or to human made changes, and to highlight the main consequences of these changes. In a second step, a joint forum with both SH and DM was performed. In this forum the main responses to the questions (which had been previously systematized) were presented to the attendees and deeply discussed.

Once the perceptions of different actors and the information on the current resource management schemes were obtained, they were analyzed under the theoretical institutional framework previously proposed. Following Ostrom (2009), the aim of this stage of the research was to determine if collective action could finally emerge as an outcome facing the coastal erosion problem and if it could be used in the future to design adaptation policies and actions.

## 5. Preliminary results: local perceptions about conflicts, problems and their causes

Tables 1and 2 summarize the main results of the workshops. The first column shows the conflicts detected by SH and DM during the meetings. A conflict is understood either as a clash between human opposing forces, or between human and natural (or biological) opposing forces. Although it might not have a negative connotation, most of the mentioned conflicts in Pehuén Co and Monte Hermoso were likened to problems. Distinctive features of Monte Hermoso and Pehuén Co are shown in gray.

In order to facilitate the comprehension, the conflicts identified by the workshops attendants were divided in two categories: those related to socio-economic matters and those related to the use and management of resources. However, there is a clear relation among both types of conflicts since the main economic activities (tourism and artisanal fishery) are based on the exploitation of natural resources.[7]

Direct consequences of conflicts are shown in column 2. Socio-economic conflicts directly lead to variations in incomes with the consequent modification in the quality of life. However, indirect effects could also induce changes in the resources system. The same applies to conflicts related to the use or management of resources that have direct consequences on resources and might have indirect effects on economic activity and the quality of life. For instance, the direct outcome of the difficulty to promote tourism activity (see the first row of Table 1) is the reduction in income perceived by some SH. However, it could also have ecological consequences, if actors overuse the beach in order to revert the negative impact on their revenues.

Column 3 in the table exhibits who are the internal SH directly affected by the conflict or who are the direct users of the resource involved in the conflict. Finally, columns 4 and 5 show the interesting differences in the perception about the causes of conflicts mentioned by SH and DM.

The first part of the tables shows the socio-economic problems identified by SH and DM. In general, socio-economic conflicts have been influenced by changes in the patterns of use of resources and by changes in tourism behavior. According to their opinion, both permanent alterations and seasonal variations in environmental characteristics in Pehuén Co had positive and negative effects on tourism. While the dune retreat implied the closure of the coastal avenue and commerces near the sea in Pehuén Co, with the consequent negative impact, climate change produced an enlargement of the touristic season due to increases in temperature and reductions in wind storms, increasing the flow of tourists and revenues. Specially perceived in Monte Hermoso, climate changes cannot be defined as "negative" in terms of the economic activity. Nevertheless, it could produce unexpected modifications in biological conditions.

Climatic and social factors combine and result in an increasing use of the beach with an ecological impact, even though the use of the beach continues to be non-extractive. Workshops attendants pointed out two relevant facts. Firstly, changes in the climatic conditions have lead to an extension of the summer season. Secondly, the behavior of the tourists has changed and visitors are present throughout the whole year. Then beaches, protected areas, forest land, wildlife areas and other natural assets are subject to overuse along the year. SH and DM have remarked the absence of an integral management plan, which would be very important and useful for the sustainable development of the tourism.

The lack of direct communication networks or roads with other cities that would imply a reduction in the distances traveled from one town to the other, enhances the difficulties to promote tourism and fishing activities in Pehuén Co, as it is difficult to enlarge the market for the products. Therefore, the majority of SH from Pehuén Co claim for a new and straight road to communicate both communities. This direct road may be built throughout the beach and may reduce the distance, from the current 96 km to 27 km, shorting the average traveling time and reducing the transport costs for fisheries from Pehuén Co to Monte Hermoso. Moreover, the new road could increase the flow of tourists with the consequent increase in economic revenues for the smaller town. Even though the community has formally made this query, DM have not accepted the request because of three main reasons. Firstly, this would imply the expropriation of private land. Secondly, to be straight enough this new route should be projected along the beach throughout the paleontology reserve and may cause some drastic impacts on it. Finally, the construction of a new route may increase erosion problem along the beach.

