

Management plans of Natura 2000 Sites and coastal
land use plans: A study concerning an integrated
approach to management of coastal zones in the Sulcis
Area (Sardinia, Italy)

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Abstract: The Protocol of the Barcelona Convention on integrated coastal zone management defines integrated coastal zone management as "...a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts."

Although integrated approach to coastal zone management has increasingly acquired importance within the international debate, with particular reference to the European Union context, its implementation puts in evidence relevant issues as regards the conflict between conservation measures related to environment and natural resources, and local development-related strategies.

From this perspective, Strategic environmental assessment (SEA) processes are particularly important since they are based on the implementation of a methodological and technical framework which aims at integrating environmental sustainability-related objectives, defined in national and regional strategies, into the local development strategies whose goals reflect needs and expectations identified by the local governments and communities.

In a SEA-based conceptual framework, this study proposes a methodological approach to the integration of strategies and related measures expressed by the management plans of Natura 2000 Sites into coastal land use plans, which generates a system of consistent objectives and related planning actions. The fundamental assumption is that SEA of management plans and coastal land use plans is very effective to build consistency in terms of sustainability-oriented strategies and local development measures. The proposed methodology is implemented in order to integrate coastal planning strategies and conservation measures related to management plans of Natura 2000 Sites with reference to three case studies concerning three municipalities, Calasetta and Carloforte, located in South-Western Sardinia, Italy.

Keywords: integrated coastal zone management; Natura 2000 Network; coastal planning; local development

Introduction

Since the 1970s, spatial planning policy of the European Union (EU) has been characterized by a marked attention to integrated coastal zone management (Saffache and Angelelli, 2010), as per Resolution no. (73) 29 (26 October 1973) of the Council of Europe, which suggests implementing a holistic approach to conservation and protection of coastal heritage.

At the moment, at the international level, integrated coastal zone management is progressively increasing its relevance in theoretical and practical terms, since it is generally assumed as a fundamental point of reference to define and implement spatial policies oriented to sustainable development (Billé, 2008). The “Protocol on Integrated Coastal Zone Management”¹ (ICZM Protocol) was adopted by the EU Council in 2008, and ratified in 2010 (Decision no. 2010/631/EU). The Protocol defines coastal zone management as a dynamic process which implements the sustainability paradigm into management and use of the coastal areas (article no. 2), by taking account of the weakness of landscapes and ecosystems, of the heterogeneous mix of ongoing activities, which include maritime activities, of their interdependency, and of the impacts generated as regards coastal and marine contexts. Moreover, the context-specific nature of the ICZM approach should be carefully considered (Soriani *et al.*, 2015), since coastal and marine planning issues cannot be addressed on a one-size-fits-all basis.

Nevertheless, integrated coastal zone management as regards the relationship between theory and practice is still a critical issue (Burbridge and Humphrey, 2003). Soriani *et al.* (2015) identify two kinds of problematic questions that may arise, which, on the one hand, are related to policies and strategic approaches, and, on the other hand, are connected to the implementation phases of spatial plans.

In this conceptual context, strategic environmental assessment (SEA) may help decision-making processes related to coastal zone management to be effective in addressing the issue at stake (Rochette and Billé, 2010). The Directive of the EU concerning SEA (no. 2001/42/CE) states (article 1) that “The objective of this Directive is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment.” In other words, SEA processes enhance the quality of decision-making by making consistent and integrated economic and social development objectives and sustainability goals (Leone and Zoppi, 2015a).

Furthermore, SEA is effective in supporting national administrations in implementing the ICZM Protocol into strategies and plans related to coastal management (UNEP *et al.*, 2011). Harvey (2000) analyzes the use of SEA with reference to Australian coastal management. Procedures based on SEA-related approaches are used on a voluntary basis in the definition and implementation of the “Strategy for integrated coastal zone management” of Portugal in 2008, as a decision-making tool (Partidário *et al.*, 2009), even though a systematic technical procedure which integrates the ICZM Protocol provisions and the SEA procedure is not available at present.

