

**UNDER THE AUSPICES OF H.E. THE PRESIDENT OF THE HELLENIC REPUBLIC
MR. PROKOPIOS PAVLOPOULOS**

**International Conference in Management of Accessible Underwater
Cultural and Natural Heritage Sites:**

“DIVE IN BLUE GROWTH”

**16-18 October 2019
Athens, Acropolis Museum, Auditorium**

CONFERENCE PROCEEDINGS



BLUEMED

Plan, test and coordinate Underwater
Museums, Diving Parks and Knowledge
Awareness Centres in order to support
sustainable and responsible tourism
development and promote Blue growth
in coastal areas and islands of the
Mediterranean

Introduction

The International Conference in Management of Accessible Underwater Cultural and Natural Heritage Sites, *“Dive in Blue Growth”*, was organized by the University of Patras in collaboration with Region of Thessaly, Ephorate of Underwater Antiquities, ATLANTIS Consulting and the active participation of BLUEMED partners, under the auspices of H.E. the President of the Hellenic Republic Mr. Prokopios Pavlopoulos, in Acropolis Museum, in Athens, from 16 to 18 October 2019.

Coastal areas and islands of the Mediterranean are tourism-based economies with key underwater assets that are vulnerable to extreme climatic conditions. They face common challenges: a) lack of coordinated policies, methods and tools to support sustainable economic development, b) ineffective protection of underwater heritage and inability to use it for sustainable tourism development, c) insufficient measures to tackle impacts of extreme climatic conditions.

BLUEMED aims to protect and preserve in a unified manner the underwater natural and cultural heritage of the Mediterranean, to help coastal and island economies prosper through a sustainable blue model for tourism development, and to protect our marine ecosystem. BLUEMED is part of Interreg MED 2014-20 Programme, co-financed by the European Regional Development Fund.

The overall success of the Conference is based on the warm welcome that conference subjects received and the high level of participation, as more than 300 people from 11 countries, from Europe, Asia and the America participated in the conference.

The three productive days of the Conference, in which 55 speakers from all over the world participated, was a great opportunity for underwater archaeologists, public organizations, local governments, universities, marine researchers, NGOs, tourist organizations, diving park/dry dive managers, and underwater industry players to exchange views on problems and solutions for underwater natural and cultural heritage.

Roberto Petriaggi, Istituto Superiore per la Conservazione ed il Restauro (ISCR) consultant for Restoring Underwater Project, Dimitris A. Pados, Charles E. Schmidt Eminent Chair Professor of Engineering and Computer Science in the Florida Atlantic University and Christos Economou, Head of the Unit Sea basin strategies in DG MARE, specialist Maritime Regional Cooperation and Maritime Security participated as Keynote Speakers in the International Conference.

During the conference different perspectives were discussed in the 3 very interesting conference topics:

- Management and protection of accessible Underwater Cultural Heritage sites and diving parks

- Initiatives for sustainable Blue tourism through accessible UCH sites and diving parks
- Technologies for offering dry dive experiences to non-drivers.

Conference participants had the opportunity to live a dry dive experience in BLUEMED pilot sites with the Virtual Reality glasses and equipment that University of Calabria provided.

In the following, you can find the submitted full papers that were presented during the Conference.

For more information about “*Dive in Blue Growth*” Conference visit the official website of BLUEMED (bluemed.interreg-med.eu).

Acknowledgement

International Conference and particularly the authors for their contributions. We are indebted to all who assisted in the organizing effort.

We express our sincere gratitude to all who have actively contributed towards the success of this

Conference Chair

Dr. Kalamara Pari

Director of the Ephorate of
Underwater Antiquities
Hellenic Ministry of Culture and Sports

Dr. Davidde Barbara

Director of the Underwater Archaeology Operation Unit (NIAS - Nucleo per gli Interventi di Archaeologia Subacquea) at the Istituto Superiore per la Conservazione ed il Restauro -Superior Institute for Conservation and Restoration (ISCR)
Italian Ministry of Cultural Heritage and Activities (MiBAC)

Committees

Scientific Program Committee

Dr. Pari Kalamara

Dr. Barbara Davidde

Dr. Yorgos Stephanedes

† Sebastiano Tusa

Dr. Fabio Bruno

Dr. Irena Radic Rossi

Organizing Committee

Aggela Veneti

Angelos Manglis

Dimitra Chondrogianni

Irini Kafousia

Anastasia Mitsopoulou

Michela Ricca

Valentina Puglisi

Salvatore Medaglia

Public Relations Committee

Stjepan Rezo

Consuelo Garcia

Yianna Samuel – Rhoads

Nikola Miskovic

Welcoming Committee

Panagiota Saranti

Anastasia Mitsopoulou

Michela Ricca

Zoi Pataki

*In memory of Sebastiano Tusa
who tragically passed away in
the Ethiopian Airlines plane
crash (Sunday March 10th,
2019).*

**UNDER THE AUSPICES OF H.E. THE PRESIDENT OF THE HELLENIC REPUBLIC
MR. PROKOPIOS PAVLOPOULOS**

**INTERNATIONAL CONFERENCE IN MANAGEMENT OF
ACCESSIBLE UNDERWATER CULTURAL AND NATURAL HERITAGE SITES:**

“DIVE IN BLUE GROWTH”

ATHENS, GREECE
16-18 October 2019
ACROPOLIS MUSEUM, AUDITORIUM

CONFERENCE AGENDA

DAY 1- 16 October 2019

09.00 -09.30 REGISTRATION OF PARTICIPANTS

09:30 -10.00 OPENING AND WELCOME REMARKS
Yorgos J. Stephanedes, *Professor, Civil Engineering, BLUEMED Scientific Coordinator
at University of Patras*
Kostas Agorastos, *Regional Governor of Thessaly*

Lina G. Mendoni, *Minister of Culture and Sports*

Prof. John Chrysoulakis, *Secretary General for Greeks Abroad, Ministry of Foreign Affairs*

Angela Gerekou, *President of Board of the Greek National Tourism Organization (GNTO)*

Luigi Ficacci, *Director of the Istituto Superiore per la Conservazione ed il Restauro, Ministry of Cultural
Heritage and Activities (MiBAC)*

10.00 -10.30 KEYNOTE SPEECH

The “Restoring Underwater Project”: how everything started

Dr. Roberto Petriaggi, Underwater Archaeologist, Consultant of the Istituto Superiore per la
Conservazione ed il Restauro for the Restoring Underwater Project

10.30 -12.00 **Management and protection of accessible Underwater Cultural Heritage (UCH) sites and UCH diving parks**
Session Chair: Yorgos J. Stephanedes

Reflections on the prospects and the institutional framework of the organization of the Accessible Underwater Archaeological Site: starting with BLUEMED

Pari Kalamara

Touristic potential of the Supetar, Cavtat, underwater archaeological zone

Irena Radić Rossi, Katarina Batur

Sustainable management and protection of accessible Underwater Cultural Heritage sites; global practices and bottom-up initiatives

Angelos Manglis, Anastasia Fourkiotou, Dimitra Papadopoulou

Protecting marine biodiversity at accessible Underwater Cultural Heritage (UCH) sites and UCH diving parks

Yianna Samuel, Yiannos Mylonas, Stavros Stylianou, Gregory Konnaris, Pavlos Diplaros, Georgios Fyttis

12.00 -12.30 *Coffee break*

12.30 -14.00 **Technologies for offering dry dive experiences to non-divers**
Session Chair: Fabio Bruno

Diving into a sea of history. Communicating the Underwater Experience in a Museum: An Analysis of ARQVA's Interactive Media

Antonio Cosseddu

Raising the awareness about underwater archaeological heritage through Edutainment and Virtual/Augmented Reality