Results of workshops indicate that conflicts on use and management of resources imply two fundamental issues in both cities: erosion matters (with its consequent increase in the vulnerability

[7] The fishery can be studied as a problematic common-pool resource itself. Given the relevance of the artisanal fishery in both cities, problems related to the access and use of fishery resources, overfishing, collective action and enforcement dilemmas were mentioned several times. Community-based management of artisanal fishery represents the other main research area of our fieldwork. Nevertheless, we must highlight that the present paper is focused only on erosion matters and vulnerability. For a recent study regarding some conflicts of resource management and its impact on the fishery in the region see for instance Zilio et al. (2013).

**Table 1**
Results of workshops - PEHUÉN CO.

| Conflict | Affected resources/Consequences | Direct users affected | Causes perceive by internal SH | Causes perceive by DM |
|---|---|---|---|---|
| Socio-economics conflicts | | | | |
| Difficulties to promote tourism | Economic activity/Reduction in incomes of tourism dependent activities and (indirectly) in the rest of the tow. | Commerce/ tourism | Lack of integral management plan<br>Closure of ways and commerces near the coast<br>Small scale of the market | Lack of integral management plan |
| Lack of direct roads and communication networks between towns | Economic activity/Slowing down of development of fishery and tourism activities | All | Private property of land.<br>High political cost of expropriation of private land to build new roads. | Potential damage on the area of paleontology reserve among towns.<br>Potential increasing on erosion problem along the beach |
| Market conflicts (fishery) | Fishermen economic incomes/Decrease in income of fishermen | Fishermen | Small-scale trade and low prices<br>Difficulties to access to the fish processing plant located in Monte Hermoso. | n. a. |
| Conflicts related to the use or management | | | | |
| Traffic of heavy vehicles on the beach | Coastal zone/Deepening of erosion problem | All | Need of fishermen to reach the sea | n. a. |
| Increase in the coastal risk | Health and tourism activity/Reduction of the safety of the beach and reduction of tourism affluence to the beach | Commerce/ tourism | Growth in the rip currents, sandbanks, bars and other *ecological* changes caused by changes in climate conditions (more frequency but minor intensity of winds) | n. a. |
| Change in species (plants and animals) and decrease in fishery resources | Ecological system/Equilibrium of ecological system<br>Fishery resources<br>Fishermen economic incomes/Decrease in income of fishermen | All | Climate change<br>Overfishing<br>Pollution | n. a. |
| Coastal erosion | Dune system/loss of capital and infrastructure built on dune | All | Climate change<br>Wrong or lack of urbanization planning<br>Lack of formal rules to avoid erosion<br>Lack of monitoring and enforcement sanctioning rules | Climate change<br>Poor or lack urbanization planning of the cities |
| Sand mining | Coastal zones/deepening of erosion problem | Neighbor associations | Unknown process by neighbors of overexploitation<br>Lack of community awareness<br>Lack of enforcement of monitoring and sanctioning rules<br>Strong economic interest | Complexity of process of monitoring<br>Enforcement body located out of the place. |
| Increase in salinity levels of the sea and land near the coast | Sea and coastal zones/Imbalance of marine system | Neighbor associations<br>Fishermen | Climate change | n. a. |
| Pollution in groundwater aquifers | Health/diseases related to water pollution | All | Rise in water consumption due to the explosive growth of the town in conjunction with the lack of a net of sewer system pollute the groundwater | Overexploitation of water resources due to the growth of the town and the lack of sewer system. |

n. a.: not available.
Source: Own elaboration based on information gathered during the workshops.

to climate change of the region) and the fishery problems (i.e.: overuse, changes in species, changes in the activity). Changes in species and decrease in fishery resources are due to several, both natural and human made reasons, and clearly impact on incomes of SH. Nevertheless, as it was established before, this work does not tackle the fishery conflict because it is important enough to be studied separately and it will be analyzed in future papers.

As shown in both tables, SH and DM define several problems which could be grouped into “erosion matters”: the existence of an important traffic of heavy vehicles over the beach, the increase in the coastal risk, the sand mining in the case of Pehuén Co, and the coastal erosion itself. Even though these facts were remarked as different problems by inhabitants of the region, many of them are driving forces for coastal erosion problem. Of course, all of these conflicts have direct or indirect socio-economic consequences.

