

Sara C. Carvalho; Fátima Alves; Ulisses M. Azeiteiro and Pablo A. Meira-Carteia (2012). "Sociocultural and educational factors in the Sustainability of Coastal Zones – The Prestige oil spill in Galicia, ten years later" in Azeiteiro, Ulisses M; Fátima Alves, Ana Pinto de Moura and Miguel Â. Pardal (Guest editors) "MARINE ENVIRONMENTAL QUALITY and SUSTAINABILITY"; Management of Environmental Quality: An International Journal, Volume 23 issue 4, pp. 362 – 382. ISSN: 1477-7835

<http://www.emeraldinsight.com/journals.htm?issn=1477-7835&volume=23&issue=4&PHPSESSID=35pt42vmmujf41r5rju73h1l47>

Sociocultural and educational factors in the Sustainability of Coastal Zones – The Prestige oil spill in Galicia, ten years later

Sara C. Carvalho^{1,3*}, Fátima Alves², Ulisses M. Azeiteiro³ and Pablo A. Meira-Carteia¹

1 Departamento de Teoría da Educación, Historia da Educación e Pedagogía Social, Facultade de Ciencias da Educación, Universidade de Santiago de Compostela, Campus Universitario Sur, 15706 Santiago de Compostela, Galicia, España.

2 CEMRI – Centro de Estudos das Migrações e das Relações Interculturais, Universidade Aberta, Rua do Amial, 752, 4200-055 Porto, Portugal

3 CFE – Centre for Functional Ecology, Department of Life Sciences, University of Coimbra, 3001-401 Coimbra, Portugal.

*Corresponding author: saracostacarvalho@gmail.com

Abstract

Purpose - Environmental threats of immediate risk in areas such as coastal zones (CZ) have aroused new trends of citizenship and participatory democracy.

This article intends to analyse elements within those trends, such as environmental culture; socio-political context; dynamics of social associative movement and integration of local knowledge. It also aims to contribute to an overview of the opportunities and barriers found in considering sociocultural and educational challenges in CZ.

Design/methodology/approach - In this analysis, case studies of integrated coastal management occurring worldwide were selected and reviewed, considering several nuances of socio-economic and political contexts of CZ. Experiences of public response to coastal catastrophes such the *Prestige* oil spill in Spain, are also described.

Findings – Whether implementing sustainable coastal management through either balanced systems (between large and small-scale strategies) or through largely bottom-up approaches, participation is detected as one of the main factors for a successful integrated approach. Principles such as participatory governance and social justice should be adopted in initial phases of sustainable management processes and preferably involve all of the implied actors of CZ.

Originality/value - The literature reviewed provides specific highlights on factors that have empirically contributed to participatory sustainability of CZ, integrating three dimensions of citizenship: education, society's dynamics and culture.

Keywords: Coastal zones; sustainability; local knowledge; environmental education; citizenship; participatory democracy; coastal disasters.

Paper type: General review

1. Introduction

Coastal zones (CZ) are complex areas of strategic importance at an environmental, economic, social, cultural and recreational level. They are constantly under pressure from human occupation and over-exploitation of resources, resulting in serious environmental impacts. The coast has a high degree of demographic vitality, and a major part of coastal populations is economically dependent on marine resources.

The reasons for the degradation of CZ are diverse and of different geographical levels, so-called globalization being one of them. Globalization of trade (in commodities) and of tourism has an important impact in these areas, among other factors. As pointed out by García-Mira *et al.* (2003), globalization may bring many advantages but also creates tensions and risks to local culture and the diversity of lifestyles within a community.

The coast is exposed to many hazards and catastrophes, such as floods, coastal erosion and oil spills. Considering that, a catastrophe is a disaster of great magnitude that occurs in a short period of time (Ascencio, 2001) then the impact of that disaster is both on the biosphere and on a socio-cultural level.

The complexity of coastal zones and their management requires the knowledge to deal with situations and issues that sometimes seem abstract to populations, especially

when the consequences of ecological disasters or human actions are not very visible. Herein lays the importance and urgency of integrating an understanding of both social and cultural factors, with all the challenges that remain open regarding coastal management. The management policies have to deal with the so-called “Giddens paradox” (2009) when considering the sustainability of coastal areas and any socio-ecological integrated action. According to this paradox, since the dangers of global warming, ecological disasters and other phenomena are not visible, tangible or immediate to us in our everyday lives; populations do not feel much urgency to take action (Giddens, 2009). This is the probable explanation as to why people, even when aware of some of the harmful consequences of human action (individual and collective), are rarely willing to change their lives to face it.

At a local level, the sustainability of small-scale fisheries is also threatened. Coastal communities, such as these small-scale fisheries, should play an active part in the decision-making process, as they are the direct users of CZ. Furthermore, they depend mostly on the shore sustainability and suffer more intensively from the socio-ecological threats. Those threats are due to factors such as: progressive decline of fishery resources due to overfishing and the degradation and loss of habitat; the weak economic viability of small-scale fishing companies; the loss of local fishing cultural heritage, among others (Allut and Jesus, 2009). In the present context of a hegemonic globalization and its effects on society, local resilience turns out to be a key element. Such resilience implies the application of several principles (Sousa-Santos and Nunes, 2004): i) democracy and participation including experiences of participatory democracy; ii) non-capitalist production and economic organisation; iii) redistribution, recognition, justice and multicultural citizenship; iv) biodiversity, different forms of knowledge and cognitive justice, emphasizing local and traditional knowledge; v) new forms of labour internationalism, with focus on local forms of action.

In this sense, culture, quality of life, and globalization are three interrelated aspects that are subject to a political debate, which includes issues such as identity of place, value systems, and care of the environment (García-Mira *et al.*, 2003).

Adaptive responses to coastal threats are increasingly demanded, including socio-ecological resilience through Integrated Coastal Zone Management (ICZM) systems. Such ICZM are necessary to cope with arising hazards and are already supported by *Agenda 21* - chapter 17 (UNCED, 1992), resulting from the Rio Earth Summit in 1992, among other international agreements.

Although there are multiple definitions of ICZM or Integrated Coastal Management (ICM), a commonly cited one considers that “ICM is a broad and dynamic process that...requires the active and sustained involvement of the interested public and many stakeholders with interests in how coastal resources are allocated and conflicts are mediated. The ICM process provides a means by which concerns at local, regional and national levels are discussed and future directions are negotiated.” (GESAMP, 1996, 66).

Focusing on integrated management as a new system of coastal and fisheries governance, its operation should connect several aspects and levels such as (Suárez-Vivero *et al.*, 2008):

- I) Economic aspects – It is necessary to have an approach that considers social justice as a priority, examining the tensions caused by processes like the liberalization of trade flows;
- II) Political level – involves a redefinition of the rules of management and requires the incorporation of new social actors. Democracy and political participation form crucial conditions for the practice of social justice in coastal management;
- III) Environmental aspects – sustainability of ecosystems should embrace an integrated approach in order to promote sociocultural and biological diversity;
- IV) Sociocultural aspects – governance should struggle for cultural recognition of fishing communities through a commitment for sustainable exploitation practices.