Fabio Bruno, Marco Cozza , Maurizio Mangeruga , Dimitrios Skarlatos , Panagiotis Agrafiotis , Barbara Davide Petriaggi , Roberto Petriaggi , Selma Rizvic , Fotis Liarokapis

Results of the "SOMMERGIAMOCI" project in the MPA Gaiola underwater park

Maurizio Simeone, Paola Masucci, Caterina De Vivo

An innovative platform for virtual underwater experiences targeting the cultural and tourism industries

Paraskevi Nomikou, Konstantinos Karantzalos, Andreas El Saer, George Pehlivanides, Panagiotis Tsois, Christos Stentoumis, Anna Dura, Giotis Ioannidis, Michalis Sarantinos, Varvara Antoniou, Othonas Vlassopoulos, George Katopodis, Katerina Plessa, Ilias Kalisperakis, Konstantina Bejelou, Konstantinos Monastiridis

Deep-Sea archaeology in the Exclusive Economic Zone (EEZ) of Cyprus

Achilleas Iasonos

14.00 -15.00 *Light lunch and networking*

15.00 -15.30 KEYNOTE SPEECH

Financing Opportunities for Blue Growth

Christos Economou, Unit Sea basin strategies, DG MARE, Maritime Regional Cooperation and Maritime Security

15.30 -17.00 **Initiatives for sustainable Blue tourism through accessible UCH sites and diving parks**
Session Chair: Barbara Davidde Petriaggi

Technological protection of an underwater archeological site; a newly discovered Roman shipwreck from the 1st century BC, on the island of Pag

Vedran Dorušić, Matko Čvrljak

Theraic Sea: A bottom-up initiative for marine conservation and sustainable living

Maria Salomidi, Sylvaine Giakoumi, Vangelis Paravas, Pierre-Yves Cousteau

Towards the Creation of Accessible Underwater Archaeological and Historical Sites in Fournoi and Leros (Eastern Aegean): an Interreg VA, Hellas - Cyprus 2014 -2020 program under Development

George Koutsouflakis

Project: blue HOMER

Marko Mišić, Toni Mandušić

17.00 -18.30 **Management and protection of accessible UCH sites and diving parks – Case studies**
Session Chair: Angelos Manglis

The studies on the underwater cultural heritage of Istanbul from the Anatolian side to the Princes' islands

Ahmet Bilir, Mustafa Şahin

Accessing Underwater Cultural Heritage on dry feet: some Sicilian case studies

Francesca Oliveri

Preservation, management and protection of Tangible Underwater Cultural Heritage of Anfeh (North Lebanon)

Nadine Panayot Haroun

Community cultural infrastructure: sustainability of the underwater cultural heritage of Bocachica, Cartagena

Liliana Patricia Rozo Pinzón

The in situ preservation as a priority option. Experiments in the upper Adriatic Sea

Massimo Capulli

18.30 -20.00 *Networking hour*

10.00 -18.00 PARALLEL ACTIVITY

Dive in Virtual Reality!

Live a Virtual Diving experience in BLUEMED pilot sites [#VR](#) [#drydive](#)
Supported by 3D Research s.r.l.

DAY 2- 17 October 2019

09.00 -09.30 REGISTRATION OF PARTICIPANTS

09.30 -11.30 **Management and protection of accessible Underwater Cultural Heritage (UCH) sites and UCH diving parks**
Session Chair: Pari Kalamara

How the Greek pilot sites were selected and the creation of the Knowledge Assessment Centers (KACs) in Greece

[Angeliki G. Simosi](#)

EGNAZIA: Enhancement and use of submerged Structures along the coast guided diving and snorkeling tours

[Gianpaolo Colucci](#)

Change behavior and raise awareness about the Adriatic's underwater treasures as common goods: the UnderwaterMuse Project

[Rita Auriemma](#), [Carlo Beltrame](#), [Ivanka Kamenjarin](#), [Danilo Leone](#), [Ivan Šuta](#), [Maria Turchiano](#)

MUSAS: an innovative project for the enhancement of the Underwater Cultural Heritage

[Barbara Davide Petriaggi](#), [Michele Stefanile](#), [Marco D'Agostino](#), [Sandra Ricci](#), [Carlotta Sacco Perasso](#)

Linking WWI and II Underwater Cultural Heritage to Sustainable Development in the Mediterranean: An Integrated Participatory Strategic Planning Approach

[Vasilike Argyropoulos](#), [Anastasia Stratigea](#)

Tourism experience in the Underwater Archaeological heritage site: managing emotional state to increase archaeological diving tourism in the Sunken City of Baiae

[Cristina Canoro](#), [Francesco Izzo](#), [Barbara Masiello](#)

11.30 -12.00 KEYNOTE SPEECH

Autonomous underwater localization, communication, and networking

Dr. Dimitris A. Pados, Charles E. Schmidt Eminent Chair Professor of Engineering and Computer Science, Florida Atlantic University

12.00 -12.30 *Coffee break*

12.30 -14.30 **Initiatives for sustainable Blue tourism through accessible UCH sites and diving parks**
Session Chair: Angelos Manglis

Diving and Underwater Cultural Heritage: a reasonable or a forced marriage? The Greek case
Dimitris Kourkoumelis, Alexandros Tourtas

Protection and development of the Lake Bolsena underwater heritage
Antonia Sciancalepore, Edigio Severi, Maria Letizia Arancio, Barbara Barbaro

Cartographic Documentation and Proposed Criteria towards the Protection and Preservation of Wrecks from the Great War in the Greek Seas
Elpida Katopodi, Kimon Papadimitriou

The National Marine Park of Alonnisos Northern Sporades: an area of rich natural and cultural heritage facing human and climatic pressures
Dimitris Poursanidis, Vasiliki Vasilopoulou

A fresh (water) case study: the time travel under water project in Lake Attersee
Cyril Dworsky

A framework for underwater cultural heritage and environmental services evaluation
Lydia Stergiopoulou

S/S Burdigala, former Schnelldampfer Kaiser Friedrich (1897-1916)
Dimitris Galon

14.30 -15.30 *Light lunch and networking*

15.30 -18.30 **Management and protection of accessible Underwater Cultural Heritage (UCH) sites and UCH diving parks**
Session Chair: Elpida Hadjidaki, Yianna Samuel

Performance management in Underwater Cultural Heritage (UCH) site, UCH diving parks and Knowledge Awareness Centers (KACs)
Dimitra Chondrogianni, Yorgos J. Stephanedes, Panagiota-Georgia Saranti, Irini Kafousia

SUB: THE WRECKS in THE GREEK SEAS, 1830-1951. The Underwater Heritage of Navy's Shareholding Fund And Mariners' Retirement Fund
Panagiotis Tripontikas

Management and protection of a little known underwater archaeological site: the case of the "Roman Villa of the Dolia" in Ancient Epidaurus; past experience and future prospects
Barbara Davidde Petriaggi, Panagiota Galiatsatou, Angelos Tsompanidis

L'Anfora ASD, the sustainable tourism and use of submerged archaeological sites in Apulia
Gianpaolo Colucci, Paola Palumbo

Japanese Shipwreck and Diving Tourism in Sangihe Islands Indonesia
Sultan Kurnia Alam Bagagarsyah

The Faro Convention and the sustainable valorization of the underwater heritage. Case studies and projects in the Adriatic and Ionian Sea
Rita Auriemma

Perspectives and obstacles for accessible underwater archaeological sites. The case of Crete
Theotokis Theodoulou

Public Access to Underwater Archaeological Sites. Enjoying and Protecting our Maritime Heritage
Carles Aguilar

"Hippocampus" the Microscopic Mythical Dragon of the Sea
Vasilis Mentogiannis

10.00 -18.00 PARALLEL ACTIVITY

Dive in Virtual Reality!