It must be noted that clear differences in perceptions among internal SH were observed during workshops. This is, for example, the case of the presence of heavy vehicles on the beach. For artisanal fishermen, on the one hand, the use of pickups and tractors are needed in order to reach the sea with their boats and equipments. SH involved in tourism, on the other hand, argue that these types of machineries of artisanal fishermen make less attractive the beach, although they accept the use of pickups or cars from tourists.

The increase in the risk of the beach is the result of the joint effect of the growth in the rip currents, sandbanks, bars and other *ecological* changes. The majority of social actors agree that the beach cycle is a result of climate change. “Sudestada” is the Spanish colloquial name of a particular storm caused by strong southeastern winds. According to the traditional knowledge of SH, these storms help to keep the beach level. But people have observed high variations in the behavior of storms during the last years, being more frequent with changes in wind direction and a lower intensity.

Particularly remarked in the case of Pehuén Co, sand mining have played a crucial role in coastal erosion. Even contradicting

**Table 2**
Results of workshops – MONTE HERMOSO.

| Conflict | Affected resources/Consequences | Direct users affected | Causes perceive from SH | Causes perceive from DM |
|---|---|---|---|---|
| Socio-economics conflicts | | | | |
| Difficulties to promote tourism | Economic activity/Reduction in incomes of tourism dependent activities and (indirectly) in the rest of the tow. | Commerce/tourism | Lack of integral management plan | Lack of integral management plan |
| Change in tourist behavior | Income from tourism related activities/Increase and more stability in income | Commerce/tourism | Climate change<br>Social factors as increases in income | n. a. |
| Conflicts related to the use or management | | | | |
| Traffic of heavy vehicles on the beach | Coastal zones/deepening of erosion problem | All | Need of fishermen to reach the sea<br>Tourism | n. a. |
| Increase in the coastal risk | Health and tourism activity/ reduction of the safety of the beach and reduction of tourism affluence to the beach | All | Growth in the rip currents, sandbanks, bars and other *ecological* changes caused by change in climate conditions (more frecuence but minor intensity of winds) | n. a. |
| Change in species (plants and animals) and decrease in fishery resources | Ecological system/equilibrium of ecological system<br>Fishery resources<br>Fishermen economic incomes/ decrease in income of fishermen | All | Changes in climate conditions<br>Overfishing<br>Pollution | n. a. |
| Coastal erosion | Dune system/loss of capital and infrastructure built on dunes | All | Climate change<br>Lack of formal rules to avoid erosion<br>Wrong or lack of urbanization planning<br>Lack of monitoring and enforcement sanctioning rules | Climate change<br>Wrong or lack of urbanization planning |

n. a.: not available.
Source: own elaboration based on information gathered during the workshops.

existing regulation which avoids the use of sand with building purposes, illegal sand mining has been reported by neighborhood associations. According to neighbors, such behavior responds to a lack of community awareness which leaves the private/individual economic interest over the common interest. Moreover, a clear problem of rule enforcement is observed. DM blames the complexity of institutions and procedures for the absence of monitoring and sanctioning. The effect of that situation is the existence of ecological problems (dune erosion) as well as socio-economic problems (potential capital losses).

It is important to highlight that SH perceive that some facts such as the presence of vehicles on the beach or sand mining are problems in themselves, but they do not find them as causes for coastal erosion. Thus, *the incidence of current human factors on erosion it is not recognized by SH*. Instead of that, the past building process and institutional failures are the causes of erosion established by social actors.

The sea has advanced over the coast, leading to an important reduction on the beach, particularly relevant in the case of Pehuén Co. Internal social actors have mentioned the lack of a strategic urban planning which takes into account the coastline characteristics. For instance, in the case of Monte Hermoso, the coastal zone has been completely occupied, and people remark that while there is legislation with the purpose of avoiding the buildings shadow on the beach, there is no regulation to prevent the coastal erosion.

SH of Pehuén Co also have asked for mitigation measures to a local governmental organism. Social actors argue that political power does not know the scope of that problem since DM live in the capital of the municipality 100 km far from Pehuén Co. The answer of DM is that there is no appropriate organism at local level to give a response to neighbors. They ensured having claimed for assistance to the Provincial Office for Hydraulic, getting no answer.

Finally, two additional problems related to the quality of water were detected in Pehuén Co. On the one side, based on their historical knowledge about the system SH have noted an increment in salinity levels of the sea and land near the coast. On the other side, pollution in groundwater aquifers has been corroborated by biochemical analyses after SH realized the problem. They assume the climate change and the overuse, respectively, as the unique causes of those conflicts. According to actors, the increase in salinity impacts on the biological balance of the coast and the contamination of the groundwater causes health problems.