The emphasis on local economy and on sociocultural aspects is growing in CZ governance in which bottom-up management systems are applied. This form of management is being implemented as an alternative to the conventional top-down coastal policy of local authorities, which failed to deliver sustainability in situations of local and regional coastal problems.

According to Reed *et al.* (2006), the bottom-up paradigm uses a variety of participatory methods, one of the most widely-used being the “Soft System Analysis. It starts by expressing the situation problem with stakeholders and makes use of informal discussions on people’s daily routine, as well as structured questionnaires. It is often combined with approaches such as participatory video mapping, oral histories, among others, in order to provide a view of how a community is vulnerable to environmental

and socio-economic threats. The method of *communities of practice* or *learning communities* is also a widely used participatory method. These communities are basically comprised of networks, the *communities of practice* referring to groups of people with a shared interest, knowledge and experience, who learning through partnership (learning-as-participation) around a situational problem (Berkes, 2009).

Top-down approaches have advantages in that they provide a more global assessment of problems, being especially important in the light of climate change models (Reed *et al.*, 2006). In contrast, the bottom-up approach provides a more contextualized understanding of local issues, thus is more suitable to community-based projects in cases of small-scale fisheries.

Nevertheless, as Reed *et al.* (2006) argues, a combination of both is necessary, through an adaptive learning process, to place the community in its relevant regional or global context and to identify external threats.

Regarding the small-scale fisheries, we underline the importance that Allut and Jesus (2009) give to the integration of fishing areas as Marine Protected Area (MPA), which can provide a framework to empower resource users.

Whether the new forms of coastal governance are implemented by using strategies of adaptive co-management (Berkes, 2009; Folke *et al.*, 2005) (collaborative/ multi-level governance); or created instead, with bottom-up strategies, integrated approaches become more and more urgent to address. The participation of all the stakeholders should then be active across all the processes, in order to respond to challenges including the economic, political, environmental and sociocultural ones.

2. Citizen participation, education and rights

The importance of citizen participation in coastal issues has been recognized as beneficial, particularly in integrated management programs. The participation process, by which people co-operate in solving problems (with creativity, knowledge, resources, and sharing of responsibility) is a way to rethink legal options and is a key factor for socio-ecological sustainability (Hernández, 2006). The author also refers to participation as a learning process that provides, among other elements, a coherent connection between education and action, to which we add the exercise of citizenship rights as a way of promoting participatory democracy. All the stakeholders of the society should take into account various ways of promoting participatory democracy. Educators, in particular, have available to them various ways of viewing the environment and the various dimensions within environmental education (EE), such as

its interdisciplinary nature. Such perspectives would effectively contribute to sustainable decision-making processes.

According to Sauv  (2005), the concept of *environment* has been seen in EE practices from various perspectives, such as the *environment as a community project* (a co-operative place with active participation of the population), and as *a place to live* (the environment related to everyday issues of social interaction, health), among other models.

These approaches to the environment benefit from educational methods such as the critical pedagogy of place (Vaske and Kobrin, 2001), as a strategy to promote principles of place attachment and environmental care.

Considering the importance of linking *environment* and *education*, then pedagogical actions focused on local issues should promote competences such as a critical thinking and questioning the realities. Losada-Otero and Garc a-Mira (2003) emphasize the role of *environmental action competence* - the ability to assess and look for solutions to current environmental problems and carry them out in practice - in order to promote critical social practices. It is expected that this competence will enable citizens to analyze problems and act in conformity towards fair and sustainable communities.

If acquiring knowledge and skills implies the participation of various actors in addition to the school, then, along with the population knowledge (their beliefs and practices), the *media* also plays an important role in aspects such as finding social representations of the environment. In addition, *media communication* is a powerful educational tool to promote social participation in the prevention of environmental hazards (Gaudiano, 2006).

Given all of these considered variables, it becomes essential to integrate the various dimensions of coastal zones management, in particular, sociocultural and educational factors, which are often not appreciated.

In order to illustrate the role of sociocultural and educational factors within coastal sustainability (e.g. factors such as the citizen participation) this paper describes some cases of integrated management systems in different coastal and fishing contexts. It also intends to highlight the potentialities and barriers to overcome in the application of those systems. Some case studies are related to the bottom-up approach using community-based systems, and others to multi-level management approaches, with an adaptive/collaborative form of governance.

The article reviews some case studies in four continents (e.g. Asian Region, East Pacific Coast of Africa, South America and South Europe) that have different nuances of sociocultural and educational factors regarding sustainability in CZ.

The socio-cultural factors discussed relate to different coastal environments (seashores, lagoons, coral reefs), including marine protected areas, and refer to the application of ICZM and community-based approaches (bottom-up systems), in contexts such as traditional fishing.

Two cases of educational programmes on coastal issues (in Russia and Mexico), as part of a strategy towards integrated management systems, are also summarised. These experiences emphasize the importance of an investment in education in order to take sustainable decisions in Coastal Zones, through integrated training and research, both on undergraduate and post-graduate level. Situations such as social-ecological resilience to coastal disasters and environmental threats are also discussed, with emphasis on the case of the unparalleled response to the *Prestige* oil spill (Spain), both in terms of sociocultural and educational action.

3. Studies review of sustainability in CZ

3.1 Community-based management – Frameworks in coral reefs in Kenya and Madagascar

Throughout the Indo-Pacific, governance of inshore marine resources is increasingly being decentralized to the local level and communities are being gradually more empowered about their natural resources (Cinner *et al*, 2009).

Bearing in mind the historical and social context of Kenya and Madagascar, as well as the flexibility of rule making, monitoring and enforcement and how community-based organizations are nested, a diagnosis was made as to the key design principles that are thought to be crucial for management success of commons institutions (Cinner *et al.*, 2009). To gather information, a combination of secondary information, expert opinion and key informant interviews were used with fisheries' staff and co-management group leaders.

In both countries, there exist co-management entities or forum structures: the Beach Management Unit (BMU), in Kenya, and *Gestion Locale Sécurisée* (GELOSE), in Madagascar.

In the Kenya context, until the 1920, coastal communities used social norms and traditional ecological knowledge to determine the rules, which governed resource use, ensuring simultaneously social cohesion, and restricting specific fishing gears. After the independence, the state took over the management of fisheries resources, and decades of top-down management led to a virtual collapse of fisheries in lakes and

coral reefs. As a solution there were created legal frameworks, as the BMU, to share responsibility through the structure.

Madagascar has sociocultural institutions that have played a role in conservation of both marine and terrestrial ecosystems, through the development of local social norms. There are marine resources vital to the national fisheries industry, the tourism industry and community livelihoods; however, there is no clearly defined national policy on marine resources.