Live a Virtual Diving experience in BLUEMED pilot sites #VR #drydive
Supported by 3D Research s.r.l.

DAY 3- 18 October 2019

09.00 -09.30 REGISTRATION OF PARTICIPANTS

09.30 -11.30 **Technologies for offering dry dive experiences to non-divers**
Session Chair: Fabio Bruno

A low cost equipment and SFM software photogrammetric survey of two shipwrecks in the sea area of Methoni, Southwestern Greece
George Michailidis

Operating contemporary recreational submersibles in Kea's Underwater Historic Park
Ioannis Tzavelakos

Reconstructing a submerged villa maritima: the case of the villa dei Pisoni in Baia
Barbara Davide Petriaggi, Michele Stefanile, Roberto Petriaggi, Fabio Bruno, Raffaele Peluso, Marco Cozza

Opto-acoustic 3D Reconstruction for Virtual Diving on the Peristera Classical Shipwreck
Fabio Bruno, Antonio Lagudi, Matteo Collina, Salvatore Medaglia, Pari Kalamara, Dimitris Kourkoumelis, Nikola Miskovic, Dula Nad, Nadir Kapetanovic, Mato Markovic

Remotely operated group of vehicles for underwater scientific exploration and intervention
Lorenz E. Baumer, Yanis Bitsakis, Mathias Buttet, Eftstratios Charchalakis, Alessia Mistretta, Alexandros Sotiriou

Monitoring and protection of accessible underwater cultural heritage

Siarita Kouka, Paraskevi Nomikou, Konstantinos Karantzalos, Aikaterini Tagonidou

11.30 -13.30 **Initiatives for sustainable Blue tourism through accessible UCH sites and diving parks**

Session Chair: Yianna Samuel

In situ conservation of cannons in marine environment: cathodic protection, cleaning treatment and coverage with geotextiles

Flavia Puoti, Barbara DaviddePetriaggi, Marco Ciabattoni, Claudio Di Franco

Underwater Archaeological Sites as a touristic and educational resource. The Isla Grosa Project

Carlota Pérez-Reverte Mañas, Felipe Cerezo-Andreo

Western Black Sea underwater cultural tourist routes

Preslav Peev

New institutions for diving tourism: Diving Parks, Archaeological Diving Parks, Modern Shipwrecks & Implementation opportunities and problems in Greece

Thanassis Stathis, Dimitris Markatos, Kostas Koutsis

Creation of a virtual museum and a diving park east of the island of Lemnos on the site of the wreck of the Svyatoslav ship

Sergey Fazlullin, Ivan Gorlov, Yury Tkachenko, Sergey Khokhlov, Michael Bardashov, Rolan Sadekov

Integrated management plan for the preservation and promotion of cultural and natural environment at Pavlopetri (Elafonissos, Greece)

Despina Koutsoumba, Stamatis Zogaris, Ioannis Kapakos, Maria Salomidi, Stergiopoulou Lydia

13.30 -14.00 **CONCLUSIONS**

Moderator: Dimitra Chondrogianni

Fabio Bruno, Barbara Davidde Petriaggi, Pari Kalamara, Angelos Manglis, Yianna Samuel, Yorgos J. Stephanedes

Table of Contents

Reflections on the perspectives and the institutional framework of the organization of the Accessible Underwater Archaeological Site: starting with BLUEMED	4
Touristic potential of the Supetar (Cavtat) underwater archaeological zone	15
Sustainable management and protection of Accessible Underwater Cultural Heritage sites; global practices and bottom-up initiatives.....	16
Protecting marine biodiversity at accessible Underwater Cultural Heritage (UCH) sites and UCH diving parks	26
Diving into a sea of history. Communicating the Underwater Experience in a Museum: an Analysis of ARQVA’s Interactive Media.....	27
Raising the awareness about underwater archaeological heritage through Edutainment and Virtual/Augmented Reality	35
Results of the “Sommergiamoci” Project in the MPA Gaiola Underwater Park	47
An innovative platform for virtual underwater experiences targeting the cultural and tourism industries	57
Deep-Sea archaeology in the Exclusive Economic Zone (EEZ) of Cyprus	64
Technological protection of an underwater archeological site; a newly discovered Roman shipwreck from the 1st century BC, on the island of Pag, Croatia	74
Theraic Sea: A bottom-up initiative for marine conservation and sustainable development in the Aegean Sea, Greece.....	82
Towards the Creation of Accessible Underwater Archaeological and Historical Sites in Fournoi and Leros (Eastern Aegean): an Interreg VA, Hellas- Cyprus 2014-2020 program under development	90
The Studies on the Underwater Cultural Heritage of Istanbul from the Anatolian Side to the Prince Islands: The NEMSUS Project.....	100
Accessing Underwater Cultural Heritage on dry feet: some Sicilian case studies.	111
Preservation, management and protection of Tangible Underwater Cultural Heritage of Anfeh (North Lebanon).....	123
Community Cultural Infrastructure: Sustainability of the maritime and underwater Cultural Heritage of Bocachica, Cartagena	132
The in situ preservation as a priority option. Experiments in the upper Adriatic Sea.....	138

How the Greek pilot sites were selected and the creation of the Knowledge Awareness Centers (KACs) in Greece	146
EGNAZIA: Enhancement and use of submerged Structures along the coast guided diving and snorkeling tours	147
Change behaviour and raise awareness about the Adriatic’s underwater treasures as common goods: the UnderwaterMuse Project	155
MUSAS: an innovative project for the enhancement of the Underwater Cultural Heritage	169
Linking WWI and II Underwater Cultural Heritage to Sustainable Development in the Mediterranean: An Integrated Participatory Strategic Planning Approach	180
Tourism experience in the Underwater Archaeological heritage site: managing emotional state to increase archaeological diving tourism in the Sunken City of Baiae	192
Diving and Underwater Cultural Heritage: a reasonable or a forced marriage? The Greek case.....	202
Protection and development of the Lake Bolsena underwater heritage (Lake Bolsena - Italy)	203
Cartographic Documentation and Proposed Criteria towards the Protection and Preservation of Wrecks from the Great War in the Greek Seas.....	210
The National Marine Park of Alonnisos Northern Sporades: an area of rich natural and cultural heritage facing human and climatic pressures.....	217
A fresh (water) case study: the time travel under water project in Lake Attersee.....	226
A framework for the evaluation of Cultural Ecosystem Services in Underwater Cultural Heritage spaces	236
The S/S Burdigala former Schnelldampfer Kaiser Friedrich (1897-1916)	244
Performance management in Underwater Cultural Heritage (UCH) site, UCH diving parks and Knowledge Awareness Centers (KACs)	252
THE WRECKS in THE GREEK SEAS, 1830-1951. The Underwater Heritage of Navy’s Shareholding Fund and Mariners’ Retirement Fund.	261
Management and protection of a little known underwater archaeological site: the case of the “Roman Villa of the dolia” in Ancient Epidaurus. Past experiences and future perspectives.....	272
L’Anfora ASD, the sustainable tourism and use of submerged archaeological sites in Apulia.....	283
Japanese Shipwreck and Diving Tourism in Sangihe Islands Indonesia.....	288
The Faro Convention and the sustainable valorization of the underwater heritage. Case studies and projects in the Adriatic and Ionian seas.....	298
Perspectives and obstacles for accessible underwater archaeological sites. The case of Crete.....	310