## 6. Final policy discussion

The joint theoretical and applied research has led us to one of the main aspect to be highlighted. The conformation of such governance frame entails the *common* understanding of four relevant matters: (1) to recognize the overexploitation, vulnerability or risk of the system; (2) to assume the need of restricting the use of the resource that faces that situation; (3) to create procedures to do it; and, (4) to generate monitoring and sanctioning methods to rule the procedures, once they have been established. Thus, the view of institutions like something that generates positive outcomes is a consequence more than a cause of the confrontation against commons problem. Suppose that there exists a set of old rules whose effects are driving resources to erosion, since wrong actions are not prevent or sanctioning. If the community recognizes the situation as a problem, certain mechanisms could come into play, causing an institutional change. Old rules would be replaced by new rules with certain sustainability purposes. These mechanisms act at community level and imply interaction, reciprocity, understanding, trust, collusion of wishes and objectives between different stakeholders. These mechanisms work with some grade of social capital.

Based on the precedent description of characteristics, problems and institutions, we can describe how these four aspects develop in the region of Monte Hermoso and Pehuén Co. Even though there is a clear comprehension of the risk and vulnerability of the zone to coastal erosion in both communities, the recognition of the over-exploitation of the resources from local inhabitants is not straightforward.

To some extent there is recognition of the second matter, as people agree on the need to restrict the use of the beaches and the coast. However, two aspects complicate this restriction. Firstly, people assume the need for reducing the exploitation and overuse, if this restriction does not directly affect their own economic activity or interest. One of the reasons why the building process is the main (and almost the only) direct cause of erosion detected by SH could be that the majority of the existing building were not erected by current SH. The behavior of "blame the other" shows a weakly feeling of social awareness and reciprocity. In both communities there are different SH exploiting individually the same open access resource. Thus, it is straightforward to explain some conflicts. For instance, the different opinions on the use of vehicles on the beach are justified by the existence of an individual profit seeking in each activity: fishermen need to reach the sea; tourism needs to use the beach.

Secondly, the lack of a direct relation between the SH and the DM and their different geographical localization complicates the fact that this recognition can clearly become a legal restriction.

The creation of a procedure to restrict the overuse is, perhaps, one of the most difficult aspects of the collective action applied to the management of resources. Nowadays, most of the rules are externally sanctioned. Organisms which establish formal norms and coordination rules belong to upper levels of government and their responsibility usually have little presence in small cities as Monte Hermoso and Pehuén Co. Monitoring process become hard and costly since policy power is far from conflicts areas. Furthermore, the lack of a close and direct communication between the affected area and the burocratic legislation process delays and complicates the process. As we pointed up in the institutional characterization the regulations for these activities emanate from the coexisting three levels of political jurisdictions.[8] Barragán et al. (2003) and Dadon (2010) present a broad discussion on the main national and provincial legislation for the coastal resources, arguing that the main problem is that regulation not only emanates from different hierarchical level but also coexists and regulates the same activity.

Formal rules, thus, seem to be inefficient many times. With a complex governance system, it becomes often difficult to make a decision and to act, because modern institutions do not generate the levels of face-to-face interactions (Putnam, 2001) that traditional institutions showed in community-based management systems. Rules interact in a dynamic and non-linear form. If initial rules established by government or society are not congruent with the characteristics of resources system, resources units and users themselves, the norm enforcement could not exist or be sustainable in the long-run.

The lack of formal legislation even did not result in informal internal rules on exploitation, non-entry or other kind of norms which could avoid the overuse in our case. Basurto and Ostrom (2009) analyze how incentives to change internal rules can be positive or negative depending on benefits and costs with the old and new rules. As we could observe during the fieldwork, not everyone seems to perceive the same costs and benefits. If the net benefits of collective choice are negative for all users, there is no incentive to invest in order to change the rules. If there exists positive net benefits for some stakeholders and they can conform a coalition big enough to win the collective choice rule in use, then, there will be a change in the old rules in favor of the coalition.