The approach proposed in this study builds on SEA in order to define a methodology which supports spatial planning processes in implementing the ICZM Protocol into local decision-making procedures. The objectives identified in different plans, namely spatial plans which regulate land uses in the coastal areas (PLUCs) and plans related to management of Natura 2000 Sites² (PMN2s), are examined and compared as regards their

¹ Available online: [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22009A0204\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:22009A0204(01)&from=EN), Date of access: 08/05/2019.

² Three types of protected areas feature Natura 2000 Sites: Sites of community importance (SCIs) and Special areas of conservation (SACs), identified under the provisions of EU Directive 92/43/EEC (the Habitats Directive), and Special protection areas (SPAs), identified according to EU Directive 2009/147/EC (the Birds Directive).

mutual coherence. Their strategies are made consistent with each other and negative effects of PLUCs on PMN2s are highlighted and addressed. The methodological approach is applied to two case studies concerning two coastal towns located in South-West Sardinia, in the region of Sulcis.

In the next section, the methodology is discussed, the documents and materials, upon which the spatial analyses are based, are identified, and the two urban contexts, considered in the two proposed case studies, are synthetically presented. The third section shows the results of the implementation of the proposed methodological approach, while implications, limits and suggestions for further research are discussed in the concluding section.

Methodology and case studies

The methodology implemented and discussed in this study focuses on building mutual consistency between PMN2s and PLUCs. It is based on the integration of strategies of PMN2s and PLUCs implemented through a logical structure (LS) which makes reference to the SEA procedure. The LS builds on the conceptual category of sustainability, mutual endogeneity of spatial planning and environmental assessment, and the presence of planning alternatives, which feature SEA-based procedures according to the Italian Law concerning SEA (Decree no. 152 of April 2006), which embeds the EU Directive on SEA into the Italian legislative framework (Leone and Zoppi, 2015a).

The LS was already used by Leone and Zoppi (2015b; 2016), who proposed a comparison between the provisions of the city masterplans and the PMN2s based on the reciprocal consistency of their goals. Here, the relationships between PLUCs and PMN2s are assessed as regards sustainability goals, through the identification of the PLUCs' operations which may generate negative effects on habitats and species protection-related goals identified in the PMN2s. Table 1 shows the diagram of the LS. The five columns refer to: i. sustainability goals; ii. thematic issues; iii. PLUC's goals; iv. PMN2's goals; and, v. PLUCs' operations which may generate negative effects on habitats and species protection-related goals identified in the PMN2s.

The proposed methodological approach is applied to the towns of Carloforte and Calasetta, two spatial contexts of South-West Sardinia located in the Sulcis region (Figure 1). The small Island of San Pietro (San Peter), where Carloforte is located, is connected to the mainland by ferryboats which depart from the Port of Calasetta. These towns were selected since they identify a consistent spatial system, whose coastal and marine areas require an integrated management approach, even though each urban area is governed by an autonomous municipal administration. Furthermore, a number of Natura 2000 Sites are located in each spatial context.

The planning documents used in the study are:

1. the PLUC of Calasetta and the PMN2s of the following SACs: ITB042208 "tra Poggio La Salina e Punta Maggiore," ITB042210 "Punta Giunchera" and ITB042209 "A nord di Sa Salina;"
2. the PLUC of Carloforte and the PMN2 of the following Natura 2000 Sites: SAC ITB040027 "Isola di San Pietro" and SPA ITB043035 "Coste e Entroterra tra Punta Cannoni e Punta delle Oche – Isola di San Pietro."

SUSTAINABILITY GOALS	THEMATIC ISSUES	PLUC's GOALS	PMN2's GOALS	NEGATIVE PLUC'S OPERATIONS
Sustainability goal 1	Thematic issue 1	Goal 1 of PLUC	Goal 1 of PMN2	Operation 1
				Operation m
		Goal k of PMN2	Operation 1	
			Operation m	
		Goal j of PLUC	Goal 1 of PMN2	Operation 1
			Goal k of PMN2	Operation m
	Thematic issue h	Goal 1 of PLUC	Goal 1 of PMN2	Operation 1
				Operation m
		Goal k of PMN2	Operation 1	
			Operation m	
		Goal j of PLUC	Goal 1 of PMN2	Operation 1
			Goal k of PMN2	Operation m

Table 1. The framework of the logical structure (LS)

Findings

The implementation of the methodological approach into the two urban contexts of the Sulcis Region identifies and analyzes coastal and marine processes which combine planning strategies differentiated in terms of scale, since the local municipal administrations, which study and approve the PLUCs, and the regional and national administrations, which define and implement PMN2s, are involved at once.