Despite of the social norms, Madagascar's experience with conservation has been based on top-down system. The first two MPA, existing since 1989 and 1997, were created by a terrestrial-based protected area procedure that placed little emphasis on community conservation (Cinner *et al*, 2009). In 1996, the GELOSE introduce sharing of responsibility over the natural resource management among users was created.

Cinner *et al.* (2009) summarizes the situation of those African regions in four implementation levels:

- a) Keys factors or principles totally implemented in both countries: clearly defined membership rights; congruence of practices; rights to organize; conflict resolution mechanisms;
- b) Principles totally implemented in Madagascar but only partially in Kenya: nested enterprises.
- c) Principles partially present in both countries: monitoring of monitors; clearly defined geographic boundaries; collective choice arrangements; graduated sanctions;
- d) Principles not implemented in any country: monitoring of resources and surveillance.

The strongest elements in the management of the coral reefs areas are related to the self- and traditional organization of local communities and with the informal relationships that facilitate the well-defined mechanisms of conflict coping. Thus, the local cohesion is seen as a strength that the authors emphasized as a sustainability element.

Furthermore, it was concluded that adopting terrestrial conservation frameworks in marine systems is easier than planning an entirely new strategy. Nevertheless, this adaptation may create mis-matches and impediments for marine management that should be identified and taken into account. For instance, the rotational closure that is used in marine systems throughout the world is not viable in the land-based GELOSE Framework (Cinner *et al.*, 2009).

In this case, study, coastal management through community-based governance and a bottom-up approach seems to bring large benefits to those local contexts.

Indeed, several principles that define these methodologies are present in the observed reality, and demonstrate the contribution to local resilience and sustainability in CZ. Some of those principles, stated by Sousa-Santos and Nunes (2004) are the local cohesion of the population; a congruence of practice (traditional and sustainable knowledge together with critical views of the currently reality); and participation motivated by a strong sense of identity of place.

In spite of local mechanisms of management that are well established, other factors, such as evaluation and monitoring instruments, which need higher levels of governance (national, international), are still incipient and crucial to overcome.

Thus, there is a need for a broader approach and dialogue between the social capital at a local level (citizens and institutions) and external sources of knowledge, management skills and stakeholders. Efforts to evolve multi-level and collaborative governance would reinforce collective choice arrangements for long-term periods, at local and regional levels.

3.2 Key findings of Integrated Coastal Management in the Philippines and Indonesia

A research study of ICZM was held in nine sites of Philippines and Indonesia, in terms of the factors that influence CZ sustainability, including social elements.

In both cases, in addition to the emphasis on general elements, such as rational planning, resource allocation and conflict mediation, Christie *et al.* (2005) refer to other specific elements as starting points for analysing ICZM based on participation, such as colonial history, low formal institutional capacities, high incidence of poverty, and high and direct reliance of coastal inhabitants on coastal resources.

As an example of the socio-ecological context, in Philippines, fisheries catch-per-unit-effort is declining in most places. In addition, reefs, mangroves and water quality are being degraded in many locations.

The findings were derived independently by three research teams within the called *Integrated Coastal Management Sustainability Research Project* (ICMSRP). The Project used multiple research methods applied to distinct social groups in both countries' study sites to evaluate the ICZM model.

The analysis of these experiences leads to the conclusion that to foster CZ sustainability in the three levels of government (village, municipal and national) implies several conditions (Christie *et al.*, 2005), which can be grouped into five elements. Two of these elements are sociocultural factors: i) effectively managing ICZM-derived outcomes, i.e. distributing social and environmental benefits equitably among constituencies (therefore each community perceives a link between economic

improvement and ICZM process); ii) reaffirming participatory management: to attain ICZM process sustainability it is necessary that the community participation begin in the early stages of the process.

The other three elements regard general design conditions: iii) integration in difficult contexts and between multiple governance scales; in Philippine and Indonesian contexts, the laws at local level are highly developed but not at a national level; iv) long-term commitment as essential to success and sustainability; the cases studied defend that a clear direction of ICZM and effective staff requires 2-3 years. Thus, the scaling up of initiatives in these countries requires on-going support and monitoring for long-term sustainability; v) continuing the evaluative and adaptive process; research framed by multiple mandates, goals, and disciplines is essential to improve ICZM (idem, 2005).

In summary, this research demonstrated that participative, rewarding and just ICZM processes, conducted in a supportive legal-institutional context, are capable of improving environmental conditions while maintaining services to society.

The experiences observed demonstrate that general principles of ICZM and specific community-based approaches, such as the participation since early stages of the ICZM process (Hernández, 2006) and social justice (equitative distribution of benefits among inhabitants) have raised other factors, such as social trust and cohesion to move towards a local sustainability.

Nevertheless, there are limitations to bottom-up governance and to the potentialities of scaling local experiences. It can also be seen that the identification of barriers in adopting multilevel/ collaborative governance (e.g. integration of national laws in local context, lack of monitoring for long-term sustainability; research by multiple disciplines) can be a powerful instrument in developing a balanced and more successful system.

Comparing the study case 3.1 with 3.2 (Philippines and Indonesia), the scaling-up process from a community system into a multilevel coastal governance had already been developed. Successful factors for the scale-up process were identified, thus facilitating the surmounting of similar barriers in other contexts. We observed some aspects in common, related to a general capacity of local resilience of the coastal population. This resilience appears to be strongly connected with three social dimensions: the existence of informal relationships within communities; well-defined local mechanisms of conflict coping; and a congruence of practices that respect traditional ecological balance.

3.3 Case study of bottom-up governance with fishermen in Marine Protected Areas in Galicia (Spain)

Since 2003, one year after the *Prestige* oil spill, Galicia has had a bottom-up governance scheme in Marine Protected Areas (MPA) for small-scale fisheries management.

Considering the great social, economic and cultural importance of small-scale fisheries in Galicia, it turns crucial to address the current threats. In 2004, there were 5565 fishing vessels, of which 4 671 were less than 12 m in length; and 25 756 registered fisherman, out of a population of 2 750 985.

The first MPA (known as *Reservas Marinas de Interés Pesquero*) implemented in Galicia is localized in the area of Lira corresponds to Category VI (protected area with sustainable use of natural resources) of the IUCN classification.

The proposal of this MPA had its promulgation in 2007, technically supported by the *Fundation Lonxanet para la Pesca Sostenible* (a regional NGO). Then, it received financial and legal support from the Autonomous Government of Galicia (*Xunta de Galicia*).

The underlying aim is to promote the sustainable exploitation of fishery resources by balancing the social and economic needs of human communities with the maintenance of healthy and diverse ecosystems. This governance approach was based on principles such as participation, legitimacy, representativeness, shared governance and the use of traditional ecological knowledge systems, considering the transparent and efficient communication mechanisms throughout the process (Allut and Jesus, 2009).

