

**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

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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).*

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**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

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

Rita Auriemma¹, Carlo Beltrame², Ivanka Kamenjarin³, Danilo Leone⁴, Ivan Šuta³, Maria Turchiano⁴

¹ University of Salento

² Ca’ Foscari University of Venice

³ Civic Museum of Kaštela

⁴ University of Foggia

Abstract: The project aims at applying on sample areas (maritime landscapes of Torre Santa Sabina, Grado, Resnik/Siculi, Caorle) a methodological and technological protocol based on research/ knowledge and development/communication of underwater archeological sites that are complex and multi-stratified, characterized by strong diversity. The project’s objective is therefore to transform the site into an underwater archaeological park (or eco-museum) through innovative and/or experimental methodologies and techniques in order to try to reduce the loss of important cultural heritages as well as to guarantee an economic spin-off deriving directly from the creation of a sector linked to the tourist-cultural promotion of the context of reference.

UnderwaterMuse will target local communities as long-term keepers of vitality at tourist destinations, promote co-creative partnerships among tourism and cultural actors, public decision makers, creative companies, associations of citizens, facilitating exchange of information. An immersive virtual reality (VR) approach renders underwater sites accessible to a wider public, including people with different kinds of disabilities. Building capacity for professionals already working in this field will help them adapt to a “museum for all” concept, in spite of limited organizational or financial resources. Training diving guides will improve the immersive experience of underwater sites. Regional action plans will enhance environmental management and preservation of coastal areas harbouring those sites. Based on the experience gained, an innovative promotional GIS tool, the ‘UnderwaterMuse MAP’ for promoting underwater sites with accessibility standards, will be developed. The ‘UnderwaterMuse MAP’ will be promoted at transnational, national and local level, in the Adriatic and beyond, thus guaranteeing its sustainability and transferability during and after its implementation.

The interdisciplinary partnership from 4 different regions will carry on pilot actions focusing on transforming sites with a strong potential as experience-based tourist destinations testing a sustainable tourist offering in areas less interested by major tourist flows.

Keywords: underwater cultural heritage, in situ protection and valorization, underwater archaeological park, VR, GIS.

Through interpretation, understanding; through understanding, appreciation; through appreciation, protection (Freeman Tilden, Interpreting our Heritage, 1977)

1. A PREMISE: WHY UNDERWATERMUSE NOW?

For the underwater archaeology, the “waterscapes archaeology”, the *in situ* preservation and enhancement represents the first option. We can recall two key passages⁴⁶:

1. the Convention on the Protection of Underwater Cultural Heritage 2001;
2. the Faro Convention.

The key goals are clear:

1. building an archaeology community, building awareness;
2. cultural heritage as common good and economic resource;
3. archaeology for the territory, archeology for the environment;
4. research, conservation, protection, management and participation as parts of the same chain.

In the Unesco’s Convention on the Protection of the Underwater Cultural Heritage we have the best and forward-looking premise. Actually, as we know, the Unesco’s Convention on the Protection of the Underwater Cultural Heritage affirms, in rule 1, that *in situ* preservation is the first option because the site of a historic event is authentic and the context defines significance.

Moreover, in rule 7, the Convention underlines that *public access to in situ underwater cultural heritage shall be promoted, except where such access is incompatible with protection and management*: heritage is protected for its public interest and its unique value for humanity; it should be enjoyed by as many people as possible; access contributes to the appreciation and awareness, and to a better understanding and knowledge and also to a better protection (Maarleveld et al. 2013).

It's true that heritage is finite but, once adequate measures for protection have been taken, there is no further reason to restrict access permanently.

Experiencing the past under water is rapidly becoming an enormous asset in the leisure industry and the experience tourism. This development has risks and opportunities for the underwater cultural heritage, but providing diving operators with a measure of responsibility and custodianship is a good solution for the need of supervision and control. As an alternative to the direct access, traditional publications and media may be supplemented with more and more virtual techniques, simulating experience or allowing for visualisation at a distance, through internet or other means.

To ensure a worldwide respect for submerged heritage by individual divers and to set a common standard UNESCO has promoted a Code of Ethics for Diving on Submerged Archaeological Sites⁴⁷.