In the case of Monte Hermoso and Pehuén Co, no coalition has imposed exclusion rules to the others. Skogen and Krange (2003) argue that *an unifying force* must exist in order to achieve a social unit with sense of connectedness (Putnam, 2000). Whether the increasing risk of vulnerability is an unifying force strong enough to give rise to a common cause or not, will be determined by the great heterogeneity of social actors. The birth of a common cause is neutralized since SH do not depend on the resources in an unique way, competing by resources and deeply increasing the transaction costs of a self-organization.

Finally, in places where well-done common resources management exists, informal monitoring processes are crucial. In these cases, the existence of a well developed social capital is the key factor. When community members maintain direct communications and increase their trust of one another, successful common governance is achieved (Dietz et al., 2003). Rules work because they are *closed* (Coleman, 1990). *Closure* is what makes one cannot escape from the enforcement. If A wants to enforce B in any action, and A does not know the behavior of B but C does, A can get help from C to force B to observe the rule.

In this case *closure* does not exist. The monitoring and sanctioning procedures are usually formal and developed by governmental institutions. These institutions (suppose A) do not have a permanent police force to obligate some SH (suppose B) to obey the norm. Additionally, the lack of appropriation of rules from the community avoids the appearance of another group of SH (C) to help governmental institutions to enforce B.

Social and ecological factors are combined in complex socio-ecological systems, where humanly useful resources are enclosed (Ostrom, 2009). As follows from the vast literature on common resource management (Basurto, 2005; Ostrom, 2009; Coleman and Steed, 2009; Fehr and Leibbrandt, 2011; Blanco, 2011; among many others), the existence of certain social behaviors and the creation of networks could lead to delineate some bottom-up or community-based management strategies for coast and beaches. If society and government organizations can develop a set of effective rules on governing, monitoring and sanctioning related to the use and management of resources, the tragedy of commons can be avoided. Norms and rules appropriated by community could work as a restriction tool, limiting the overexploitation and vulnerability.

## 7. Concluding observations

The paper presents the preliminary findings of a broader research on the management of coastal and marine natural resources, which constitutes a significantly problem in a context of Climate Change. Indeed, the recognition of the relevance of the problems related to the overexploitation of coastal resources has led to a boost in the literature related to the study of the impact of institutional and legal framework on the existence of coastal management plans and their performance (Eisma et al., 2005; Lowry et al., 2005; Wakita and Yagi, 2013; among others). As it has been stressed before, in this first stage, the paper addresses only the specific problem of erosion in Argentina. The study is located in the cities of Pehuén Co and Monte Hermoso, the southern coast of the Buenos Aires Province, due to the relevance of the problem of coastal erosion in the area, the potential impacts of this problem on the economic activities and the consequent increase in the vulnerability of the region. Then, the aim of this research was to isolate the driving forces of the conflicts on the use of coastal resources from SH and DM perspectives. Then conflicts were discussed by leaning on social capital and institutional framework.

[8] With respect to the control over natural resources, their *original domain belongs to the provinces where they are located* (National Constitution, article N° 124). Before the reform of the National Constitution in 1994 the regulation on natural resources concerned the national government, therefore this change can be seen as a little step to bring closer the legislation of natural resources to the citizens who live in the places where the resources are located.

As it has been extensively discussed in the previous two sections, despite the wide (and sometimes different) branch of problems and conflicts remarked in each one of the cities, there are two coincident aspects: the erosion of the beach that increases the vulnerability of socio-economic activities, and the problems related to the fishery, which also impacts on economic activity of the population.

Some aspects related to the results must be taken into consideration, as they are really important in the theoretical framework of this paper and have important policy implications. Firstly, the majority of SH recognize and identify the existence of problems, but they usually attribute them to climate change (an external process) or to the exploitation and overuse made by another SH. Then, they agree that more regulation and control on the use of natural resources is needed, as long as the restriction does not directly affect their own economic activity or interest. Secondly, and especially important for policy making, there are clear differences in perceptions among DM and SH, and also between SH from different economic sectors. With this regard, the Argentinean jurisdictional organization seems to complicate the situation, as usually DM are not located in the problem site and there is a clear lack of interaction between them and understanding of the relevance of the incorporation of SH in the planning and regulation process. The existence of different opinions between SH also complicates the establishment of regulatory process and planning. Finally, there seems to be a lack of long range planning for urbanization as well as economic exploitation of resources, probably due a contradiction of interests of the different economic activities (for instance tourism and fishery). We have also identified that the existence of legal regulations lack of an appropriate monitoring and sanctioning process. The long-term effectiveness of rules depends on capacity of users to monitor one another, their exploitation practices and on the governance system coherency besides the scale of the governance system (Ostrom, 2009; Coleman and Steed, 2009). It is straightforward that in this specific case, rules are not effective. The competence for natural resources as a consequence of heterogeneity of SH, and the failing of enforcement due to the non-appropriation of norms by SH and the weak social capital are the main causes.

