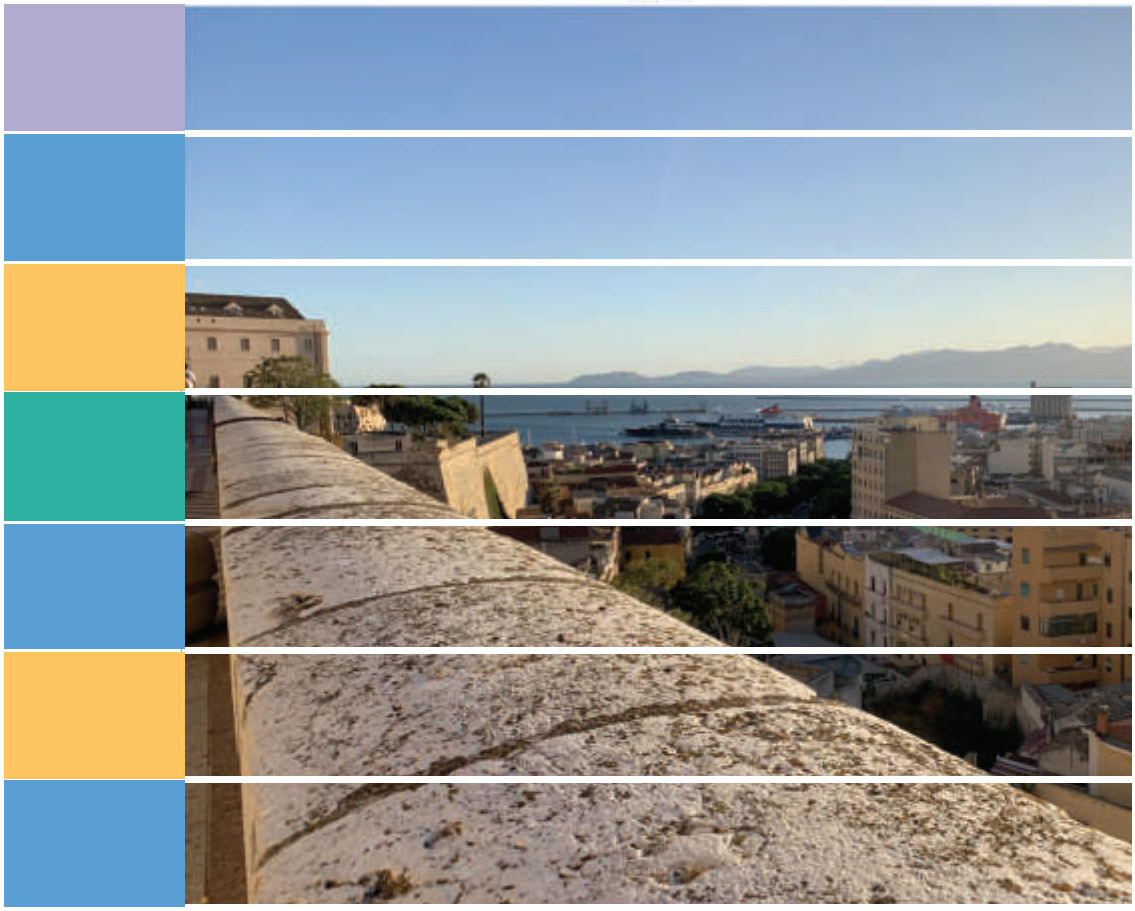
Carmela Gargiulo Corrado Zoppi
Editors

Planning, Nature and Ecosystem Services



INPUT TeMA*Lab* Dicea UniNa

Federico II Open Access University Press

fedOAPress

Università degli Studi di Napoli Federico II
Scuola Politecnica e delle Scienze di Base

Smart City, Urban Planning for a Sustainable Future

5

Carmela Gargiulo Corrado Zoppi

Editors

Planning, Nature and Ecosystem Services

INPUT aCAdemy 2019

Conference proceedings

La cooperazione al cuore del Mediterraneo

Planning, nature and ecosystem services / editors Carmela Gargiulo, Corrado Zoppi - Napoli: FedOAPress. 2019 - (Smart City, Urban Planning for a Sustainable Future. 5).