In Galicia, the small-scale fisheries management is led by local fishermen's organizations (guilds/*cofraría* - traditional organizations with a democratic structure with two representative groups – owners and crew). To initiate the bottom-up process, it was necessary to legitimate it within the fishermen's organization, as well to elect a Committee of Representatives, which would include external facilitators who gather periodically.

Fishermen's experiences and traditional ecological knowledge are crucial sources of information on resource uses, threats, conflicts, species' life cycles, among other aspects. This data is regularly integrated in geographical information systems (GIS) in order to help in decisions on MPA location, zoning and how resources should be used and protected.

At the end of the design phase is organized a plenary session (or a general assembly) with all the fishermen to legitimize the proposal elaborated by the Committee of

Representants, who formulates than a Preliminary Management Plan defining long-term goals, prioritising needs, and proposing measures. Such Plan was voted for during a general assembly, and was adjusted to be then submitted for government approval.

The creation of the first MPA in the region - Os Miñarzos, in Lira, generated important methodological and legal precedents that were acknowledged by the Galicia government for the implementation of future MPAs (Allut and Jesus, 2009). In the meantime, other five initiatives were started. One of those has the particularity of being carried out by a network of four fishermen' organizations. This particularly type of collaboration demonstrates the existing social cohesion among these communities and the capacity of self-organization.

This MPA also tried to encourage other dimensions of CZ sustainability, such as scientific research, environmental education, public awareness and recreational opportunities (Allut and Jesus, 2009). In this regard, it is important to note that further studies would be useful to understand the impact of the application of those dimensions and to help to re-adjust the strategies already developed.

Since the implementation of MPA for small-scale fisheries is a recent phenomenon in Galicia, we agree with the statement of Allut and Jesus (2009) that the implementation of more MPAs would be reinforced by developing strategies to increase coordination among stakeholders. Such strategies would also facilitate the operation of consensual principles for local resilience and sustainability, such as those stated by Suárez-Vivero *et al.* (2008): political participation for social justice; promotion of sociocultural and ecological diversity with recognition of the culture of fishing communities.

3.4 MARGov – Setting the Ground for the Governance of Marine Protected Areas (study case of Portugal)

In 2008, a Model of Collaborative Governance for MPA through the MARGov Project was created in the Marine Park Luiz Saldanha (MPLS), Sesimbra, South East of Portugal. The model aims to empower local communities and share management responsibilities among stakeholders, including artisan fishermen, through a participatory process, with the goal of lessening contested decisions in the MPA (Vasconcelos *et al.*, 2011). The MPLS was created in 1998 with an area of 53 km² corresponding to 38 km of rocky coast, and is integrated in the European Network *Natura 2000*. The area complements a previously existing territorial protected area, created by a top-down process, and characterized by conflicts due to fishing

restrictions. In contrast, the MARGov Project has developed its strategy based on the methodology of *communities of practice* or *learning communities* (Berkes, 2009).

The Project is structured in three components: *Governance* (classified as participation, collaboration and decision); *Citizenship* (education and awareness); and *Dynamic-spatial Structure*. The participatory process has been developed in three main phases: identification of the stakeholders; structuring of the participatory processes; and elaboration of a proposal.

In the participatory process, MARGov implemented collaborative negotiation techniques with the stakeholders to address the existing conflicts. A virtual platform was developed where participants launched questions, discussed answers and prioritized them. This process culminated with the organization of a workshop, challenging the participants to identify further key-participants to deal with those questions. There were also monthly *forums* with presentations by experts on the priority questions, as well as debates involving different stakeholders. Simultaneously, the team organized monthly closed meetings with the fishermen and other meetings with different public entities, in order to get feedback and evaluation on the participatory process.

The *Citizenship* component strategies consisted, firstly, in the description of existing environmental awareness and education activities, followed by: diffusion of the MARGov project in the media and events; an environmental educational (EE) program (resulting in a participation of more than 1000 children and students); educational outreach community events (EE mobile structures, e.g. a van visited by over 1000 people); and cultural events involving all generations (storytelling sessions, among others).

As main results, the involvement of the different stakeholders led, according to Vasconcelos *et al.*, (2011), to a set of collaborative learning. The methodology has the potential to enhance trust building and empowerment. Similarly, it was possible to pass from a controversial context into an opportunity for co-responsabilization, since stakeholders felt genuinely involved and showed greater autonomy to pursue independent initiatives within the social network of the project (Vasconcelos *et al.*, 2011).

The implementation of collaborative and integrated governance in MPLS has also contributed, as a study case, to develop and test a set of adaptive-participative sustainable development indicators (SDI) for the assessment, management and reporting of this and other MPAs, as it is described by Marques *et al* (2011). It is important to note that in this set of sustainability indicators, special significance is given to socio-economic conditions and governance levels.

The analysis of this project shows the importance of the active participation of all stakeholders, especially of local citizens and fishing communities. The need to critically investigate the methodologies that participatory processes have used in local governance and sustainability is also suggested.

Community participation using creativity, knowledge, resources and the sharing of responsibility, seems to have many benefits in the MPLS. The citizen participation in PMLS was approached as a *learning process* (Hernández, 2006), since it provided a connection between educational and action dimensions of the project. Nevertheless, further quality results regarding the *Citizenship* component are required in order to help evaluate the motivations and impact of the educational activities in the local community, including the students. Such assessments could contribute in developing deeper and more committed social, educational and environmental approaches, considering principles such as the *critical pedagogy of place* (Vaske and Kobrin, 2001).

Comparing the MPA of the closed regions of Galicia (Spain) with the MPA of Sesimbra (Portugal), in both cases the aspects of active participation of local communities and the sharing of traditional knowledge were integrated in the planning and implementation processes. In addition, in both cases, the involvement of the local and fishing communities led to enhanced trust building and empowerment among those communities.

We highlight some differences, in terms of leadership structure and initial motivations for the MPA creation. In Galicia, the implementation of MPA (called bottom-up governance) was an initiative of fishermen organizations. It also involves a networking system led by those organizations to create other MPAs, which demonstrates a strong local cohesion and high level of fisheries empowerment. In contrast, the Portuguese MPA presented is based on a multilevel system - collaborative governance, instead of a typical bottom-up approach. This option is probably due to the initial Portuguese context, with the existing conflicts involving the fishing community. In spite of the initial difficulties, the current collaborative governance has shown to be crucial to overcome problems and to gradually foster an increase in participation and trust building.

3.5 ICZM of traditional fishing – Coast of the State of Santa Catarina (Brazil)

In the coast of Santa Catarina, Brazil, the crisis in artisanal fisheries is growing more intense. Until recently, many fishing communities in this Brazilian region had adopted strategies such as: informal rules for access and use of marine resources; monitoring mechanisms; leadership and conflict management, with principles based on traditional

ecological knowledge of fishermen that promoted socio-ecological sustainability. However, such rules tend to be disregarded with the increase of urban pressure, with mass tourism and the demand for industrial fishing and aquaculture.