Public Access to Underwater Archaeological Sites. Enjoying and Protecting our Maritime Heritage	311
“Hippocampus” the Microscopic Mythical Dragon of the Sea	315
A low cost equipment and SfM software photogrammetric survey of two shipwrecks in the sea area of methoni (in Soutwestern Greece)	316
Operating contemporary recreational submersibles in Kea’s Underwater Historic Park	326
Reconstructing a submerged villa maritima: the case of the villa dei Pisoni in Baiae	331
Opto-acoustic 3D Reconstruction and Virtual Diving on the Peristera Shipwreck.....	332
Remotely operated group of vehicles for underwater scientific exploration and intervention.....	340
Monitoring and protection of accessible underwater cultural heritage	341
In situ conservation of cannons in marine environment: cathodic protection, cleaning treatment and coverage with geotextiles	342
Underwater Archaeological Sites as a touristic and educational resource. The Isla Grosa Project. ...	350
Western Black Sea underwater cultural tourist routes.....	360
New institutions for diving tourism: Diving Parks, Archaeological Diving Parks, Modern Shipwrecks	366
Implementation opportunities and problems in Greece.....	366
Creation of a virtual museum and a diving park east of the island of Lemnos on the site of the wreck of the Svyatoslav ship	380
Integrated management plan for the preservation and promotion of cultural and natural environment at Pavlopetri (Elafonissos, Greece)	385

The Faro Convention and the sustainable valorization of the underwater heritage. Case studies and projects in the Adriatic and Ionian seas

Rita Auriemma¹

¹Dipartimento di Beni Culturali - Università del Salento

Abstract: During the last years, some marine or coastal protected areas subject to the landscape planning restrictions, along the Adriatic and Ionian coasts have been the backdrop of the coastal landscape archaeological researches carried out by the Salento and Trieste Universities, in collaboration with national and international partners, both public and private. They are excellent sites for geo-archaeological research, where the protection activity allows us to individuate the signs – poorly recognizable or unequivocal – of the changes and to re-trace through the trans-disciplinary analysis the ancient landscape features.

The presentation aims to describe some projects, some of which are in progress, that have as common denominator a valorization model of the environmental and historical-archaeological heritage and a methodological protocol of the geo-archaeological investigation in a particular context such as a protected marine area and/or natural park.

These valorization proposals comprise a series of actions: a preliminary paleo-geographic, paleo-environmental and archaeological investigation program, that includes also topographical and bathymetric surveys, cores, targeted excavations, mapping and development of integrated information systems; furthermore the design of technical, exhibition and reception spaces, with interactive multimedia displays, life-size and scale replicas, landscape reconstructions and simulation of its changes, through semi-immersive fruition using holographic systems presented in sequence; design and installation of “blue paths” accessible by snorkeling, scuba diving with trained guides (also for people with a disability) and/or boat, glass bottom boat or video-boat; the blue paths’ stops are represented by environmental, geomorphological, archaeological and geoarchaeological points of interest.

Keywords: marine or coastal protected areas, waterscapes archaeology, in situ preservation, enhancement, blue paths, Museum-aquarium.

1. ARCHAEOLOGY AND ENVIRONMENT, “WATERSCAPES” ARCHAEOLOGY

The best practice of the in situ preservation and enhancement is the natural target of the global landscapes archaeology, in our case “waterscapes archeology”, “a coherent sub-discipline of human ecology, neither a form of natural science nor a form of archaeology, but an integrated way of understanding humans in dynamic landscapes” (Barker G., Bintcliff J. 1999: 207). As we know, the landscape/waterscape is a system generated by mutual relations between physical, anthropic and cultural features. Our primary task – as historians, geoarchaeologists, etc. – is to tell the story of social groups in changing landscapes, recording the discontinuities, the development processes, the identity-making features; this operation enables us to write the *longue durée* history, complementary to the Braudelian “*histoire événementielle*” (Braudel H. 1949; Barker G. 1991; Hodges 1993; Cambi, Terrenato 1995: 282-289)

The global landscape archeology, due to its holistic approach, has a very evident political connotation: it is public archaeology, “archaeology of the territory, carried out in the territory for the territory”, an effective tool “*for the protection of the landscapes and for the measures of territorial planning, more careful to the*

safeguard and enhancement of the archaeological heritage, capable to reconcile the needs of the current society with the knowledge and the preservation of the traces of the past”.

The waterscape, because of its complexity and dynamism, is the most challenging and organic of the territorial and cultural “archives”, able to facilitate the entirety of approach and sources and to reassemble the various archaeological competences in a holistic perspective.

The submerged archaeological site is a perfect mix between nature and culture. We would define it as “eco-museum” or “widespread museum”, where landscape, in our case waterscape, becomes museum, as a system where goods and objects are in connection and, because of this, understandable; a widespread museum, where the cultural heritage is preserved in the environment of which it is an integral part.

On this statement the Italian legislation is perfectly consistent with the European as testified:

- Codice Urbani: *the archaeological park is a territory characterized by important archaeological evidences and by the joined presence of historical, landscape and environmental values, equipped as an open-air museum”;*
- also the framework law 394/1991 on the protected areas aims at safeguarding *anthropological, archaeological, historical, architectural values*
- Faro Convention:
Art. 2 - definition of cultural heritage: *a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions. It includes all aspects of the environment resulting from the interaction between people and places through time;*
See also Art. 8 – Environment, heritage and quality of life.

The marriage of nature and culture is particularly efficient in the touristic aspect of the *in situ* preservation. In the underwater tourism historical and biological/naturalistic concerns merge. Piero Pruneti, promoter of this kind of cultural tourism in Italy, speaks of an “history ecosystem”. The underwater tourism combines in a single activity leisure, sport, culture and ecology. For exploiting its potential, it needs a local touristic system integrated and effective, quite diversified, in which different actors accept to interact. Furthermore, it’s a kind of tourism that needs areas provided of a status of juridic protection of environmental type (MPA) and/or archaeological type (Parks).

These forms of protection imply and at the same time foster a “culture of the territory”, that is increasingly important for our country.

If we want to attract cultural tourism or the more profitable underwater cultural tourism, it occurs to invest in protection policies and to make the territory more attractive with specific environmental brands (MPA), as evidenced/demonstrated by the brand “Unesco World Heritage”, obsessively sought-after by the local authorities.

On the other side, the underwater archaeological tourism has a limit that conflicts with the principles of the UNESCO Convention and Faro Convention: it implies elevated costs for the users and limits the fruition to the middle and upper class, in a form of “gentrification”. This public during holidays likes to or must spend a significant budget for diving services and equipment, the transport and the boat rental, the touristic services, such as hotels and restaurants.

It is very profitable/lucrative, of low or zero environmental impact, that is to say sustainable, “programmed alternative tourism”, at high regulation and low intensity of flows. But it still doesn’t seem a tourism for all that is that not all the community will be able to access, know and share its own heritage.

2. STUDY CASES: MARINE OR COASTAL PROTECTED AREA

During the last years, some marine or coastal protected areas subject to the landscape planning restrictions, along the Adriatic and Ionian coasts (Miramare Marine Protected Area and the Marano Lagoon (Ud) in Friuli Venezia Giulia, Torre Guaceto Marine Protected Area, Porto Selvaggio-Palude del Capitano Natural Park and the contiguous Marine Protected Area of Porto Cesareo) have been the backdrop of the coastal landscape archaeological researches carried out by the Salento and Trieste Universities, in collaboration with national and international partners, both public and private. They are excellent sites for geo-archaeological research, where the protection activity allows us to individuate the signs – poorly recognizable or unequivocal – of the changes and to re-trace through the trans-disciplinary analysis the ancient landscape features. They are excellent sites in which to experiment widely accessible forms of underwater tourism, affordable tourism for all, in line with the principles of Faro Convention.

The first example is offered by the **Miramare Marine Protected Area** and its immediate surroundings, located at the foot of the Miramare promontory.