Web link:
http://www.tema.unina.it/index.php/tema/Monographs

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

Università degli Studi di Napoli Federico II
Centro di Ateneo per le Biblioteche "Roberto Pettorino"
Piazza Bellini 59-60 - 80138 Napoli, Italy
http://www.fedoapress.unina.it

Published in Italy

Cover and graphic project: TeMA*Lab*

This book collects the papers presented at INPUT aCAdemy 2019, a special edition of the INPUT Conference hosted by the Department of Civil and Environmental Engineering, and Architecture (DICAAR) of the University of Cagliari.

INPUT aCAdemy Conference will focus on contemporary planning issues with particular attention to ecosystem services, green and blue infrastructure and governance and management of Natura 2000 sites and coastal marine areas.

INPUT aCAdemy 2019 is organized within the GIREPAM Project (Integrated Management of Ecological Networks through Parks and Marine Areas), co-funded by the European Regional Development Fund (ERDF) in relation to the 2014-2020 Interreg Italy – France (Maritime) Programme.

INPUT aCAdemy 2019 is supported by Società Italiana degli Urbanisti (SIU, the Italian Society of Spatial Planners), Istituto Nazionale di Urbanistica (INU, the Italian National Institute of Urban Planning), UrbIng Ricerca Scientifica (the Association of Spatial Planning Scholars of the Italian Schools of Engineering) and Ordine degli Ingegneri di Cagliari (OIC, Professional Association of Engineers of Cagliari).

This book is the most recent scientific contribution of the "Smart City, Urban Planning for a Sustainable Future" Book Series, dedicated to the collection of research e-books, published by FedOAPress - Federico II Open Access University Press. The volume contains the scientific contributions presented at the INPUT aCAdemy 2019 Conference. In detail, this publication, including 92 papers grouped in 11 sessions, for a total of 1056 pages, has been edited by some members of the Editorial Staff of "TeMA Journal", here listed in alphabetical order:

- Rosaria Battarra;
- Gerardo Carpentieri;
- Federica Gaglione;
- Carmen Guida;
- Rosa Morosini;
- Floriana Zucaro.

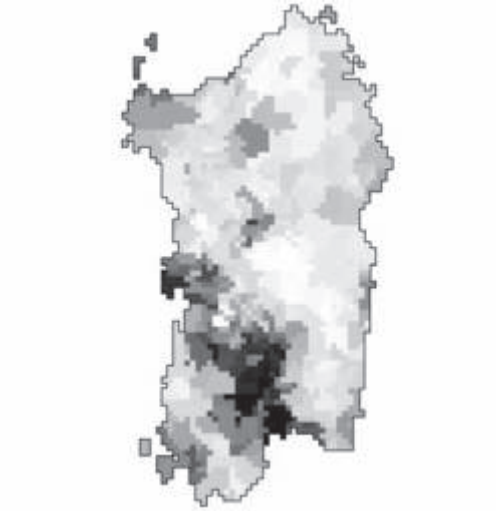
The most heartfelt thanks go to these young and more experienced colleagues for the hard work done in these months. A final word of thanks goes to Professor Roberto Delle Donne, Director of the CAB - Center for Libraries "Roberto Pettorino" of the University of Naples Federico II, for his active availability and the constant support also shown in this last publication.

Rocco Papa
Editor of the Smart City, Urban Planning for a Sustainable Future" Book Series
Published by FedOAPress - Federico II Open Access University Press

Table of contents

Session: 2 - Integrated management of marine protected areas and Natura 2000 sites

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6



AN EXPERIMENTAL METHODOLOGY FOR THE MANAGEMENT OF MARINE PROTECTED AREAS

MADDALENA FLORIS, FEDERICA ISOLA
CHETI PIRA

Department of Civil and Environmental
Engineering and Architecture
University of Cagliari, Italy
e-mail: maddalena.floris@unica.it
federica.isola@unica.it; chetipira@unica.it

How to cite item in APA format:
Floris, M., Isola, F. & Pira, C. (2019). An experimental methodology for the management of Marine Protected Areas. In C. Gargiulo & C. Zoppi (Eds.), *Planning, nature and ecosystem services* (pp. 165-175). Naples: FedOAPress. ISBN: 978-88-6887-054-6, doi: 10.6093/978-88-6887-054.6