Reducing coastal erosion will require the implementation of an interactive process in order to recover the coherence of the governance system. On the one hand, DM should prioritize the dialogue with stakeholders to consider the conflicts and solutions proposed by them in the policy making. This implies the understanding that the local knowledge of the socio-ecological system may be crucial for the performance of the norms. On the other hand, SH should deepen their social capital to enhance the coherence in demands and solutions that they propose to the governmental institutions. The elaboration of the bottom-up policies is the challenge to reduce the vulnerability of the region and the performance of the adaptation policies.

## Acknowledgments

The Seventh Framework Program of the European Union is gratefully acknowledged for supporting the research work in Argentina through the COMET-LA project. The views and opinions expressed in this article do not necessarily reflect those of the funding agency for this research.

## References

Acemoglu, D., Robinson, J., 2008. The Role of Institutions in Growth and Development. Commission on Growth and Development. Working Paper N° 10.

Adger, W.N., Hughes, T.P., Folke, C., Carpenter, S.R., Rockström, J., 2005. Social–ecological resilience to coastal disasters. Science 309, 1036.

Barragán, J.M., Dadon, J.R., Matteucci, S.D., Baxendale, C., Rodríguez, A., Morello, J., 2003. Preliminary Basis for an integrated management program for the coastal zone of Argentina. Coast. Manag. 31 (1), 55–77.

Basurto, X., 2005. How locally designed access and use controls can prevent the tragedy of the commons in a Mexican small-scale fishing community. Soc. Nat. Resour. 18, 643–659.

Basurto, X., Ostrom, E., 2009. Beyond the tragedy of the commons. Econ. delle fonti energ. dell'ambiente 52 (1), 35–60.

Berkes, F., 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. J. Environ. Manag. 90, 1692–1702.

Blanco, E., 2011. A social–ecological approach to voluntary environmental initiatives: the case of nature-based tourism. Policy Sci. 44, 35–52.

Bowles, S., Gintis, H., 2002. Social capital and community governance. Econ. J. 112 (483), F419–F436.

Bowles, S., Jayadev, A., 2004. Guard Labor: An Essay in Honor of Pranab Bardhan. Working Paper Series 63. University of Massachusetts. http://ideas.repec.org/p/uma/periwp/wp90.html.

Brandani, A., 1990. La Zona Costera de Argentina: Perfil Ambiental e Institucional. In: El Manejo Ambient. Recur. Costeros América Lat. el Caribe, vol. 1. Departamento de Asuntos Científicos y Tecnológicos de la OEA, pp. 37–53.

Brown, A.C., McLachlan, A., 2002. Environ. Conserv. 29, 62–77.

Bustos, M.L., Piccolo, M.C., Perillo, G.M.E., 2009a. Cambios en la geomorfología de la playa de Pehuén Co debido a la actividad de las olas el 26 de julio de 2007. In: Actas las Jornadas Interdiscip. del Sudoeste Bonarense, Universidad Nac del, pp. 97–102.

Bustos, M.L., Perillo, G.M.E., Piccolo, M.C., 2009b. Balance sedimentario comparativo de zonas urbanizadas y no urbanizadas en el balneario Pehuén Co. In: VII Jornadas Nacionales de Ciencias del Mar. Instituto Argentino de Oceanografía, Bahía Blanca.

Bustos, M.L., Piccolo, M.C., Perillo, G.M.E., 2011. Efectos geomorfológicos de fuertes vientos sobre las playas, el caso de la playa de Pehuén-Co, Argentina. Cuad. Investig. Geogr. 37 (11), 121–142.

Bustos, M.L., 2012. Estudio integrado ambiental del balneario de Pehuén-Co (PhD Dissertation). Universidad Nacional del Sur., pp 231.