Community structures usually maintain consistency with the culture and lifestyles in each socio-ecological context (Rebouças *et al.*, 2006). Therefore, these authors highlight the relevance of adaptive co-management of common-use resources.

Such co-management implies an institutional strategy at the local level in order to give a quicker response to environmental feedback than centralized government agencies are able to, maintaining the local scope linked to other levels of management. It is therefore crucial that partnerships exist between government agencies, NGOs, resources users, educational and research institutions, the fishing industry and other entities.

The scientific community in particular is highly challenged to integrate inter and trans-disciplinary research, as is made clear by the example of an integrated implementation of the Local Agenda (LA) 21 in a community of fishermen of the Santa Catarina State.

In LA 21, the participatory diagnosis of the fishing sector was held in 2003, with the support of the National Environment Fund. It also implemented an adaptive co-management approach that integrated several aspects of the fishing activity, including socio-economic, political, institutional and cultural elements (Rebouças *et al.*, 2006). A series of initiatives within LA 21 were developed, namely the creation of a fishermen's association and a community workshop. This workshop made resolutions such as the increase of exchanges between the fishing community and the Secretariat of Aquaculture and Fisheries, and the creation of a national network of technical support for artisanal fisheries. This event was also useful to create awareness in the inhabitants for a marine-coastal extractive reserve and for the development of a city plan for ICZM. LA 21 has also encouraged civil actions regarding problems of illegal coastal occupation that affect fishing activities.

Rebouças *et al.* (2006) argue that, in Brazil and other countries, local participatory assessments of ecosystems and the establishment of scenarios are crucial to obtain long-term sustainability. Thus, it is necessary to develop research networks and training initiatives in different environmental sciences.

This study corroborates the notion stated by Hernández (2006) that citizen active participation, through the sharing of responsibility, can effectively contribute to rethinking legal and institutional options. In the mentioned community of fishermen, the implementation of the LA 21 instrument was continuously linked to a national network of technical support. This case also demonstrates that the participation process

became a learning process, with local people practicing citizenship right towards a participatory democracy.

In the same way, the connection between the bottom-up management system and the top-down scheme, through the development of adaptive co-management and a transdisciplinary research approach, was seen as a key element for sustainability. The application of the transdisciplinarity factor implied, in this case, tackling the *environment* as those perspectives presented by Sauv   (2005): *environment* as a *community project* (e.g. active participation of fishermen) and as *place to live* (e.g. recovery of place connectiveness to the coast).

This case adds an innovative factor to the other studies, since it introduces the instrument of Agenda 21 as a management system for fishing communities that emphasizes a logic of collaborative and integrated governance.

As in the other first cases presented, in this Brazilian context the focus is in the social cohesion, and there is a system of informal rules for resources' use (conflict management). However, there is an important difference from those studies, since the higher levels of coastal management are well developed and integrated within the local system. One example of this situation is the existence of consistent mechanisms of monitoring the Agenda 21 process.

3.6 *Social-ecological resilience to Coastal Disasters – Tsunamis and climate change events*

Two studies analysed the linkages between ecosystems and human societies in helping to enhance resilience in coastal areas – the Asian tsunami in 2004 and a research on adapting to severe storms and climate change in the Caribbean.

Among other elements, researchers observed that fishing communities in the west of Sumatra survived the tsunami thanks to inherited local knowledge of tsunamis and to institutional preparedness for disasters.

Likewise, in the Caribbean, responses depended on social and ecological resilience, but there were difficulties in adaptation processes. For instance, during hurricane Mitch, farmers near the coast that used modern management practices suffered greater losses than those that employed traditional agro-ecological practices (Adger *et al.*, 2005).

In both cases, individuals and communities undertake adaptive strategies that involve the mobilization of networks and social capital and imply diversifying patterns of resource use by encouraging alternate activities and lifestyles, among other initiatives.

To sum up, effective multi-level governance systems are critical for building capacity to cope with climate changes, disease outbreaks, hurricanes, global market demands, subsidies, governmental policies and other large-scale changes. In the same way, multi-level social networks are crucial for developing social capital and for supporting the legal, political and financial frameworks that enhance sources of social and ecological resilience. The study finally shows that incentives are essential to generate ecological knowledge and to transfer this knowledge into information that can be used in governance (Adger *et al.*, 2005). The factors of success in dealing with those coastal disasters can be categorised into three main aspects: the ecological knowledge and its integration in a broader resilience framework (cultural recognition of coastal communities); the socio-ecological and traditional resilience (threats from modern and non-contextual practices); and the development of multi-level social networks as an instrument to share practices and promote change in behaviours.

To sum up the study cases above, they have different but complementary characteristics of integrated management, depending on geographical, economic and socio-cultural contexts, and on the coastal governance systems adopted.

Nevertheless, some key factors were found in common. In all contexts, the planning and implementation phases were developed with an active participation of the local community. Similarly, all the systems observed have considered the traditional ecological knowledge of coastal and fishing communities. Thus, the importance of the culture of coastal communities is more and more recognized as essential to promote socio-ecological sustainability in those areas.

Following the previous examples and factors we now discuss the case of coping with an oil spill disaster (*Prestige*' case, in 2002, in Galicia), which occurred one year before the adoption of bottom-up management in this coastal region, mentioned in 3.3.

This case highlights specific characteristics of dealing with coastal problems, namely, the strong connection between the sociocultural context (citizen action) and the educational context (school involvement with the community), concerning mobilization and resilience capacity.

4. Coping with a spill disaster – The *Prestige* case

The *Prestige* accident that occurred off the Galician coast (Northwestern Spain) is considered the ecological disaster that most affected Europe: the oil tanker split in half and sank discharging thousands of tonnes of toxic and heavy oil into the ocean.

Following the parameters to evaluate the severity of these events, Armas and García-Allut (2003) explain that in the case of *Prestige*: i) the proportion of population affected was higher than in the *Exon Valdez* accident (in Alaska); ii) the familiarity with the crisis was very high in Galicia (it was the fifth ship accident in 30 years); iii) the intensity of participation of the economic and social actors was very high; iv) the probability of occurrence is high in Galicia (intensity of 1400 ships/year with hazardous substances). The biodiversity impact was extremely high, from the extinction of species that are fixed to the seashore, to the damage to the organisms that float and inhabit the coastal and marine zone (Beiras-Manuel, 2003).

The oil spill also had a significant effect on the economy of the region because Galicia is highly dependent on the sea, especially with fishing, fishing-related activities and the tourism sector.

Although many experts consider it difficult to assess consequences of socio-cultural impacts, it was found that there was an increase of emigration in the most affected areas, an increase in alcoholism among fishermen, and there were indirect negative impacts caused by images of the region on international television (Aleixandre and Cienfuegos, 2003).