ABSTRACT

Sustainability poses several important questions concerning the knowledge and interpretation of the coastal area. This means that management and planning instruments are required in order to balance trade-offs between environmental conservation and economy grow. The use and protection of the coastal areas have a dual relationship: the use has an environmental impact on the coastal system and the protection limits the coastal system use. Therefore, the environmental systems need conceptual models which are able to join the ecological sensitivity with the anthropic pressure. The methodological approach proposed here aims to provide the definition of an experimental protocol in order to integrate the protection and the management plans for coastal natural heritage. This study describes the results of the research experiments carried out on the experimental protocol application for developing the Marine Protected Area Regulations of the "Isola dell'Asinara" and "Tavolara - Punta Coda Cavallo". This planning approach should support the integration of decision-making procedures to achieve inclusiveness, interactivity, and repeatability of the planning processes.

KEYWORDS
Integrated Management; Natura 2000 Sites; Marine Protected Areas; Planning

1 INTRODUCTION

Marine coastal ecosystems represent an important resource for both the environment (Norse, 1993; Parsons, 1992) and the economy. On the one hand, management and conservation are necessary requirements/prerequisites to support ecological and economic values (Potts et al., 2014). Sustainable coastal and marine tourism development is essential to maintain high-quality marine water, great biodiversity and a healthy ecosystem (European Commission, 2015). However, marine biodiversity is threatened by species overexploitation, habitat destruction, environmental changes and increasing pollution of marine waters (Smith et al., 1999). Indeed, industrial tourism may involve the degradation of the coastal ecosystem (Marinho, 2018). New management strategies are needed to promote sustainable resource use so that coastal and marine areas would be included in larger strategies of coastal planning based on the integrated approach to coastal management (Cicin-Sainm & Belfiore, 2005). This approach was formalized by the Integrated coastal zone management (ICZM) Protocol. The Protocol defines integrated coastal management not only as a continuous and dynamic process but also as a process to promote sustainability, development, and protection of coastal and marine resources (Cicin-Sain et al., 2000).

Marine Protected Areas (MPAs) are recognized as an effective tool for the management and improvement of marine ecosystems (European Commission, 2015). According to the World Conservation Union (IUCN), a protected area is defined as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means". In terms of integrated management, the initiatives concerning the Protocol must be unified with those implemented by the MPAs.

The European Environment Agency Report[1] defines three different types of European protected areas: Natura 2000 marine sites, MPAs designated at the Regional Maritime Conventions and the individual national MPAs. Frequently, these areas overlap in terms of administrative limits and in terms of multiple regulations (European Commission, 2015).

Referring to the national Italian context, there are two protection regulation levels of the MPAs. The first level is represented by the Ministerial Decree, under the Laws n. 979 of 1982 and n. 394 of 1991. According to the Ministerial Decree, the MPA institution is characterized by significant environmental, historical, archaeological and cultural value of

[1] http://www.eea.europa.eu/soer-2015/europe/marine-and-coastal

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

the marine site. However, the primary role of the MPAs is biodiversity conservation by means of sustainable management of the territory (Kelleher, 1999).

These territories are geographically delimited marine and coastal systems. With respect to the environmental values they are legally subject to different levels of protection: the A Zones to the integral reserve, the B Zones to general reserve and the C Zones to partial reserve (Marino, 2011).

The second level of protection is the management plans of the Natura 2000 (N2K) network, these sites often overlap the MPAs. In particular, the N2K network is composed of Sites of Community Importance (SCIs), destined to become Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). This network represents marine and terrestrial system areas to safeguard biodiversity through natural, semi-natural habitats, wild flora and fauna conservation.

However, this stratified framework, composed of different environmental protection regulations, represents an obstacle to the management of the territory. In other words, this overlapping of the regulatory and management instruments brings about a fragmentation of administrative responsibility. One of the most significant impacts of this fragmentation is the negative effects on environmental protection.