Chang, H.-J., Evans, P., 2005. The role of institutions in economic change. In: Dymski, G., Da Paula, S. (Eds.), Reimagining Growth: Institutions Develop and Society. Edwar Elgar, New York.

Cinner, J.E., Wamukota, A., Randriamahazo, H., Rabearisoa, A., 2009. Toward institutions for community-based management of inshore marine resources in the Western Indian Ocean. Mar. Policy 33, 489–496.

Coleman, J., 1990. Equality and Achievement in Education. Westview Press, Boulder, CO.

Coleman, E., Steed, B., 2009. Monitoring and sanctioning in the commons: an application to forestry. Ecol. Econ. 68 (7), 2106–2113.

Dadon, J.R., 1999. Gestión de Sistemas con Baja Biodiversidad: Las playas arenosas del noreste de la Provincia de Buenos Aires. In: Matteucci, S.D., Solbrig, O.T., Morello, J., Halffter, G. (Eds.), Biodiversidad y Uso de la Tierra. CEA, EUDEBA, Buenos Aires, pp. 529–548.

Dadon, J.R., 2010. Manejo costero en la República Argentina. In: Congreso Red Ibermar. Manejo costero integrado y política pública en Iberoamérica: (un diagnóstico. Necesidad de cambio. Río de Janeiro, noviembre).

Dietz, T., Ostrom, E., Stern, P.C., 2003. The struggle to govern the commons. Science 12, 1907–1912.

ECLAC, 2012. Efectos del cambio climático en la costa de América Latina y el Caribe: vulnerabilidad y exposición. Naciones Unidas, Santiago de Chile. http://www.cepal.org/ddsah/.

Eisma, R.-L., Christie, P., Hershman, M., 2005. Legal issues affecting sustainability of integrated coastal management in the Philippines. Ocean. Coast. Manag. 48, 336–359.

Escalante Semerena, R., Basurto Hernández, S., Brugger Jakob, S.I., Lara Padilla, Y., Chapela, F., Hernández López, I., 2012. Stakeholders' vision on the socio-ecological system (SES) situation in Mexico. A case study. In: Comet-LA Proyect, seventh Framework Programme, México City. Available at: http://www.comet-la.eu/sites/default/files/_Comaltepec.pdf.

Farah, M.A., Garrido, E., Maya, D.L., Ortiz, C., Ramos, P., 2012. Stakeholder vision on socioecological system situation in Colombia case study. In: Comet-LA Proyect, seventh framework Programme, México City. Available at: http://www.comet-la.eu/sites/default/files/stakeholder%20view%20on%20SES%20deliverable%20COLOMBIA%2014%20SEPT%202012%20final.pdf.

Fehr, E., Leibbrandt, A., 2011. A field study on cooperativeness and impatience in the tragedy of the Commons. J. Public Econ. 95 (9–10), 1144–1155.

Geilfus, F., 2002. 80 herramientas para el desarrollo participativo: diagnóstico, planificación, monitoreo, evaluación. IICA, San José, C.R.. IPCC, 2007.

Gomez, E.S., Toresani, N.I., 1998. Las regiones de humedales de la Argentina. Región 3: Pampas. In: Canevari, P., Blanco, D.E., Bucher, E.H., Castro, G., Davidson, I. (Eds.), Los humedales de la Argentina. Clasificación, Situación Actual, Conservación y Legislación, vol. 46. Wetlands International Publications, pp. 97–114.

Hardin, G., 1968. The tragedy of the commons. Science 162, 1243–1248.

Huamantinco Cisneros, M.A., 2012. Efecto de la variabilidad climática del balneario Monte Hermoso sobre su geomorfología costera y el confort climático. Tesis doctoral. Departamento de Geografía y Turismo, Universidad Nacional del Sur, Bahía Blanca, Argentina.