4.1 Sociocultural factors in coping with the *Prestige* accident

In contrast to other ship accidents, in the *Prestige* case the political response during the spill episode was a lot more subdued. As a manifestation against the lack of response, and at the extent of the spread of the spill, social action was initiated by the community (citizens' organizations, members of local private companies and a few co-ordinators from different non-governmental organizations and fishermen guilds). The manifestation included taking practical and voluntary action to mitigate the effects of environmental damage, such as coastal cleaning operations and political action in the form of public protest and civic mobilization against government complacency (with the support of the platform *Never More (Nunca Mais)* (Armas and García-Allut, 2003). This platform had been created after other shipping accidents (*Urquiola*, in 1976 and *Aegean Sea*, in 1992), as an instrument to demand preventive measures.

The relevance of this social response was analyzed in a study on the environmental culture of the society of Galicia - *Fénix* Project (Meira-Cartea, 2007). The study was based on a representative sample of the Galician population over 18 years old, from a sample of 1,200 citizens), who were interviewed by telephone. The sample criteria also considered the proportional size of the four provinces of Galicia and the three types of

habitats (municipalities with over 50,000 inhabitants, another between 10,000 and 50,000, and those with less than 10,000 people).

The research, conducted five years after the accident showed that almost one third of the respondents (34,6%) had attended a social initiative in response to the catastrophe, in particular individuals between the ages of 18 to 25 years old. As a socio-economic element, the greatest amount of participation was seen from those with the highest level of studies. From such data, it could be inferred that these citizens have a higher level of environmental culture/knowledge and, therefore, a greater tendency to participate. However, when citizens were asked about the “main reason” to participate in actions, the majority of motivations stated were related to instinctive reaction and activation, and only a minority reveal a rational reaction. The spectrum of reactions includes:

i) Participation as an instinctive and social activation of resilience to a local threat, perceived as very serious and without well-defined resolutions. These types of motivation were most common (almost 70%): 22,5% justified them with “I could not stay without doing anything against the magnitude of the disaster”; 19,7% “solidarity with people living from the sea”; 17,3% “indignation about the lack of reaction from the Administration”; 9,9% “the attempt of the Administration to minimize the catastrophe”; 9,6% “Outrage to our land/region” (answer also associated with a motivation related to a sense of place identity).

ii) Participation, as a rational reaction, results from a society composed, in part, by the “generations of environmentally educated” and environmental culture, which by the time of the *Prestige* incident was mature in terms of an environmental awareness and civic commitment – 14,7% answered “ecological awareness of the environmental disaster”, and 0,7% “to collaborate as citizen on a common problem”. These types of motivation may indicate a proactive component of the answers, though they were a minority.

The coastal provinces of Pontevedra and A Coruña had participated more than the inland regions. The lack of interest of those latter regions probably is due to an elderly population and a lack of education (idem, 2007).

One factor motivating indignation, public protest and social response came, by the time of the accident, from the lack of information, and the unreliability of available information, through cases of *media* manipulation, observed by the absence of news on the risk to the population and productive sectors (Beiras, 2003). The occurrence of that phenomenon was informally reported by citizens and NGOs in the streets, as a way of demanding the resignation of *media*’s managers (Beiras, 2003).

The *Prestige's* social impact brought a challenge to the *media* and the social responsibility of journalists, based on several factors (Blanco, 2007): i) Many journalists were mediators of the disaster with a social function, disseminating information and condemning the lack of freedom of speech; ii) the public criticised the social responsibility of journalists; iii) the high degree of citizen mobilization took information from the local to the national and international levels.

Social pressure together with *media* collaboration forced the government into organizing volunteers' participation and making emergency plans to create new infrastructures and projects for the social and economic development of Galicia.

Several factors have led to the unparalleled social and community response, in the context of Galicia. Meira-Cartea (2005) points out the existence of: an identity factor, based on the cultural and symbolic role of the sea in Galicia Society; a socio-economic factor, because the social response was more active in the most dynamic economic zones (with companies dependent on the sea); a solidarity factor, volunteers came from all over the country and abroad but two thirds were from Galicia; a political factor, because the society experienced the power of their participation; and an factor of environmental culture (30 years of environmental education and also civic maturity).

García-Mira *et al.* (2006) conducted a diagnosis about the changing relationship between a damaged environment and a human community, immediately and a year after the catastrophe. Through interviews, a relevant difference was found between the perceptions of inhabitants and the volunteers who collaborated in cleaning initiatives. A year later inhabitants seemed much less concerned about the circumstances and consequences of the disaster (in 2002, 84% of inhabitants were quite affected or very affected and only 55%, in 2003). According to García-Mira *et al.* (2006), the apparent complacency of the population, one year after, is due to: i) a coping psychological strategy of minimizing the perceived impact; ii) most fishermen receive a subsidy from the government (irregular salary) that inhibits public manifestations; iii) with no remaining visible oil slicks the tendency is to forget; iv) socio-political and cultural background, i.e. challenging authority is difficult to sustain in a conservative society.

In general, it was solidarity behaviour although, as Armas and García-Allut (2003) note, the emergency organizations have not always worked, nor have the mechanisms of perception and behaviour changed.

Nevertheless, the *Fénix* Project has shown that coastal and marine issues are still present in the environmental concerns of the Galicia population, 5 years on from the *Prestige* accident. In fact, themes like "coastal contamination" appear in 10th place (3.8%) in a list of problems within Spain, while this theme appears in 4th place as a

problem within Galicia (12%, with several references to the *Prestige*) (Meira-Cartea, 2007).

According to the author (2007), this data may help to warn of the need for a culture of prevention, rather than just one of reactive actions to disasters. It also calls for re-thinking educational tools towards appropriate strategies of prevention and sustainable coastal management.

4.2 Educational factors in coping with *Prestige*

In the context of the great mobilization, there was a unique response of the educational community throughout Galicia with a diversity of methodologies and initiatives (debates on consumer options and other themes; questioning the crisis by comparing news coverage; art installations; parents helping in cleaning activities; a human chain initiative on the beach, and others).

Aleixandre and Cienfuegos (2003) identified common elements of such initiatives (Figure 1): i) the connection between school and society, ii) an interdisciplinary perspective; iii) creation of solidarity networks with Internet support; iv) collaboration with NGOs; v) development of critical thinking; vi) massive involvement of primary and secondary schools.

Figure 1 – Dimensions of the actions took in the context of the *Prestige* catastrophe
(from Aleixandre and Cienfuegos, 2003)

The integration of environmental education and social response among the Galician society was analysed by Meira-Cartea (2004), with several factors for such a connection being identified:

- The recognition of the power of current innovative environmental education (EE) – although it may be incipient, the environmental culture of Galician society has been changed and awoken with the *Prestige*;
- The current educational program in primary and high schools doesn't embrace episodes like the *Prestige*;
- The symbolic off shoring of EE was called into question; the *Prestige* has a local dimension (CZ of Galicia) and a global one (energy needs, etc.), in opposition to general themes without a social scenario.
- From a certain EE configuration the conflict emerged because there arose some alternative views of the socio-political reality;
- Many teachers have become critical intellectuals and social activists;
- The spontaneity in creating social networks, articulated with the social implication;

-The school administration inverts its EE concept because it had censured the socio-political position of teachers;

-EE becomes political education, i.e. the focus of EE actions are the social relations with the environment and not the environment (biophysics) itself.