1.1 The new stage that strengthens the process: the Faro Convention

After the Unesco’s Convention on the Protection of the Underwater Cultural Heritage the new stage of the current process of reappropriation of the cultural heritage as common good, “popular” good, is represented by the Faro Convention, “framework convention”, adopted by the Committee of Ministers of the Council of Europe on 13 October 2005 and ratified by 17 member States. In Italy the implementation process inside our legislative system has been interrupted by the change in government and therefore we have only the draft bill.

⁴⁶ For the previous conventions and laws related to submarine archaeological sites, a good synthesis is in Negri 2000 and Prott 2000.

⁴⁷ UNESCO Code of Ethics for Diving on Submerged Archaeological Sites <http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/divers/code-of-ethics/>

However, it emphasizes the important aspects of heritage as they relate to human rights and democracy. As we know, it promotes a wider understanding of heritage and its relationship to communities and society. The Convention encourages us to recognize that objects and places are not important in themselves, but because of the meanings and uses that people attach to them and the values they represent⁴⁸.

In line with the Faro Convention, we must address our effort to the development of “models for managing underwater cultural heritage in a way that brings benefits for the sustainable economic development of regions”, in order to “increase the positive image of underwater archaeology and the involvement of the public in the awareness, the protection and enjoyment of the underwater cultural heritage” *It is necessary to engage, not only from a research perspective, but also as an ethical obligation to the local communities within the environments that archaeologists work. It is important to recognize the different values attached to the project by ourselves as heritage professionals, and the communities as «providers» of knowledge* (Roberts, Benjamin, McCarthy 2016).

The Faro Convention stresses the continuous dissemination of activities and initiatives, in a living dialogue with the communities and the individuals, to start participation processes and raise awareness of ever widening groups.

It is necessary to communicate the entirety and the complexity, to properly use the technologies, to do good storytelling and to stimulate the proactive participation (Volpe, De Felice 2014), in the framework of a “community archaeology”.

The Scientific and Technical Advisory Body - STAB of the UNESCO Convention 2001, gathered in its following 5th session in Paris in June 2014, adopted the 3rd Recommendation 3/STAB 5 in which “*recommends to consider as best practice all initiatives, taken in exemplary manner and in conformity with the Convention, permitting the public at large access to knowledge about the underwater cultural heritage, in particular: responsible **non-intrusive access to observe or document in situ** underwater cultural heritage, such as provided through dive trails, submarine visits or glass bottom boat visits; responsible **public access on land**, such as provided by museums, exhibitions and interpretative trails; and access, **such as provided by publications, virtual or digital applications**, websites or other means”* (Rey da Silva 2016).

2. PUBLIC ACCESS CASE STUDIES

Some existing examples of responsible public access initiatives could possibly be counted in future under best practices. Around the Mediterranean⁴⁹ the best practices of caging experienced in Croatia are well known: Za Planiku, Island Lastovo (1), Saplun, Island Lastovo (2), Bay Koromašna, Island Žirje (3). Islet Supetar near Cavtat (4), Klačine, Island Mljet (5), Bay Vlačka Mala, Island Pag (6),

⁴⁸ See in particular art. 10 – Cultural heritage and economic activity, Section III – Shared responsibility for cultural heritage and public participation, 11 – The organisation of public responsibilities for cultural heritage, 12 – Access to cultural heritage and democratic participation, 13 – Cultural heritage and knowledge, 14 – Cultural heritage and the information society. See also Faro Action Plan Handbook.

⁴⁹ We can't quote all the examples outside the Mediterranean, but we remember that currently the largest underwater museum in situ is the Baiheliang Museum in China, where some of the oldest hydrological inscriptions, recording 1 200 years of changes in the water level of the Yangtze River have been seen submerged after the construction of the Three Gorges Dam and now lie at a depth of 43 metres (Ge Xiurun, 2011).

Cape Sorinj, Island Rab (7), Shallows Buje near Umag (8) (Zmaić 2009; Pešić 2011; Mesić 2008, 2014).