This study shows the innovative and multidisciplinary approach used to overcome the current fragmentation of the system regulation related to the context of the MPA "Isola dell'Asinara".

The study is articulated in five sections. The second section describes the context, regulatory and management instrument related to the case study. The third section shows the methodological approach to the analysis and the assessment of the objectives refers to a Logical Framework (LF) in order to develop the MPA Regulation (MPAR). The outcomes derived from those methodologies are presented in the fourth section. The concluding section presents some suggestions based on the results and proposes some reflections related to planning policies in the coastal and marine areas.

2 CASE STUDY: CONTEXT, REGULATORY AND MANAGEMENT INSTRUMENTS

This study focuses on "Isola dell'Asinara" MPA, in the north-west region of Sardinia in Italy, extending about 108 square kilometres around the "Asinara" National Park. The island had been a maximum-security prison for many years until in 2002 the Italian Ministry of the Environment and of the Land Protection instituted a National Park and the MPA. Both of them include two Natura 2000 sites, the Special Protection Areas (SPA) "ITB010001 Isola

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

Asinara" and the Special Areas of Conservation (SAC) "ITB010082 Isola dell'Asinara". Moreover, there is a third site SPA "ITB013011 Isola Piana di Porto Torres" outside the limits of the AMP and the Park, as Fig. 1 shows.

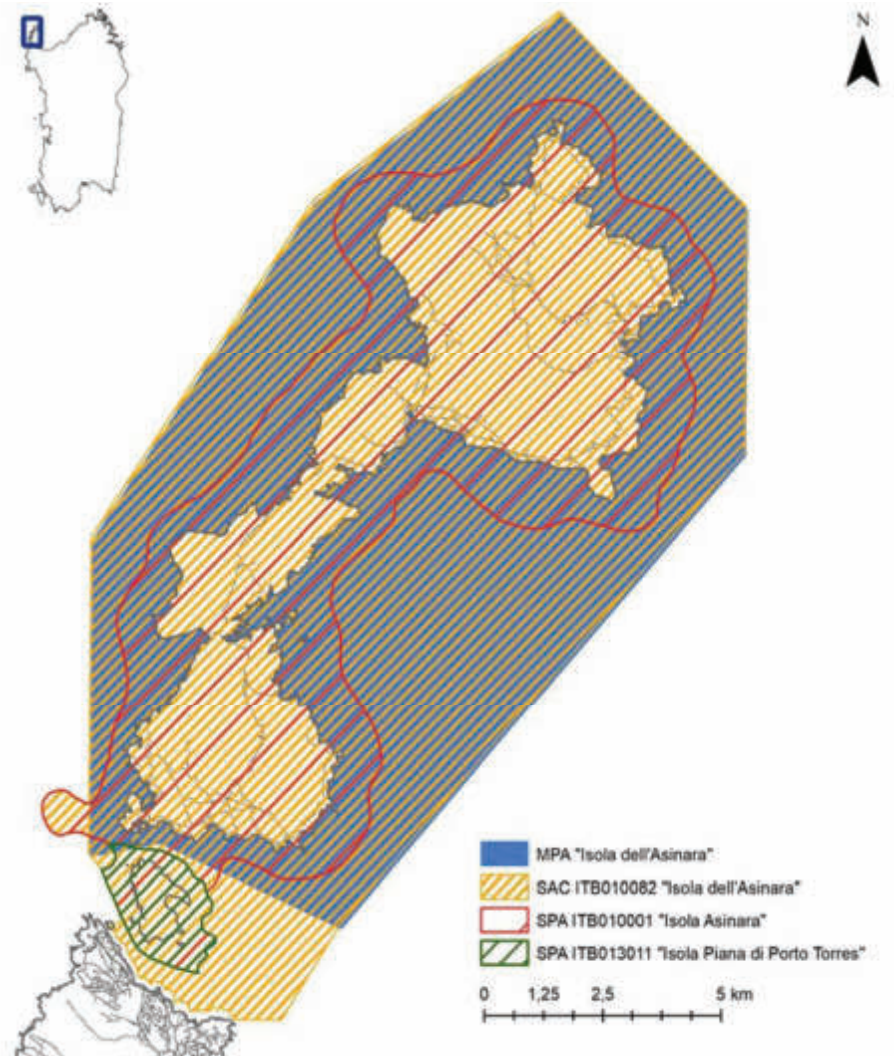


Fig. 1 The study area

Planning and policy include a wide range of regulatory and management instruments: the Regulation of MPA (MPAR), the Management plan (MPs) of the Natura 2000 sites, the Integrated Coastal Zone Management (ICZM) Protocol and the Standardized Management Interventions effective in marine protected areas (SIEA) Project.