The LSs concerning the PLUCs and the PMN2s related to the towns of Carloforte and Calasetta are reported in Table 2 and Table 3. Considering contents and objectives of PMN2s and PLUCs, each of the two tables shows sustainability goals concerning conservation of biological diversity, plants and animals. PLUCs and PMN2s are mutually consistent as regards goals and thematic issues. The PLUCs focus on the following thematic issues: i. relations between coastal and marine ecosystems and services provided on the beaches; ii. conservation and enhancement of coastal and marine ecosystems; and, iii. accessibility to beaches and coastal areas. For example, the objectives of the PLUC of Calasetta focus on the integration of services provided on the beaches and coastal and marine ecosystems, identifying ecosystem conservation as the core issue, whereas the goals of the PLUC of Carloforte focus on the same integration issue, assuming accessibility as the main question. This is explained by the fact that the SAC “Isola San Pietro” overlays the municipal land of Carloforte and, as a consequence, the approval process of proposed spatial transformations is based on the Appropriate assessment procedure, established under the Habitats Directive³, which aims at preventing negative effects of projected operations on habitats and species of SACs, SPAs and SICs.

³ Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives [...] [T]he competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.” (Habitats Directive, art. 6, paragraph 3).

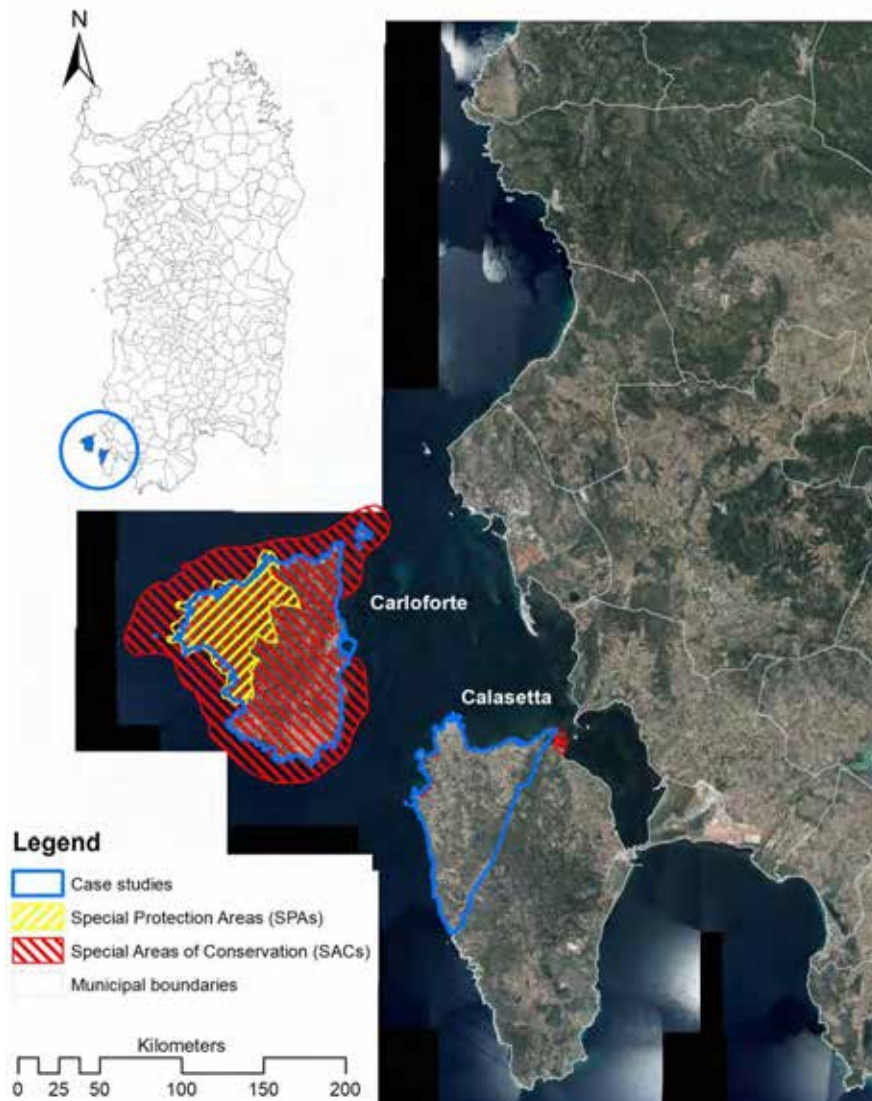


Figure 1. The study area. Source: elaboration by Federica Leone on an aerial photography drawn from <http://www.sardegnaeoportale.it/index.php?xsl=2425&s=324505&v=2&c=14488&t=1&tb=14401>, Date of access: 08/08/2019.

It has to be put in evidence that, notwithstanding PLUCs and PMN2s are mutually consistent as regards their sustainability goals, the PLUCs' planned operations can generate negative impacts on the PMN2s.

In the case of Calasetta (Table 2), the coastal and marine areas are planned both as environmental resources deserving protection-oriented measures and as factors of economic development related to leisure and tourism. The PLUC focuses on the definition of a set of planning policies to exploit tourist attractiveness (Goal CL_PLUC_2) and on prevention or mitigation of erosional processes concerning beaches (Objective CL_PLUC_3). The planned operations aim at developing tourism and at increasing the attractiveness of the seashores (Operations CL_PLUC_O_2, CL_PLUC_O_3, CL_PLUC_O_4, CL_PLUC_O_5, CL_PLUC_O_6, CL_PLUC_O_7 and CL_PLUC_O_8). On the other hand, the goals of the PMN2 focus on limiting tourist presence on the beaches (Objective CL_PMN2_3), on prevention or mitigation of the negative effects generated by human activities, animals and infrastructure on dunal habitats and species (Goal CL_PMN2_4), and, in general, on habitats and species (Goal CL_PMN2_1).