We can point out the important experience in Greece: the cases of Methoni Bay – Sapienza Island and the National Marine Park of Alonissos and Northern Sporades, with the submerged Neolithic site of



Fig. 1. Caging best experiences in Croatia (*Exploring Underwater Heritage in Croatia 2009*).

Aghios Petros, the biggest shipwreck of the classical age, 'Peristera' wreck, and many other well preserved classical, Roman and Byzantine cargos (Georgopoulos, Fragkopoulou 2013, with references); surely another impressive cases are the Sebastos of Caesarea Maritima (Raban, Holum 1996, Raban et al. 2009; Hohlfelder et al. 2007, 2014; Brandon et al. 2014) and Alexandria, Egypt: the latter, aiming at presenting submerged Egyptian culture, including small finds and features, the remains of the Alexandrian harbour and the famed lighthouse on Pharos, is still under study and highly recommended by

the personnel of Department of Underwater Antiquities (Morcos 2000; Hafiz 2011; Frigerio 2013; El-Kady 2017).

Moreover, a few open underwater archaeological excavations can be recalled: the Roman shipwrecks of Bou Ferrer (Juan Fuertes, Cibecchini, Miralles, 2013) or Cap del Vol, where engagement with diving clubs and federations show success (Aguilar 2013).

As far as the Italian experiences are concerned, some marine parks and underwater trails, such the positive experiences of Baia and the Sicilian trails, contrast with the tens of coastal and submerged sites literally abandoned, encircled by abusive urban speculations and wild moorings, whose access is totally uncontrolled with all the risks and possible damage that this situation brings with it (Stefanile, 2012; Stefanile 2016 with references; Secci, Stefanile 2016).

In Pozzuoli and Baiae, in the Gulf of Naples, villas, mosaics, baths, streets, houses and harbour structures of the Roman period were submerged by the sea, as a result of the volcanism. This unique environment, severely looted over the years, has been included in a Marine Protected Area since 2001. Since then, the Archaeological Superintendence has carried on some research and documentation works, while the Conservation and Restoration Central Institute – ISCR has experimented with new techniques for the conservation of the underwater structures. The public access has been made possible with the opening of underwater archaeological trails, and through the involvement of the diving instructors active in the area, appropriately trained.

The benefits in terms of local development were foreseen already in the Interministerial Decree 304/2002 for the Institution of the Underwater Park. The finalities (article 3) include also the promotion of a socio-economical development compatible with the historical and landscape evidences of the area, also sustaining existing local traditional activities; (in this framework) the regulation of the activities related to the management of the touristic flows, guided visits and public transports would

foresee that the above mentioned activities are delivered primarily by the local citizens and businesses.

Currently, five sites/trails are predisposed for diving (and others probably will be open) equipped with guidance ropes and didactic PVC panels, accompanied by official diving guides, trained thanks to professional courses held by the Superintendence. Due to the shallow depth, four of these spots are accessible by snorkeling or on glass bottom boats, suitable also for primary school groups. The area lends itself to underwater archaeology training courses and field schools as well as environmentalist interventions and it is also object of real archaeological research.

The diving centres, made responsible and aware, pay a fee for each diver, and at the same time take a proactive role in UCH protection: sending away the pleasure boaters and intruders, reporting to the Superintendence damages or problems, and even checking divers for eventual artefacts souveniring.

The involvement of diving centers by the Superintendence has been a good choice: the site is undoubtedly more protected and exploited than in the past, and the visits, both of foreigners and locals, are increasing. On the other side, also the diving centers benefit from this activity, increasing their revenues, creating job opportunities (also for archaeologists!), deseasonalising and expanding touristic flows, receiving recognition for the significant results (Stefanile 2016).



Fig. 2. The underwater archaeological Park and MPA of Baia and Gaiola (Naples).

Other case-studies can be the Protected Marine Areas of Gaiola, S. Maria di Castellabate - Punta Licosa (Stefanile, Agizza 2012), Ischia –Aenaria Regno di Nettuno

The Region of Sicily has devoted particular attention to this phenomenon, due to the fact that it is currently the only region that has a Superintendence of the Sea. This has fostered the creation of numerous archaeological trails and the publication of scientific and informative material, related to the underwater tourism (Melotti 2007; www.regione.sicilia.it/beniculturali/archeologiasottomarina/itinerari.)