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

3 METHODOLOGY

An incremental and inclusive method to integrate the conservation measures regarding the regulatory and management instruments into the MPARs are proposed. This article focuses on a technical procedure, Experimental Protocol (EP), which draws its inspiration from the SEA, to improve decision making and to foster sustainable use of the marine environment. The methodological approach, based on sustainable development and environmental protection of the marine ecosystem, can be described with a double evaluation carried out with progressive steps and continuous feedback compared to previous measures to implement the drafting of the MPARs.

3.1 FIRST EVALUATION: A LOGICAL FRAMEWORK

The first evaluation can be schematized in a LF organized on four levels to identify the conceptual relationships between aims inferred by the territorial context, policy landscape, and Regulation actions.

The first level can be identified as the sustainability objectives inferred by SWOT analysis; this consist in a qualitative examination that helps in understanding the environment status by means of the environmental components referred to the territorial context (Kajanus et al., 2012). The second objectives level were identified by analyzing regional, provincial and local plans and programs which could have a potential effect on the MPA.

The third level can be identified as the structural part of the EP, this is certainly fundamental in the definition and implementation of MPs. The specific objectives, inferred by the different protection instruments of the MPA: the MPAs for N2K, the ICZM Protocol and the SIEA Project, represent the objectives of MPA Regulation. The last level of the LF represents the operability of the MPAR. The actions were identified within the different protection instruments of the MPA and from the implications of the SWOT analysis in order to implement the LF into the definition of MPAR. These actions provide a framework for the second evaluation of the EP.

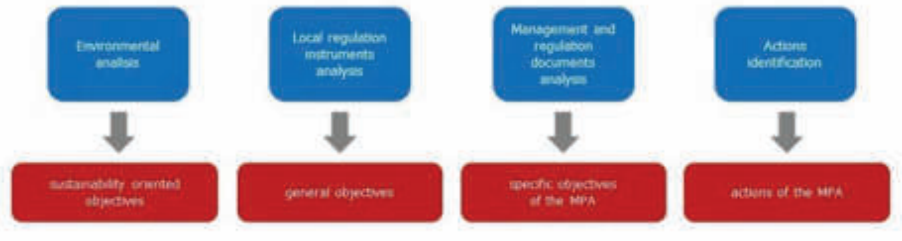


Fig. 2 The Logical Framework

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

3.2 SECOND EVALUATION: A REGULATION UPDATING

The second evaluation consists of the examination of the current RAMPs in order to define the actions for the LF and is characterized by two levels.

This evaluation is a crucial phase to improve the RAMP; through an integrated approach, the indications of the current planning system in the context of the MPA and the rules will be applied. Specifically, the methodological approach to develop RAMP "Isola dell'Asinara" is based on a double order of coherence evaluation in order to implement the phase to apply the EP. The first level consists of the evaluation of actions through the articles of the Regulation in force. The second level consists of the comparison between the Regulation in force and the recently approved Regulations in other MPAs of the Sardinia Region. The criteria of the first level of assessment are based on the consistency of the actions EP with respect to the articles of the Regulation in force. The model is based on evaluation results represented by three different colors, which are associated with some proposed changes, as follows:

- if the action is fully integrated within the analyzed standard, then the article of the Regulation, does not change (in green);
- if the action is partially integrated or some aspects are not exhaustive, the article of the Regulation is modified (in yellow);
- if the action or the subject of the action are not integrated in the Regulation in force, the inclusion of new articles or its integrations are applied (in red).