SUSTAINABILITY GOALS	THEMATIC ISSUES	PLUC's GOALS	PMN2's GOALS	NEGATIVE PLUC'S OPERATIONS
Preservation and enhancement of coastal ecosystems and biodiversity	Relations between coastal and marine ecosystems and services provided on the beaches	CL_PLUC_1	CL_PMN2_1 Prevention or mitigation of the negative effects generated by human activities, animals and infrastructure on habitats and to the rural, species protected under the Habitats Directive	CL_PLUC_O_1 Authorization for pet-care services
			CL_PMN2_2 Restoration of natural coastal morphology	CL_PLUC_O_2 Installation of pedestrian boardwalks
		CL_PLUC_2	CL_PMN2_3 Mitigation of overuse of beaches by tourists, in particular during Summer	CL_PLUC_O_3 Installation of dressing rooms and small cabanas
				CL_PLUC_O_4 Placement of beach chairs and sun loungers
				AO4. Placement of beach chairs and sun loungers
				CL_PLUC_O_5 Installation of cabanas for the watchpersons
				CL_PLUC_O_6 Installation of toilets and showers
				CL_PLUC_O_7 Installation of kiosks selling beverages and snacks
				CL_PLUC_O_8 Installation of small stands in support of beach services and activities such as small boat charters, diving and sailing schools
		Conservation and enhancement of coastal and marine ecosystems	Prevention or mitigation of erosional processes concerning beaches	CL_PLUC_3
				CL_PLUC_O_4 Placement of beach chairs and sun loungers
				CL_PLUC_O_5 Installation of cabanas for the watchpersons
				CL_PLUC_O_6 Installation of toilet and shower facilities
				CL_PLUC_O_7 Installation of kiosks selling beverages and snacks
				CL_PLUC_O_8 Installation of small stands in support of beach services and activities such as small boat charters, diving and sailing schools
				CL_PLUC_O_2 Installation of pedestrian boardwalks
				CL_PLUC_O_1 Authorization for pet services
				CL_PLUC_O_2 Installation of pedestrian boardwalks
Conservation and enhancement of coastal and marine ecosystems	Promotion of environmental rehabilitation			CL_PLUC_4
			CL_PMN2_2 Restoration of natural coastal morphology	
			CL_PMN2_7 Protection and restoration of Posidonia oceanica meadows in the mooring areas	
			CL_PMN2_6 Integration of measures aiming at removal of Posidonia oceanica deposits from the beaches and at protecting coastal and marine habitats	
		CL_PLUC_5	CL_PMN2_6 Integration of measures aiming at removal of Posidonia oceanica deposits from the beaches and at protecting coastal and marine habitats	