It is more and more recognized that to foster a critical, active and concerned citizenship with regard to their current reality, the EE must integrate socio-political elements at several spatial levels. Thus, the cooperation of actors such as authorities, *media* and other social sectors is an instrument for political education of students (Canabal *et al.*, 2003). In spite of the emotional motivation for high participation levels at the time of the accident, several specialists agree that the Prestige case has revealed a process of cultural change that was already ongoing in the Galician society since the last generations.

4. Recommendations and conclusions: The way forward

The trends to address environmental problems are frequently framed by technical factors as a priority and do not consider cross-sector approaches to emphasizing cultural and socio-political issues in decision-making processes.

In order to minimize conflicting uses within the coastal context, several specialists defend the need of Integrated Coastal Zone Management (ICZM) systems seeking plans that strike a balance between large-scale and targeted (local) management.

Some experiences defend the adoption of an integrated model through a co-adaptive management system, taking into consideration the continuous dialogue and feedback between the multiple levels of governance. In this approach, centralized projects have the opportunity to link local initiatives with their intrinsic contexts (their limits/problems and potentialities), and have the opportunity to understand the sociocultural systems together with the ecosystems, thus moving towards a holistic approach of CZ.

A large debate is currently occurring between proponents of participatory integrated models through bottom-up governance, aimed at meeting social and environmental goals on relatively small scales. As Christie *et al.* (2005) point out, as an alternative to ICZM, local government-led management regimes may not be ideal from the ecological perspective but in many cases are the most effective strategy. Human-ecological studies have already shown a large number of cases of local fisheries management in almost all regions of the planet (Berkes *et al.*, 2001). Depending on the socio-economic and geographic context, some coastal management systems are exclusively designed with community-based strategies, as can be seen in emerging countries (which give

priority to local initiatives that are more developed, and only in a second stage is there a link of such initiatives to centralized political strategies).

Whether through a collaborative and integrated system or through a community-based strategy, there are common socio-cultural aspects among the cases presented in this paper that may influence the paths and decisions towards coastal sustainability:

- In implementation processes of integrated coast management, it was found that in order to reaffirm participatory principles, it is useful to employ early-stage community participation in context through methodologies such as discussion groups and networks (*communities of practice*) (Berkes, 2009); or participatory video mapping, oral histories (Reed *et al.* (2006), among others.

- Challenging small-coastal communities to manage their own resources is also a key issue, by promoting shared responsibility, local autonomy and self-organization and by promoting citizen involvement (e.g. organization of fishermen through the creation of associations);

- Both social and environmental benefits should be equitably distributed in ICZM, managing outcomes as a socio-economic factor. In this manner, rewarding and just processes can actually contribute to improve coastal conditions and to maintain social services;

- The creation of multi-level social networks is crucial for developing social capital that can support frameworks (legal, financial) to enhance social and ecological resilience.

- Creation and restoration of conflict resolution mechanisms should be encouraged, considering aspects such as clearly defined membership rights;

- Recognition of the population's needs and the study of their relationship with the coastal areas (cultural characteristics including empirical and traditional knowledge) is important for a decentralization of the fishing activities based on socio-ecological sustainability. As Leff (2004) states, cultural restoration of fishermen's communities means a recognition of the "place in the world" of these groups. In line with this view, in many of coastal areas, aspects such as the traditional knowledge, has become an integral part of the dynamics and management of coastal ecosystems (Kallesøe *et al.*, 2008).

In terms of educational factors for CZ sustainability and for a participative integrated management, the following patterns are identified:

- As in other geo-biophysical contexts, the level of environmental culture (environmentalist factors) and the level of studies in CZ are both highly influential in the motivation for participation in community initiatives;

- The approach to coastal issues in the school curriculum should be a priority, according to several experts and official documents. Such approaches should integrate the local and global dimensions of the problems, considering contextual complexity (emphasis of environmental education (EE) on a community projects perspective and with a sense of connectness to the place). Likewise, tackling EE as a form of political education facilitates the adoption of a critical view of the reality and competence for action in the minds of the participatory democracy (including scholarly institutions, social and institutional networks);
- There is a need for training courses, in particular on local leadership issues and conflict management. Such training schemes have been developed by means of community workshops, and have produced tangible results: increased exchange between local communities and regional/national institutions; creation of networking advice to fishermen' communities; awareness initiatives for developing marine protection areas;
- Inclusion of local universities in the process of integrated management, as a way to consolidate a culture of cooperation in the preservation of the coast. In addition, adaptive co-management studies indicate that efforts should be made in the area of inter- and trans-disciplinary research from all of the environmental sciences;
- The implementation of assessment strategies on educational initiatives was revealed an effective instrument to contribute toward sustainability within Coastal management practices.

The sociocultural and educational factors in this paper reinforce the notion that an integrated and participatory management of CZ facilitates the preservation of the dynamics of natural resources and the quality of life of citizens living within those contexts.

Acknowledgements

We would like to thank the Foundation of Science and Technology, Portugal, which funds the PhD research of the co-author Sara Carvalho (grant ref. SFRH / BD / 69059 / 2010). We are grateful as well to an anonymous reviewer for the helpful comments and suggestions. Thanks also to Pedro Flores, Conceição Almeida and Jason Pascoe, for their generous contributions to English reviews of the text.

References

Adger, W.N.; Hughes, T.P.; Folke, C.; Carpenter, S.R. and Rockstrom, J. (2005). "Social-Ecological Resilience to Coastal Disasters". *Science*, Vol.309, No.5737, 1036-1039.

Aleixandre, P.J. and Cienfuegos, E. (2003). "Educación ambiental en tiempos de catástrofes – educación en un contexto social: la marea negra en los centros escolares gallegos". *Aula de Innovación educativa*, No.122, 6-11.

Allut, A.G. and Jesus, A. (2009). "Becoming Proactive Agents". *Samudra Report*, Vol.53, 15-18.

Armas, P. and García-Allut, A. (2003). "O Prestige: Teoría Social da Catástrofe", Varela, J.A. and García-Allut, A., *Que foi do Prestige?*, Sotelo Blanco Edicións, Santiago de Compostela, pp.79-124.

Ascencio, C.L. (2001). "El medioambiente: un acontecer catastrófico", paper presented at the VII Congreso Español de Sociología (FES), September de 2001, Universidad de Salamanca, Spain.

Blanco, I.L. (2007). "El periodista ante el Prestige: La función social y educadora del periodista durante la catástrofe", Vilallonga, R.M. and Muñoz, L.C., *Nuevas tendencias en investigaciones en Educación Ambiental*, Organismo Autónomo Parques Nacionales, Ministerio de Medio Ambiente, Madrid, pp. 483-497.