Fig. 1: Grignano, Trieste. The promontory. Aerial photo: 1. submerged breakwater; 2. findings behind the Miramare Stables (a) and to the north (b); 3. Roman pier under the modern port (Regione FVG- volo Trieste 2003, lotto 15, strisciata 38, fotogramma 33).

The maritime character is clear, since the Roman and Medieval age; from the beginning of the 12th century, at the start of the Venetian hostilities, the Venetian ships lay in ambush in the little harbour of Grignano, while the Triestine ships sought refuge in the same harbour....For the Roman age we can draw a more articulated system: a northern basin, the port of Grignano, with the greek pi-shaped pier known to Kandler and documented in the historical cartography and also by Degrassi in the last century; a second little landing place, or, better, boats to the south, at the mouth of the Aurisina creek. The researches carried out as part of the Interreg Italia-Slovenija *AltoAdriatico* project allowed us to document

both the foundation of the pier in the Grignano bay and a breakwater – a 70 m long, 2 m high, L-shaped dry stone jetty - in front of the Miramare Stables.

Both the sites must be related to one or more important coastal residences, whose traces – mosaics, brick stamps, etc. - have been found in a kilometer long stretch of the coast. The submerged and geoarchaeological evidences could enrich the already wide offerings of the MPA, and could provide additional opportunities for training, educational and touristic programmes.

The *Storie dal mare* research project, carried out by the Trieste University and the Superintendency for Cultural Heritage of Friuli Venezia Giulia had as its primary focus **the lagoon area of Marano**, frequented

since the Neolithic age and showing a strong role in trade supported by the waterways mostly evident from the Iron age. It is possible to reconstruct for the Roman age an articulated settlement framework with strategic landing places both on islands and on the lagoon perimeter, that represented strategic points in strict connection with the Aquileia harbour system.



Fig. 2: The Marano lagoon.



Fig. 3: The Marano Lagoon. Archaeological map.

The import from different Mediterranean areas (food, pottery and other goods) indicates the vitality of the trade flows, and, together with the shipwrecks in the riverbeds and probably also in the lagoon, put in light the area's role as an hub between the land routes, the rivers and the sea routes.

Near the two Regional Reserves, Foci dello Stella and Valle Canal Novo, there are some other archaeological sites, investigated during the Project, such as the room with mosaic at Piere d'Isela, the archaeological ceramic materials at Piere del Ficariol, the relevant building complex at Piere del Tribel, the

Early Mediaeval structures and deposits on the S. Andrea island, hypothetically referred to a Christian church, founded by the Patriarch Elia at the end of the 6th cent. AD.

As results of the project we have achieved

- an hypothesis of reconstruction of the paleo-landscape, through the study of the relative sea-level changes and the morphological evolution of the lagoon environment;
- the elaboration of the archaeological GIS of the Marano Lagoon
- knowledge-sharing events, such as the exhibition “*Alle porte del mare. Paesaggi d’acqua e di storia nella laguna di Marano*”, that was held in Marano, old fishery, 1st September – 3rd November 2013
- educational and touristic initiatives, such as laboratories, guided visits, themed dinners and tastings (*The flavours of history*)
- publications, such as papers in scientific journals and the exhibition catalogue R. Auriemma, P. Maggi (a cura di), *Alle porte del mare. Paesaggi d’acqua e di storia nella laguna di Marano*, Catalogo della mostra, Luglio Editore, Trieste 2013.
- the design of an archaeological itinerary, on the land, the islands and under water, linked to the existing environmental one, capable of enriching the high quality touristic offer.

In the **Southern Adriatic**, coastal landscape archaeological researches have been carried out in various areas, aiming at the continuous updating of the Archaeological Underwater Map / Web GIS of the Apulia Region.

In the natural **Reserve and Marine Protected Area of Torre Guaceto**, where the coast shows beautiful pocket beaches, the three islets of Torre Guaceto, in front of the promontory of the same name, and the 2 southernmost islets of Apani.

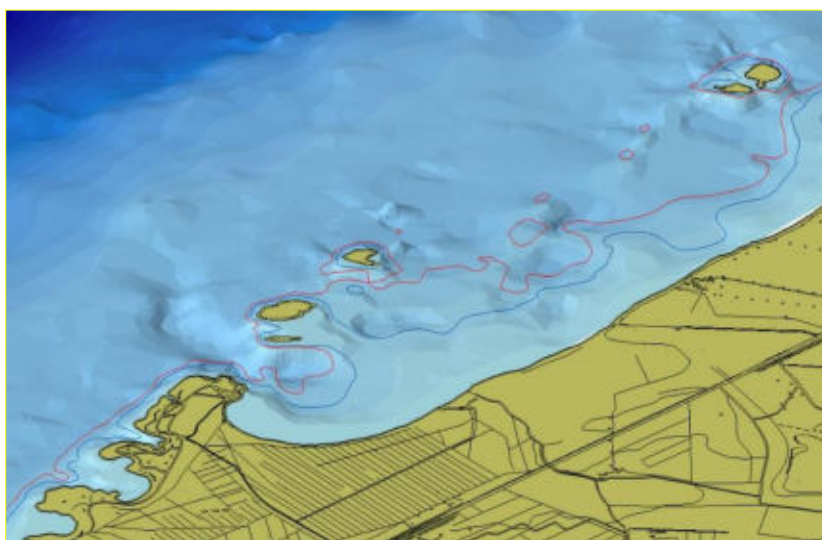


Fig. 4: Torre Guaceto. Bronze age (red) and Roman coastline (blu).

A vast Bronze age settlement extends at least 1 km along the coast, on the islets and also on the sea bottom, all scattered with post holes of different shapes and sizes, frequently aligned, up to a depth of 3.5/4 m.

Roman age deposits and a shallowly submerged quarry are on the second islet, that – as the landscape evolution analysis has demonstrated – was at that time a sort of headland used as a landing and loading point for little boats that transported local products – especially wine and oil contained in amphoras - to the Brindisi terminal.

Late antique deposits and the squared blocks foundation of a hypothetical tower/lighthouse are on the third islet. The stretch of water between the latter and the shore shows the scattered remains of a late antique shipwreck: ballast stones, amphoras and tile sherds, a rotary millstone, etc. This wreck demonstrates that at the end of the Roman Empire the relative sea level increase caused the sea ingression and the definition of the islets that represent the protruding fragments of the ancient coastline.

Archaeological and morphological data allow us to recognize important changes in the coastal profile, between the Bronze age and the medieval age (Auriemma R. 2004, I: 86-87; Auriemma R. et al. 2004. Scarano T. et al. 2008). The inhabited areas are located on high terrains compared to a coastal plain (larger than the current one) characterized by abundant water flows (Canale Reale), widespread swamps and lush vegetation.

In the 2nd millennium BC, due to a medium sea level 3-4 m lower than current one, the landscape was characterized by sites in the most elevated points of the coastal plan, eminent in respect of other areas rich in fresh water (the water network of the ancient Canale Reale) and game.

After the Bronze age, the rising sea level started to undermine the MIS 5 dunes, and eroded and flooded the hollows behind. Underwater findings attest the existence of a landing place in Torre Guaceto during the late Republican and Early Imperial Roman age, functional to the nearby Apani amphoras kilns and to the significant oil and wine production in the hinterland, probably near the mouth of Canale Reale (Auriemma R. 2004, I: 91-94). During this phase, in accordance with the archaeological sea level markers of nearby sites such as Egnazia and Torre S. Sabina, with a sea level 2.5-3 m lower than current, the “caricatore” could have been located on a promontory coinciding with the two surviving islets. In the Late Antiquity the remains of a cargo in the shallows between the third islet and today’s shore testify to the sea ingression, as do the vestiges of a presumed tower-lighthouse also on the third islet (Giardina B. 2010).