Koku, J., Gustafsson, J., 2001. Local institutions and environmental planning in the South Tongu district: reflections on some challenges and prospects for effective resource management. In: Conference Proceedings, the 2001 International Sustainable Development Research Conference, Manchester, 2001. ERP Environment, Shipley.
Koku, J.E., Gustafsson, J.-E., 2003. Local institutions and natural resource management in the South Tongu district of Ghana: a case study. Sustain. Dev. 11, 17–35.
London, S., Santos, M.E., 2007. Rev. Econ. Soc. edición especial N° 20, Julio–Septiembre 2007, Universidad Michoacana de San Nicolás de Hidalgo, México.
London, S., Recalde, M., Rojas, M., Zilio, M., Perillo, G., Bustos, L., et al., 2012. Stakeholders vision on social–ecological system situation in Argentina case study. In: Comet-LA Proyect, Seventh Framework Programme. Available at: http://www.comet-la.net/sites/default/files/DELIVERABLE%20ARGENTINA%20FINAL.pdf.
Lowry, K., White, A., Courtney, C., 2005. National and local agency roles in integrated coastal management in the Philippines. Ocean. Coast. Manag. 48, 314–335.
Marcomini, S.C., López, R.A., 1997. Influencia de la urbanización en la dinámica costera, Villa Gesell, provincia de Buenos Aires, República Argentina. Rev. Asoc. Argent. Sedimentol. 4, 79–96.
Morton, R.A., Miller, T.L., Moore, L.J., 2004. Open File Report 2004-1043. U.S. Geological Survey.
North, D., 1990. Institutions, Institutional Change and Economic Performance. Cambridge University Press, Cambridge.
Ostrom, E., 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press, Cambridge.
Ostrom, E., 1999. Coping with tragedies of the commons. Annu. Rev. Polit. Sci. 2, 493–535.
Ostrom, E., 2009. A general framework for analyzing sustainability of social-ecological systems. Science 325, 419–422.
Perillo, G.M.E. (Ed.), 1997. Evaluación de la vulnerabilidad de la costa argentina al ascenso del nivel del mar, p. 62. PNUD/SECYT ARG/95/G/31.
Perillo, G.M.E., Piccolo, M.C., 2011. Global variability in estuaries and coastal settings. In: Wolanski, E., McLusky, D.S. (Eds.), Treatise on Estuarine and Coastal Science, vol. 1. Academic Press, pp. 7–36.
Perillo, G.M.E., Iribarne, O.O., 2003. New mechanisms studied for creek formation in tidal flats: from crabs to tidal channels. EOS Am. Geophys. Union Trans. 84 (1), 1–5.
Perillo, G.M.E., Piccolo, M.C., Syvistki, J.P.M., 2010. Delta geomorphology: is it in equilibrium with present day dynamic conditions?. In: Eighteenth International Sedimentological Congress, Mendoza, Argentina (Abstract).
Putnam, Robert, 1995. Bowling alone: America's declining social capital. J. Democr. 6 (1), 65–78.
Putnam, R.D., 2000. Bowling Alone: the Collapse and Revival of American Community. Simon & Schuster, New York.
Putnam, R.D., 2001. Social Capital: Measurement and Consequences. Working Paper. Kennedy School of Government, Harvard University, pp. 1–15.
Scott, C.A., Varady, R.G., Meza, F., Montaña, E., de Raga, G.B., Luckman, B., Martius, C., 2012. Science-policy dialogues for water security: addressing vulnerability and adaptation to global change in the arid Americas. Environment 54 (3), 30–42.
Skogen, K., Krange, O., 2003. A wolf at the gate: the anti-carnivore alliance and the symbolic construction of community. Sociol. Rural. 43 (3), 311–325.
Stiglitz, J.E., 2000. Formal and informal institutions. In: Dasgupta, Serageldin (Eds.), Social Capital: A Multifaceted Perspective. World Bank, Washington, DC, pp. 59–68.
Syvitski, J.P.M., 2008. Deltas at risk. Sustain. Sci. 3, 23–32.
Tohmé, F., London, S., 1998. A mathematical representation of economic evolution. Math. Comput. Model. 27 (8), 29–40.
del Vaquero, M.C., Pascale, J.C., Rodríguez, C.A., 2011. Encuentro Internacional de Turismo, Mar del Plata.
Wakita, K., Yagi, N., 2013. Evaluating integrated coastal management planning policy in Japan: why the guideline 2000 has not been implemented. Ocean. Coast. Manag. 84, 97–106.
Zhang, K., Douglas, B.C., Leatherman, S.P., 2004. Global warming and coastal erosion. Clim. Change 64, 41–58.
Zilio, M.I., London, S., Perillo, G.M.E., Piccolo, M.C., 2013. The social cost of dredging: the Bahia Blanca estuary case. Ocean. Coast. Manag. 71, 195–203.