Table 2. Logical structure of the integration of the PLUC and of the PMN2 concerning the town of Calasetta

SUSTAINABILITY GOALS	THEMATIC ISSUES	PLUC's GOALS	PMN2's GOALS	NEGATIVE PLUC'S OPERATIONS
Preservation and restoration of marine and coastal ecosystems, with a particular focus on species and habitats protected under the Habitats Directive	Relations between coastal and marine ecosystems and services provided on the beaches	CR_PLUC_1 Planning beach-related services and activities consistently with landscape and environmental protection goals	CR_PMN2_1 Preservation of coastal waters	CR_PLUC_O_1 Authorizations released to boaters of small boat charters
			CR_PMN2_2 Conservation of reef habitats	CR_PLUC_O_2 Provision of the minimum service level in support of tourism in the most popular sandy and rocky beaches
			CR_PMN2_3 Preservation of dunes and of their habitats	
			CR_PMN2_4 Promotion of sustainable uses of sites and related environmental resources	
			CR_PMN2_5 Conservation of arborescent matorral, thickets and phrygana habitats	
			CR_PMN2_6 Conservation of important botanical species (<i>Astragalus maritimus</i> , <i>Rouya polygama</i>)	
			CR_PMN2_7 Protection of the most significant bird species for Natura 2000 Sites in Carloforte	
			CR_PMN2_8 Protection of the local fauna	
			CR_PMN2_9 Protection of “ <i>Caretta caretta</i> ”, a species of Community interest	CR_PLUC_O_1 Authorizations released to boaters of small boat charters
			Accessibility to beaches and coastal areas in order to regulate public access to beaches and coastal areas, minimizing environmental impacts	
CR_PMN2_3 Conservation of dunal habitats	CR_PLUC_O_3 Boardwalks installation which make it easier to access the beaches			
CR_PMN2_5 Protection of habitats such as thickets, phrygana and arborescent matorral	CR_PLUC_O_4 Development of parking sites close to habitats and species protected under the Habitats Directive			
CR_PMN2_10 Promotion of a sustainable use of the site and its resources				

Table 3. Logical structure of the integration of the PLUC and of the PMN2 concerning the town of Carloforte

Two issues characterize the case of Carloforte (Table 3). On the one hand, preservation of coastal waters (Goal CR_PMN2_1) and of *Caretta caretta* (Goal CR_PMN2_9), identified as a protected species under the provisions of the Habitats Directive, conflict with the authorized traffic of small boat charters (Operation CR_PLUC_O_1). Indeed, these boats are allowed to sail with no license or certification concerning the technical knowledge of the boaters as regards coastal ecosystems, habitats and plants, such as *Posidonia oceanica* seabed and other peculiar habitats, or protected species, such as *Caretta caretta*. On the other hand, the boardwalks installation which make it easier to access the beaches (Operation CR_PLUC_O_3), and the development of parking sites close to habitats and species protected under the Habitats Directive (Operation CR_PLUC_O_4), are likely to determine negative impacts with reference to preservation of dunes and of their habitats (Goal CR_PMN2_3) and to protection of habitats such as thickets, phrygana and arborescent matorral (Goal CR_PMN2_5).