This site testifies that there is no valorization without a preliminary strategic research programme.

We identified the focal points in the homonymous look-out coastal Tower and in the **blue trails**, underwater itineraries with floral and faunal, geomorphological (the submerged sapping valley to the east of the Tower), geoarchaeological (the paleoshore) and archaeological points of interest, that are presented to the visitors with replicas of scattered cargos and decontextualized finds.

The interior of the Tower has been set up with a replica of a little cargo boat apt to transport amphoras to the Brindisi harbour from the loading place of Guaceto, inspired by a small “cabotatore” 8 m long, similar to the Cavalier shipwreck. Educational panels attractively illustrate the landscape context, the agricultural activities and tools, such as the grain milling, the wine and oil production, the amphora kilns and the transport of the goods by cart to the landing place, etc.

In the Ionian sea we have operated in some **Marine Protected Areas, such as that of Porto Cesareo**.

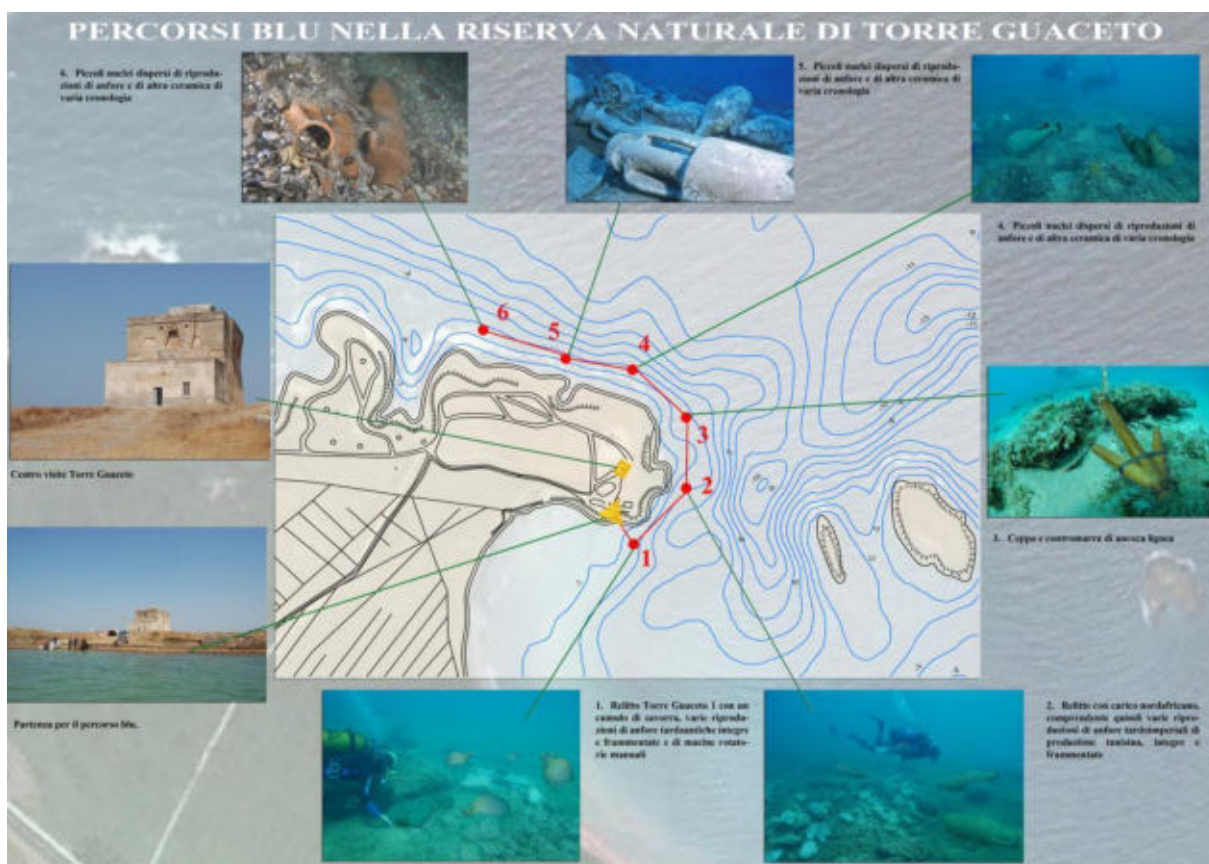


Fig. 5: Torre Guaceto: blue trails project.

Here there are some well-known underwater evidences, such as the **navis lapidaria** shipwreck, with the monumental cipollino marble column cargo coming from Eubea, that lies at a depth of 4.5 m, but also some decontextualized finds, including the small precious statue of the baboon-God Thoth, in green basalt and with hieroglyphics, some lead stocks recently found (one recovered), etc., that attest an intensive frequentation of this coastal stretch, both along fishing and cabotage pathways and the crossing route of the Ionian sea, towards Kroton.

The Torre Chianca headland and the nearby small peninsula show very conspicuous archaeological deposits dated back to the Roman age, exposed by erosion, as well as wall block foundations that delimit some settings, and a necropolis area, with limestone sarcophagi and tombs cut in the rocky bed, with skeletal remains, all now partially submerged, due to relative sea level changes that have caused the transformation of a headland into the island of Malva.

All these evidences can be referred to an extended settlement located around the bay, aimed at exploiting maritime resources.

A little further to the south of Torre Chianca, the promontory of Scalo di Furno hosts one of the most significant proto-historical settlements of the Salento coast, dating from the Bronze to the archaic age (18/17th – 8th cent. BC and further), that has offered also Mycenaean pottery.



Fig. 6: Scalo di Furno (Lecce). Bronze age settlement's lower terrace with the now submerged fortification and stone pavement; the yellow line indicates the ancient coastline – 4.5 m.

Subsequently, between the end of the 7th and the beginning of the 5th cent. BC, the site became a place of worship, with a small temple devoted to a messapic Goddess, altars and votive deposits and offerings.

The underwater survey between the promontory and the opposite islet allowed us to reconstruct a paleo-landscape completely different from present; we have recognized the lower terrace of the settlement, with the now submerged fortification wall and cobble stone pavement, that reveal a sea level rise of 4.5 m from the Bronze age and a relevant tectonic down-lift.

A further wreck has been brought to light recently; a beached wreck dated back to the Medieval age (770-1020 d.C.) by radiocarbon analysis and maybe referable to the Eastern Mediterranean environment.

Also in this case some blue trails have been designed and promoted to the public. Furthermore, we developed a VR replica of the column cargo ship that can be enjoyed by the visitors.

Since 2008 a vast coastal landscape research program (surveys and excavations on the land and under water) has been carried out in the **Natural Park of Porto Selvaggio and Palude del Capitano (Nardò)**, partially contiguous to the Porto Cesareo MPA.



Fig. 7: Natural Park of Porto Selvaggio and Palude del Capitano (Nardò).

The investigations concerned the coastal settlement of Frascone, a maritime villa in the late republican phase and a fishing farm in the Roman Imperial stage.

The Municipality of Nardò requested to extend the park to the southerly bordering maritime stretch, up to Porto Selvaggio and S. Caterina; in this way, some shipwrecks could be included in the protected area: the cargo traces reported at P. Lea and the 2 ships sunken near S. Caterina harbour (dia): the hellenistic wreck of Scogli delle 2 sorelle (dia), of which scattered remains of the cargo are visible on the beautiful sea bottom; the well known wreck of S. Caterina-Punta dell'Aspide, with Greco-italic wine amphoras partially excavated, that has been proposed for the in situ preservation. Also the former could be enjoyed, even if heavily looted, through reproductions of amphoras and living on board objects, and 3D models.