Beiras, R. (2003). "A catástrofe do Prestige: Unha oportunidade para a transformación da sociedade galega". *Grial – Revista galega de Cultura*, No.157, pp.15-26.

Beiras-Manuel, X. (2003). *A catastrophe do Prestige*, Edicións Laiovento, A Coruña, pp.80.

Berkes, F. (2009). "Evolution of co-management: Role of knowledge generation, bridging organizations and social learning", *Journal of Environmental Management*, Vol. 90, pp. 1692-1702.

Berkes, F.; Mahon, R.; McConney, P.; Pollnac, R. and Pomeroy, R. (2001). *Managing small-scale fisheries: alternative directions and methods*. IDRC Edition, Ottawa, Canada.

Canabal, A.; Constenla, X.; Anxo, E.; Iglesias, M. and Pillado, N. (2003). "Educar a personas críticas, un reto a nuestro alcance". *Aula de Innovación educativa*, Vol.122, 18-22.

Christie, P.; Lowry, White, A.T.; Oracion, E.G.; Sievanen, L.; Pomeroy, R.S.; Pollnac, R.B.; Patlis, J.M. and Eisma, R.V. (2005). "Key findings from a multidisciplinary examination of integrated coastal management process sustainability". *Ocean & Coastal management*, No.48, pp. 468-483.

Cinner, J.E.; Wamukota, A.; Randriamahazo, H. and Rabearisoa, A. (2009). "Toward institutions for community-based management of inshore marine resources in the Western Indian Ocean". *Marine Policy*, No. 33, pp. 489-496.

- Folke, C.; hahn, T.; Olsson, P. and Norberg, J. (2005). "Adaptive Governance of Social-ecological Systems", *Annual Review of Environmental Resources*, Vol. 30, pp. 441-473.
- García-Mira, R., Cameselle, J.S. and Martínéz, J.R. (2003). "Culture, quality of life and globalisation, García-Mira, R., Cameselle, J.S. & Martínéz, J.R., *Culture, environmental action and sustainability*, Hogrefe & Huber, Cambridge, UK, pp.11-19.
- García-Mira, R.; Real, J.E.; Uzzell, D.L.; San-Juan, C. and Pol, E. (2006). "Coping with a threat to quality of life: the case of the Prestige disaster", *Revue européenne de psychologie appliquée*, Vol. 56, 53–60.
- Gaudiano, E.G. (2006). *Educação Ambiental*, Instituto Piaget, Lisboa, pp. 258.
- GESAMP-Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (1996). *The contributions of science to integrated coastal management*. GESAMP Reports and Studies, No. 61, pp. 66.
- Giddens, A. (2009). *The politics of climate change*, Polity Press, Cambridge, pp. 664.
- Hernández, F.H. (2006). "A participación como proceso de aprendizaxe e coñecimento social. Ambientalmente Sustentable". *Revista Científica Galego-Lusófona de Educación Ambiental*, Vol.1, No.1-2, pp.229-242.
- Kallesøe, M.F.; Bambaradeniya, C.; Iftikhar, U.A.; Ranasinghe, T. and Miththapala, S. (2008). *Linking Coastal Ecosystems and Human Well-being*, IUCN, Ecosystems and Livelihoods Group Asia, Ministerio de Medio Ambiente, Spain, <http://www.iucn.org/asia/coastalinfo/> (01/04/2009)
- Leff, E. (2004). *Saber ambiental - Sustentabilidad, racionalidad, complejidad, poder*, Siglo XXI Editores, PNUMA, Buenos Aires y Mexico, pp. 414.
- Losada-Otero, M.D. and García-Mira, R. (2003). "Action competence in environmental education", García-Mira, R., Cameselle, J.S. and Martínéz, J.R., *Culture, environmental action and sustainability*, Hogrefe & Huber, Cambridge, UK, pp.71-83.
- Marques, A.S.; Ramos, T.R.; Caeiro, S.; Costa, M.H. (2011). "Adaptive-participative sustainability indicators in marine protected areas: Design and communication", *Coastal Zone Ocean and Coastal Management* (In press, available online 17 August). doi: 10.1016/j.ocecoaman.2011.07.007.
- Meira-Carteá, P.A. (2004). "La dimensión política de la Educación Ambiental a la luz de la catástrofe del Prestige", Torres, A., *L'educació ambiental en xarxa*, VI Fórum 2000+4, pp. 15-28.
- Meira-Carteá, P.A. (2005). "Educación Ambiental en tiempos de Catástrofe: La respuesta educativa al naufragio del Prestige". *Educação e Pesquisa*, Vol. 31, No. 2, pp. 265-283.
- Meira-Carteá, P.M. (2007). "Unha aproximación à cultura ambiental da Sociedade Galega – Estudo Demoscópico". Relatório do Projecto Fenix, Sociedade Galega de Educación Ambiental, Santiago de Compostela, pp. 91.

Rebouças, G.N.; Filardi, A.C. and Vieira, P.F. (2006). “Gestão Integrada e Participação da Pesca Artesanal: Potencialidades e obstáculos no litoral do Estado de Santa Catarina”, *Ambiente & Sociedade*, Vol. 9, No. 2, pp. 83-104.

Reed, M.S., Fraser, E.D. and Dougill, A.J. (2006). “An adaptive learning process for developing and applying sustainability indicators with local communities”, *Ecological Economics*, Vol. 59, No 4, pp. 406-418.

Sauvé, L. (2005). “Uma cartografia de correntes em educação ambiental”, Sato, M. and Carvalho, I., *Educação Ambiental: pesquisa e desafios*, Editora Artmed, Porto Alegre, RS, Brasil, pp. 17-44.

Sousa-Santos, B. and Nunes, J.A. (2004). “Introduction: Democracy, participation and grassroots movements in contemporary Portugal”, *South European Society & Politics*, Vol. 9, No.2, p.1-15.

Suárez-Vivero, J.L.; Rodríguez, J.C. and Florido-Corral, D. (2008). “La gobernanza en la pesca: de lo ecológico e lo ético, de lo local a lo global”. *Scripta Nova – Revista Electrónica de Geografía y Ciencias Sociales*, XII, No. 278 (www.ub.es/geocrit/sn/sn-278.htm).

UNCED (1992). Agenda 21 – An Action Plan for the Next Century, endorsed by United Nations Committee on Environment and Development, Rio de Janeiro, United Nations Association.

Vasconcelos, L.; Pereira, M.J.; Caser, U.; Gonçalves, G.; Silva, F. and Sá, R. (2011). “MARGov – Setting the ground for the governance of marine protected areas”, *Ocean and Coastal Management* (In press, available online 29 July). doi: 10.1016/j.ocecoaman.2011.07.006.

Vaske, J. and Kobrin, K. (2001). “Place Attachment and Responsible Behaviour”. *The Journal of Environmental Education*, Vol. 32, No. 4, pp. 16-21.