Discussion and conclusions⁴

The outcomes of the proposed methodology based on the LS show that negative effects may occur on the achievement of the goals of the PMN2s as a consequence of operations planned by the PLUCs. The LSs defined to assess the coherence of the PLUCs and PMN2s concerning the towns of Calasetta and Carloforte put in evidence that the operations planned in the PLUCs may put at risk the effectiveness of the conservation measures identified in the PMN2s, related to habitats and species, since PLUCs and PMN2s were studied and approved following independent procedures, implemented by different public administrations, that is, the

⁴ This Section partially reproduces a discussion proposed in a previous study of the authors (Leone and Zoppi, 2016, Section “5. Discussion and Conclusions”).

municipal administrations in the case of the PLUCs, and the regional administration in the case of the PMN2s. Furthermore, the two types of plan focus on different core issues, since PMN2s deal with conservation measures regarding habitats and species of the Natura 2000 Sites, whereas PLUCs are related to sustainable coastal zone management aimed at catalyzing social and economic local development based on tourist attractiveness.

From this standpoint, this study defines, and applies to the urban contexts of Calasetta and Carloforte, a methodological approach whose scope is to integrate different plans, which take place in the local public domain, that is the Sulcis Region, into a unique planning instrument which makes consistent nature protection-related and development-related objectives.

The study shows, by detailed comparative appraisals of two PLUCs and related PMN2s, that the LS-based procedure entails an enormous potential in order to build consistency and, much more important, to drive the issue of conservation and enhancement of habitats and species outside the narrow boundaries of sectoral policies concerning the Sites of the Natura 2000 Network. The application of the LS makes the issue a comprehensive and fundamental question related to the PLUCs. The implementation of the PMN2-related sustainability objectives into the PLUCs through the LS approach is based on the environmental characterization of the supporting ecosystem services (ESs) supplied by habitats and species (Millennium Ecosystem Assessment, 2003). In the first place, ESs are identified in the spatial context of the Sites of the Natura 2000 Network, and afterwards, during the application of the LS approach, they become spatial and environmental characteristics of the whole coastal and marine areas (Leone and Zoppi, 2016).

The proposed LS-based approach implements PMN2s into PLUCs and, that being so, not only is suitable to assess and drive the definition and establishment of planning decisions (ex ante phases of PMN2s/PLUCs), but also to support the planning policies to be carried out, since the ES-related sustainability objectives entail a monitoring system based on benchmarks concerning the environmental indicators related to the ESs.

Furthermore, it has to be stressed that the planning policies concerning supporting ESs may generate conflicts related to tourism-related ESs, whose land uses may be prevented by conservative measures entailed by the PMN2s. Therefore, LS-based procedures that imply ES-based sustainability objectives should take account of supporting ESs not only in terms of conservation and enhancement of habitats and species, but also as sources of conflict between alternative land uses related to alternative types of ESs, that is supporting and tourism-related. The conflicts are expressed by the trade-offs between protection and preservation of coastal and marine species and habitats, that is, supporting ecological systems, and the pressure for increasing the provision of services for tourists and local visitors in the coastal areas, that is tourism-related ESs, which is the main focus of PLUCs (Lai and Zoppi, 2017).

The results proposed in this essay are very robust in terms of exportability to other EU contexts, since the LS-based procedure implemented into spatial plans (PLUCs) at the municipal level is always based on the same normative framework, established by the SEA Directive. Moreover, the reference of the PMN2s is always the Natura 2000 Standard Data Form, approved by the European Commission with the Decision of 11 July 2011⁵. As a consequence, it can be applied as such in other EU countries, even though different institutional frameworks and planning practices at the national and regional levels may possibly imply more-or-less huge differences in terms of timing and duration and public authorities responsible for the PLUCs and the PMN2s' planning procedures, the quality of the participatory processes and the qualitative and quantitative size of the participating public and stakeholders.

⁵ Available from the European Environment Agency's at <http://natura2000.eea.europa.eu/>, accessed 2 May 2019, Date of access: 08/05/2019.

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