TITLE

REGULATION IN FORCE	FIRST LEVEL OF EVALUATION			SECOND LEVEL OF EVALUATION	REGULATION UPDATING
paragraph	action	evaluation article/action	observations evaluation article/action	article of recently MPARs	proposal paragraph updating

Tab. 1 Double order of evaluation

4 FINDINGS

The final output of this empirical work is a proposal to improve MPAR of the "Isola dell'Asinara" MPA; actions Regulation and recently MPARs contribute to this implementation. The EP approach proposes to update the MPAR has an important effect on its organization system. In general, the base structure of Regulation (titles) remained unchanged, improvement regards articles, paragraph, and letters; for simplicity, in this section, only the articles are discussed. Regulation has been increased by 13 articles (from 30 to 43)

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

interesting all titles. Tab. 2 shows the comparison between the glossary MPAR in force and MPAR updating.

The integration can be divided into two categories: the first one includes the articles that are totally new; indeed, this subject is not including in the recent MPARs. The second category complies the "Isola dell'Asinara" Regulation in force with recently MPARs. In particular, article 4 "Biodiversity protection", article 5 "Land protection", article 9 "Inter-institutional collaboration", article 38 "Risk assessment" are included under the first category and article 43 "Referral rules". Article 4 is related to conservation action by SIEA Project and N2K sites, emphasize the protection measures of the Regulation in order to improve the conservation performance management. Article 5 meets the needs of the SIEA Project and environmental analysis on soil protection. Article 9 introduces the cooperation concept according to the ICZM Protocol targets. The article 38, according to the N2K direction, integrated the prevention, mitigation, and adaptation concepts in order to limit the consequences of environmental emergencies. The article 43 stems to avoid a regulatory gap. On the contrary, following articles are included under the second category: articles 11 "Regulation of Maritime domain", article 12 " Regulation of Posidonia banquette", article 13 "Regulation of waste water drains", article 20 "Regulation of sea-watching activities", article 25 "Regulation of rental, lease or occasional rental of boating activities", article 26 "Regulation of whale-watching activities", article 30 "Regulation of sport, play, recreation events", article 31 " Regulation of educational and naturalistic divulgation activities". In particular, article 11 meets the needs of ICZM Protocol and conservation action by N2K sites. Article 12 introduces the concept of policy management in order to promote the benefice from Posidonia. Article 13 addresses the problem of waste complying in the SIEA Project and N2K requirements. Article 20 defines, according to the conservation measures by N2K, the policy management to avoid negative impacts resulting from Sea-watching activities. In particular, article 21 and 25 complies recently MPARs concerning pleasure boating activities. Article 26 define measures for cetacean protection according to the N2K sites actions and the SIEA Project. Article 30 and 31 meets the needs of environmental analysis in order to reduce human pressures.

5 DISCUSSION AND CONCLUSIONS

The outcomes of the Protocol allow for the objective proposed in the introductory section to be achieved. The innovative and multidisciplinary approach proposed has allowed the research group to overcome the current fragmented management territory and to define a new paradigm to create integrated environment policies.

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

CURRENT MPAR	PROPOSAL TO UPDATE THE RMPA
Title I **General provisions**	**Title I** **General provisions**
Article 1 *Application*	Article 1 *Application*
Article 2 *Definitions*	Article 2 *Definitions*
Article 3 *Aims, boundaries and not permitted activities in the Marine Protected Area*	Article 3 *Aims, boundaries and not permitted activities in the Marine Protected Area*
	Article 4 *Biodiversity protection*
	Article 5 *Coastal areas protection*
Title II **Organization of Marine Protected Area**	**Title II** **Organization of Marine Protected Area**
Article 4 *Management of Marine Protected Area*	Article 6 *Management of Marine Protected Area*
Article 5 *Authority responsible for the Marine Protected Area*	Article 7 *Authority responsible for the Marine Protected Area*
Article 6 *Reserve commission*	Article 8 *Reserve commission*
	Article 9 *Inter-institutional collaboration*
Title III **Specific provisions and conditions for permitted activities**	**Title III** **Specific provisions and conditions for permitted Activities**
Article 7 *Zoning and activities permitted in the different zones of the Marine Protected Area*	Article 10 *Zoning and activities permitted in the different zones of the Marine Protected Area*
	Article 11 *State-owned marine areas*
	Article 12 *Posidonia oceanica*
	Article 13 *Water and waste discharges*
Article 8 Relief and surveillance activities	Article 14 Relief and surveillance activities
Article 9 *Scientific research activities*	Article 15 *Scientific research activities*
Article 10 *Professional photographic, cinematographic and television shooting*	Article 16 *Professional photographic, cinematographic and television shooting*
Article 11 *Bathing activities*	Article 17 *Bathing activities*
Article 12 *Scuba diving and freediving*	Article 18 *Scuba diving and freediving*
Article 13 *Underwater guided tour and diving instructions*	Article 19 *Underwater guided tour and diving instructions*
	Article 20 *Sea-watching activities*
Article 14 *Recreational boating*	Article 21 *Recreational boating*
Article 15 *Mooring activities*	Article 22 *Mooring activities*
Article 16 *Anchoring activities*	Article 23 *Anchoring activities*
Article 17 *Passenger transport, sailing charter and guided tour*	Article 24 *Passenger transport, sailing charter and guided tour*
	Article 25 *Pleasure boats rental*
	Article 26 *Whale-watching activities*
Article 18 *Professional fishing activities*	Article 27 *Professional fishing activities*