The research program has allowed the very recent opening of an educational **Maritime Museum in Nardò**, displaying all the results and conceived particularly for a young public.

The strong relationship between naturalistic and cultural aspects of the sea constitutes the core of the **Museum-Aquarium of S. Maria al Bagno**, carried out within the interdisciplinary 'Aquaria for the Promotion of Environment and History' (A.Pr.E.H.) project financed by the European Territorial Cooperation Programme (E.T.C.P.) "Greece-Italy" 2007-2013. The mission of the 2 Aquaria of the project (in S. Maria e in Argostoli, Greece) will be the promotion, education, and information not only for the knowledge of the local marine fauna and flora, but also of the ancient, modern and contemporary history, through renderings and reproductions of some wrecks belonging to the various periods, from the Roman ship of S. Caterina to the II World War steamers and plane (Posi et al. 2013).

The coastal area of the Natural Reserve of **Le Cesine**, one of the surviving testimonies of the extended marshes along the Apulian shore, deserves a mention; various submerged and partially submerged evidences are known: Bronze age deposits, squared block structures, a presumed fishpond, basins for the salt production and walls.

Recently the hull of a modern copper-bottomed beached wreck with double planking has been discovered, of medium tonnage and presumably 30 m long. In close proximity 2 cannons lie in the sandy bottom 2,40 m and 2,10 m long.

The wreck is comparable, as far as the preservation, position and naval carpentry are concerned, with the contemporary wreck of Torre Rinalda, a little to the north, in the Municipality of Lecce.

Also in this case the in situ preservation seems the best option for the enhancement of the whole context and we proposed a trail around the cannons and the visible perimeter of the hull, 300-400 m long.

We can also quote **Ugentosommerso project**: naturalistic and archaeological underwater trails in the Ugento shallow waters; the project has foreseen a multilingual video and other informative and communication materials production.

The project MareMuseoSalento Università del Salento – Regione Puglia

A project of enhancement and in situ preservation of the Apulian underwater heritage is currently in progress: through the knowledge and the data base of the Southern Apulia Underwater Archaeological Map/webGIS, the purpose is to create an efficient touristic network of accessible submerged or partially submerged sites (structures and shipwrecks or cargos, isolated finds and harbour dumps). Along the Salento coast there are various and heterogeneous shipwrecks that are suitable to this project: marble cargos/*naves lapidariae* as well as amphoras and pottery cargos, beached wrecks, etc.

The goal is also to involve local actors – especially young people, through specific measures and calls for interest - for the setting of the sites (also with metallic cages), management and development of related activities, including the resumption of old trades such as the shipwright for building ships' **didactical replicas** or virtual replicas.

3. REFERENCES

- Africano E. and R. Bonaiuti (2008). "Parchi archeologici subacquei", *Archaeologia Maritima Mediterranea. An International Journal of Underwater Archaeology*, Vol. 5, pp. 179-185.
- Alfonso C., R. Auriemma, T. Scarano, G. Mastronuzzi, L. Calcagnile and G. Quarta (c.s.). "The ancient coastal landscape of Protected Marine Area of Porto Cesareo (Le): recent researches", 3rd International Symposium on Occupational Diving of ESPD - ISOSD 2011 Conference Proceedings, Porto Cesareo, Lecce, 2011, *Underwater Technology - International Journal of the Society for Underwater Technology*, special issue.
- Amici C.M., G. Ceraudo, S. Marchi and M. Sammarco (c.s.). "Il porto antico di S. Cataldo (Lecce)", *Atti del III Convegno Nazionale di Archeologia Subacquea*, Manfredonia, 2007.
- Antonioli F., M. Anzidei, K. Lambeck, R. Auriemma, D. Gaddi, S. Furlani, P. Orrù, E. Solinas, A. Gaspari, S. Karinja, V. Kovačić and L. Surace (2007). "Sea level change during Holocene from Sardinia and Northeastern Adriatic (Central Mediterranean Sea) from archaeological and geomorphological data", *Quaternary Science Reviews*, Vol. 26, pp. 2463-2486.
- Antonioli F., S. Furlani, K. Lambeck, F. Stravisi, R. Auriemma, D. Gaddi, A. Gaspari, S. Karinja and V. Kovačić (2008). "Archaeological and geomorphological data to deduce sea level changes during the late Holocene in the Northeastern Adriatic", *Terre di mare* (eds. R. Auriemma and S. Karinja), 2008, pp. 221-234.
- Auriemma R. (2000). "Che fine ha fatto il relitto di S. Caterina di Nardò?", *L'Archeologo Subacqueo*, Vol. VI, 1, pp. 10-11.
- Auriemma R. (2004). *Salentum a salo. I. Porti e approdi, rotte e scambi lungo la costa adriatica del Salento. II. Forma Maris Antiqui*, Galatina.
- Auriemma R., G. Mastronuzzi and P. Sansò (2004). "Middle to Late Holocene relative sea-level changes recorded on the Coast of Apulia (Italy)", *Géomorphologie: relief, processus, environnement*, Vol. 1/2004, pp. 19-34.
- Terre di mare. *L'archeologia dei paesaggi costieri e le variazioni climatiche* (2008). *Atti del Convegno Internazionale di Studi* (eds. R. Auriemma and S. Karinja), Trieste, 2007.
- Auriemma R., V. Degrassi, D. Gaddi, S. Mauro, F. Oriolo and D. Riccobono (2008). "Terre di mare: paesaggi costieri dal Timavo alla penisola muggesana", *Terre di mare* (eds. R. Auriemma and S. Karinja), 2008, pp. 75-211.
- Auriemma R. and E. Solinas (2009). "Archaeological sites as sea level change markers: a review", *Quaternary International*, Vol. 206, pp. 134-146.
- Barker G. (1991). "Approaches to Archaeological Survey", *Roman landscapes. Archaeological Survey in the Mediterranean Region*, (eds. G. Barker and J. Lloyd), *Archaeological Monographs of the British School at Rome*, Vol. 2, pp. 1-9.
- Barker G. and J. Bintcliff (1999). "Geoarchaeology in Mediterranean landscape archaeology: concluding comments", *Environmental Reconstruction in Mediterranean Landscape Archaeology*, (eds. Ph. Leveau, F. Trément, K. Walsh and G. Barker), *The Archaeology of Mediterranean Landscapes*, Vol. 2, Oxford, pp. 207-210.
- Beltrame C. (2001). "Imbarcazioni lungo il litorale altoadriatico occidentale in età romana. Sistema idroviario, tecniche costruttive e tipi navali", *Antichità Altoadriatiche*, Vol. 46, pp. 431-449.
- Cambi F. and N. Terrenato (1995). *Introduzione all'archeologia dei paesaggi*, Urbino.
- Carre M.B. and R. Auriemma (2009). "Piscinae e vivaria nell'Adriatico settentrionale: tipologie e funzioni", *Olio e pesce in epoca romana: produzione e commercio nelle regioni dell'Alto Adriatico*, (eds. S. Pesavento Mattioli and M.B. Carre), *Atti del Convegno*, Padova, 2007, pp. 83-100.