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

Article 19 *Sport fishing*	Article 28 *Sport fishing*
Article 20 *Recreational fishing activities*	Article 29 *Recreational fishing activities*
	Article 30 *Sport and recreational events*
	Article 31 *Education and information activities*
Title IV **Provisions for authorizatization procedures**	**Title IV** **Provisions for authorizatization procedures**
Article 21 *Application*	Article 32 *Application*
Article 22 *Application for authorization*	Article 33 *Application for authorization*
Article 23 *Mandatory documents*	Article 34 *Mandatory documents*
Article 24 *Procedure for examining the applications for authorization*	Article 35 *Procedure for examining the applications for authorization*
Article 25 *Criteria for assessing the applications for authorization*	Article 36 *Criteria for assessing the applications for authorization*
Article 26 *Autorizzation and administrative fee*	Article 37 *Autorizzation and administrative fee*
TITOLO IV **Final provisions**	**Title IV** **Final provisions**
	Article 38 *Risk assessment*
Article 27 *Monitoring and updating*	Article 39 *Monitoring and updating*
Article 28 *Surveillance*	Article 40 *Surveillance*
Article 29 *Publicity*	Article 41 *Publicity*
Article 30 *Penalties*	Article 42 *Penalties*
	Article 43 *Referral rules*

Tab. 2 Comparison between current MPAR and proposal to update the MPAR

In a fragile context such as coastal and marine, the empirical approach of the protocol allows a balance to be found between environmental protection and social-economic impacts. In addition to the fragmentation, a range of critical aspects of the current process of drawing up Regulations and Plans in the coastal marine areas have emerged. The first criticality is due to the overlapping of skills. In particular, this applies to the RAMPs approved by the MATTM and the MPAs for the N2K sites which are drawn up by the municipalities and approved by the regions. In this framework, the protocol aims to integrate the different policies and recommendations and overcome the gap due to the overlapping of skills. In particular, one of the merits of this experimental procedure is the cooperation process between the different entities in charge and stakeholders. The second criticality is the lack of a system of operational objectives that allow defining actions to deal with the environmental and socio-economic territory problems. This criticality of the RMPs is covered by Annual Regulations which lay down detailed rules and conditions for exercising the activities currently permitted in the AMP. In this framework, the protocol does not completely overcome this gap. In other words, due to the complexity or nature of some

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

subjects, it is particularly appropriate to tackle them in the Annual Regulations. According to the European Directive 2001/42/EC, the SEA shall be applied to plans and programs which are likely to have significant environmental effects. For this reason, for the update of the MPAR the EP was used. This protocol is inspired by the principles and methodology of the SEA in order to include environment objectives in the decision making.

The environmental objectives, the objectives of the second level, the specific objectives and actions defined in order to update the MPAR were outlined in the LF. An important implication of the results of this empirical procedure for future research could be the definition of the guidelines. For example, the systematic application of the EP could change the regulation and planning of the protected areas. In particular, this concerns the areas characterized by the overlapping of different regulatory regimes which are characterized by multiple management instruments. This application could optimize the biodiversity value and foster development of sustainable tourism, with significant benefits for both human well-being and economic output.

ACKNOWLEDGEMENTS

Maddalena Floris gratefully acknowledges Sardinia Regional Government for the financial support of her PhD scholarship. (P.O.R. Sardegna F.S.E. Operational Program of the Autonomous Region of Sardinia, European Social Fund 2014-2020 - Axis III Education and training, Thematic goal 10, Priority of investment 10ii.)

Maddalena Floris, Federica Isola and Cheti Pira have made substantial contributions to the study's conception, background and design remarks. Sections 1 and 2 are by Cheti Pira. The Section 3, 4 and 5 are by Maddalena Floris and Federica Isola.

REFERENCES

Cicin-Sain, B. & Belfiore, S. (2005). Linking marine protected areas to integrated coastal and ocean management: A review of theory and practice". *Ocean & Coastal Management*, 48(11-12), 847-868. doi: https://doi.org/10.1016/j.ocecoaman.2006.01.001.

Cicin-Sain, B., Knecht, R. W., Vallega, A. & Harakunarak, A. (2000). Education and training in Integrated Coastal Management: lessons from the international arena, *Ocean & Coastal Management*, 43(4-5), 291-330. doi: https://doi.org/10.1016/S0964-5691(00)00030-2.

European Commission (2015), Report from the Commission to the European Parliament and the Council on the progress in establishing marine protected areas (as required by Article 21 of the Marine Strategy Framework Directive 2008/56/EC). http://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/implementation/pdf/marine_protected_areas.pdf.

Kajanus, M., Leskinen, P., Kurttila M. & Kangas, J. (2012). Making use of MCDs methods in SWOT analysis: lessons learnt in strategic natural resources management. *Forest Policy and Economics*, 20, 1-

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6

9. doi: https://doi.org/10.1016/j.forpol.2012.03.005.

Kelleher, G. (1999). Guidelines for Marine Protected Areas. *Gland, Switzerland & Cambridge*, UK: IUCN. ISBN: 2-8317-0505-3.

Marinho, I. (2018). The plastic age. Harmful effects and solutions. *Current conservation*, 12(2), 11-13.

Marino, D. (2011). Le aree marine protette italiane. Stato, politiche, governance. Milano: FrancoAngeli Edizioni. ISBN: 9788856836806.

Norse, E. A. (1993). Global Marine Biological Diversity: a strategy for building conservation into decision making. Washington: Island Press. ISBN-10: 1559632569, ISBN-13: 978-1559632560.

Parsons, T.R. (1992). Biological coastal communities: productivity and impacts, in Coastal systems studies and sustainable development. *UNESCO Technical Papers in Marine Science*, 64, 27-37.

Potts, T., Burdon, D., Jackson, E., Atkins, J., Saunders, J., Hastings, E. & Langmead, O. (2014). Do marine protected areas deliver flows of ecosystem services to support human welfare? *Marine Policy*, 44, 139-148. doi: https://doi.org/10.1016/j.marpol.2013.08.011

Smith, V.H., Tilman, G.D. & Nekola, J.C. (1999). Euthrophication: impacts of excess nutrient inputs on freshwater, marine, and terrestrial ecosystems. *Environmental Pollution*, 100, 179-196.

AUTHOR'S PROFILE

Maddalena Floris, graduated in Architecture at the University of Cagliari, Italy (2013). She is currently a graduate student in the doctoral program in Civil Engineering and Architecture at the University of Cagliari. Her research areas are sustainable urban and regional planning, and environmental policy-making.

Federica Isola, building engineer, is Research Doctor in Environmental Sciences and Engineering (Italy, 2012). She is currently a research fellow at the Department of Civil and Environmental Engineering and Architecture of the University of Cagliari.

Cheti Pira, environmental engineer, is Research Doctor in Land Engineering (Italy, 2012). She is currently a research fellow at the Department of Civil and Environmental Engineering and Architecture of the University of Cagliari.

ISBN: 978-88-6887-054-6
DOI: 10.6093/978-88-6887-054-6