- Castiglioni B. (2002). *Percorsi nel paesaggio*, Torino.
- Cessi R. (ed.) (1933). *Origo civitatum Italiae seu Venetiarum (Chronicon Altinate et Chronicon Gradense)*, Roma.
- De Grassi V. (1950). "Esplorazioni archeologiche nel territorio della laguna di Grado", *Aquileia Nostra*, Vol. 21, pp. 5-24.
- Degrassi V. and R. Auriemma (2012). "L'edilizia residenziale lungo l'arco costiero nord-orientale, tra il Lacus Timavi e Grignano", *L'architettura privata ad Aquileia in età romana*, (eds. J. Bonetto and M. Salvadori), *Atti del Convegno di Studio*, Padova, 2011, pp. 511-532.
- Di Bartolo M., C. Alfonso and F. Zongolo (2014). "Il relitto moderno di Torre Rinalda", *Atti del III Convegno Nazionale di Archeologia Subacquea*, (eds. D. Leone, M. Turchiano and G. Volpe), Manfredonia, 2007, pp. 407-416.
- Felici E. (2008). "Ricerche sulle tecniche costruttive dei porti romani. Note preliminari sul porto di Astura (Latina)", *I porti del Mediterraneo in età classica*, *Atti del V Congresso di Topografia Antica*, Roma, 2004, *Rivista di Topografia Antica*, Vol. XVI (2006), pp. 59-84.
- Fontana A. (2006). *Evoluzione geomorfologica della bassa pianura friulana e sue relazioni con le dinamiche insediative antiche*, Udine.
- Fontana F. (1993). *La villa romana di Barcola. A proposito delle villae maritimae della Regio X*, Roma.
- Garabello R. (2004). *La convenzione Unesco sulla protezione del patrimonio culturale subacqueo*, Milano.
- Gasparini L. (1932). "Miramare e paraggi nelle memorie inedite di P. Kandler", *Archeografo Triestino*, Vol. 45, pp. 275-299.
- Gianfrotta P.A. (2007). "Note di topografia marina e marittima", *I porti del Mediterraneo in età classica*, *Atti del V Congresso di Topografia Antica*, Roma, 2004, *Rivista di Topografia Antica*, Vol. XV (2005), pp. 7-36.
- Giannotta M.T. (1993). "Nauna (s.v.)", *BTGCI XII*, Pisa-Roma, pp. 314-316.
- Giardina B. (2010). *Navigare necesse est. Lighthouses from Antiquity to Middle Ages*, BAR I.S. 2096, Oxford.
- Gioia A. (2004). "La Convenzione dell'UNESCO del 2 novembre 2001 sulla protezione del patrimonio culturale sottomarino", *Tutela, conservazione e valorizzazione del patrimonio culturale subacqueo*, (ed. F. Maniscalco), Napoli, pp. 27-39.
- Guaitoli M. (1997). "Attività dell'Unità Operativa Topografia Antica", *Metodologie di catalogazione dei beni archeologici I. 2*, Lecce, pp. 9-45.
- Hodges R. (1993). "Il declino e la caduta: S. Vincenzo al Volturno", *Storia di Roma* 3,2, Torino, pp. 255-278.
- Jurišić M. (2006). "La protezione fisica dei siti archeologici sommersi del fondale marino nell'Adriatico croato", *Archeologia subacquea in Croazia. Studi e ricerche*, (ed. I. Radić Rossi), Venezia, pp. 147-156.
- Lambeck K., F. Antonioli, A. Purcell and S. Silenzi (2004). "Sea-level change along the Italian coast for the past 10,000 yr.", *Quaternary Science Reviews*, Vol. 23, pp. 1567-1598.
- Lambeck, K., M. Anzidei, F. Antonioli, A. Benini and E. Esposito (2004). "Sea level in Roman time in the central Mediterranean and implications for recent change", *Earth and Planetary Science Letters*, Vol. 224, pp. 563-575.
- Lo Porto F.G. (1990). "Porto Cesareo. Insediamento protostorico di Scala di Furno", *Archeologia dei Messapi*, (ed. F. D'Andria), Bari, pp. 221-232.
- Marangio C. (2004). "CIL IX, 10 e il porto di Neretum", *L'Africa Romana. Lo spazio marittimo del Mediterraneo occidentale. Geografia storica ed economica*, (eds. M. Khanoussi, P. Ruggeri and C. Vismara), *Atti del XIV Convegno di Studio*, Sassari, 2000, pp. 891-904.
- Marangio C. (2007). "Porti e approdi della Puglia romana", *I porti del Mediterraneo in età classica*, *Atti del V Congresso di Topografia Antica*, Roma, 2004, *Rivista di Topografia Antica* Vol. XVI (2006), pp. 101-128.
- Mastronuzzi G. and R. Auriemma (2007). "Shipwreck, wreckage, coastline and paleogeography: the study case of Apulian coasts", *Convegno Internazionale L'Archeologia dei paesaggi costieri e le variazioni climatiche*, Trieste, 2007, oral presentation.

- Mauro S. (1999-2000). *Materiali per una Carta Archeologica della Laguna di Marano*, Tesi di Laurea, Università di Udine.
- Merlo R. (2003). "Il territorio come componente del parco archeologico", *Musei e parchi archeologici. IX Ciclo di Lezioni sulla Ricerca applicata in Archeologia*, (eds. R. Francovich and A. Zifferero), Certosa di Pontignano, Siena, 1997, pp. 216-225.
- Mesić J. (2004). "Protezione del patrimonio culturale subacqueo in Croazia", *Tutela, conservazione e valorizzazione del patrimonio culturale subacqueo*, (ed. F. Maniscalco), Napoli, pp. 27-39.
- Miholjek I. (2008). "The Project of underwater archaeological park in Cavtat", in (Eds.), *Proceedings of the 13th Annual Meeting of the European Association of Archaeologists* (eds. I. Radić Rossi, A. Gaspari and A. Pydyn, Zadar, Croatia, 2007, pp. 61-67.
- Peano A. (2003). "Parchi naturali e parchi archeologici: un'integrazione possibile", *Musei e parchi archeologici. IX Ciclo di Lezioni sulla Ricerca applicata in Archeologia*, (eds. R. Francovich and A. Zifferero), Certosa di Pontignano, Siena, 1997, pp. 185-186.
- Posi M.E., F. Denitto, A.M. Miglietta, A. Dell'Anna, R. Auriemma, C. Alfonso and G. Belmonte (2012). "An interdisciplinary Aquarium project for the promotion of natural and historical heritages in Italy and Greece", *8th IAC proceedings – International Aquarium Congress, Cape Town, 2012*, http://iac2012.co.za/congress/8th_iac_proceedings/poster_presentations/
- Scarano T. (2011). "Refuge or dwelling place? The Middle Bronze Age fortification walls of Roca (Lecce): spatial and functional analysis of Postern C", *Rivista di Scienze Preistoriche*, Vol. LXI, pp. 95-122.
- Scarano T., R. Auriemma, G. Mastronuzzi and P. Sansò (2008). "L'archeologia del paesaggio costiero e la ricostruzione delle trasformazioni ambientali: gli insediamenti di Torre Santa Sabina e Torre Guaceto (Carovigno, Br)", *Atti del Secondo Simposio Internazionale Il monitoraggio costiero mediterraneo: problematiche e tecniche di misura*, Napoli, 2008, CNR-IBIMET, Firenze, pp. 391-402.
- Valchera A. and S. Zampolini Faustini (1997). "Documenti per una carta archeologica della Puglia meridionale", *Metodologie di catalogazione dei beni archeologici 1. 2*, Lecce, pp. 103-158.
- Vitri S., F. Bressan, P. Maggi, P. Dell'Amico, N. Martinelli, O. Pignatelli and M. Rottoli (2003). "Il relitto romano del fiume Stella (Ud)", *L'Archeologia dell'Adriatico dalla Preistoria al Medioevo*, (ed. F. Lenzi), *Atti del Convegno Internazionale*, Ravenna 2001, pp. 324-338.
- Volpe G. (2008). "Per una 'archeologia globale dei paesaggi' della Daunia. Tra archeologia, metodologia e politica dei beni culturali", *Storia e archeologia della Daunia, in ricordo di Marina Mazzei* (eds. G. Volpe, M.J. Strazzulla and D. Leone), *Atti delle Giornate di Studio*, Foggia, 2005, pp. 447-462.