Where the diving is difficult or there are risks for the UCH, monitoring and broadcasting systems have been employed, through the use of underwater telecameras.

3. THE UNDERWATER TOURISM

The underwater tourism combines in a single activity leisure, sport, culture and ecology, it is very profitable and highly sustainable, low or zero environmental impact, it is a "programmed alternative tourism", at high regulation and low intensity of flows but needs a local touristic system integrated, effective, diversified, as well as areas provided of a status of juridic protection of environmental type (MPA) and/or archaeological type (Parks), in according with a "culture of the territory", investment in protection policies and in making the territory more attractive with specific environmental brands (MPA). On the other side, the underwater archaeological tourism implies elevated costs for the users, limits the fruition and can generate a form of "gentrification". The question is: is it really a tourism for all?

In the UK a study into the economic impact of the historical wrecks diver trails was carried out to determine the number of visitors to the site, and how much each visitor had spent in the surrounding areas. The study aimed to understand the value of the protected wrecks in terms of the economy of the country and the well-being of the people, that is to say the principles of Faro Convention. In the period 2008-2012, considering 3 different sites, there was an increase up to 341%. In the case of *Coronation Wreck Project*, the study found that in 2012 alone over 700 visits were made to the wreck, generating £42000 worth of benefits to Plymouth: over £60 per visitor to the city. The study demonstrates that underwater historic wrecks can actually be a great benefit to local economies.

The success of any designated wreck diver trail can only be evaluated in the long term. Visiting, seeing and touching a real archaeological monument like a wreck site is without doubt a positive experience that can change people's perception of the UCH value. *Public access must remain a cornerstone of any underwater cultural heritage management strategy, a strategy that must receive long-term commitment from both the trail organizers and the heritage agencies* (Beattie-Edwards 2016).

4. THE PROJECT UNDERWATERMUSE: THE CHALLENGES

Returning now to the initial question (*why UnderwaterMuse now?*), the project UnderwaterMuse could be, such as the Bluemed project and others, one of the responses, based on the principles of the Convention on the Protection of Underwater Cultural Heritage 2001 and the Faro Convention 2005. Furthermore, as far as the international cooperation is concerned, rule 8 of the Unesco Convention 2001 affirms that *International cooperation in the conduct of activities directed at underwater cultural heritage shall be encouraged in order to further the effective exchange or use of archaeologists and other relevant professionals*

The project UnderwaterMuse aims at applying on sample areas (maritime landscapes of Torre Santa Sabina, Grado, Resnik/Siculi, Caorle) a methodological and technological protocol based on research/knowledge and development/communication of underwater archeological sites that are complex and multi-stratified, characterized by strong diversity. The project's objective is therefore to transform the site into an underwater archaeological park (or eco-museum) through innovative and/or experimental methodologies and techniques in order to try to reduce the loss of important cultural heritages as well as to guarantee an economic spin-off deriving directly from the creation of a sector linked to the tourist-cultural promotion of the context of reference.

to the cultural heritage, surpassing the traditional cataloguing models based on fragmentary and sectorial concepts.

SiRPaC FVG is the Geographic Information System of the Cultural Heritage of Friuli Venezia Giulia, constituted by a database of over 320.000 records and related webGIS, implemented in collaboration with Universities, Superintendence public and private institutions (www.ipac.regione.fvg.it/).

It is an instrument for sharing knowledge, of documentation for research and dissemination purposes, but also of efficient territorial *governance, protection and proactive valorization policies*.

The Informative system is a guarantee for the protection that must pass from defensive and proprietary to proactive and communitary, «from economically residual and supported to industrially affordable” (Montella 2009).

The WP 4 includes the preparation and implementation of two types of pilot actions:

- in the field of capacity building

Capacity building on AR-focused training material developed for museum experts to be held in Venice and Split; VR workstation will be realized in Grado, Caorle, Kaštela, Brindisi Museums.

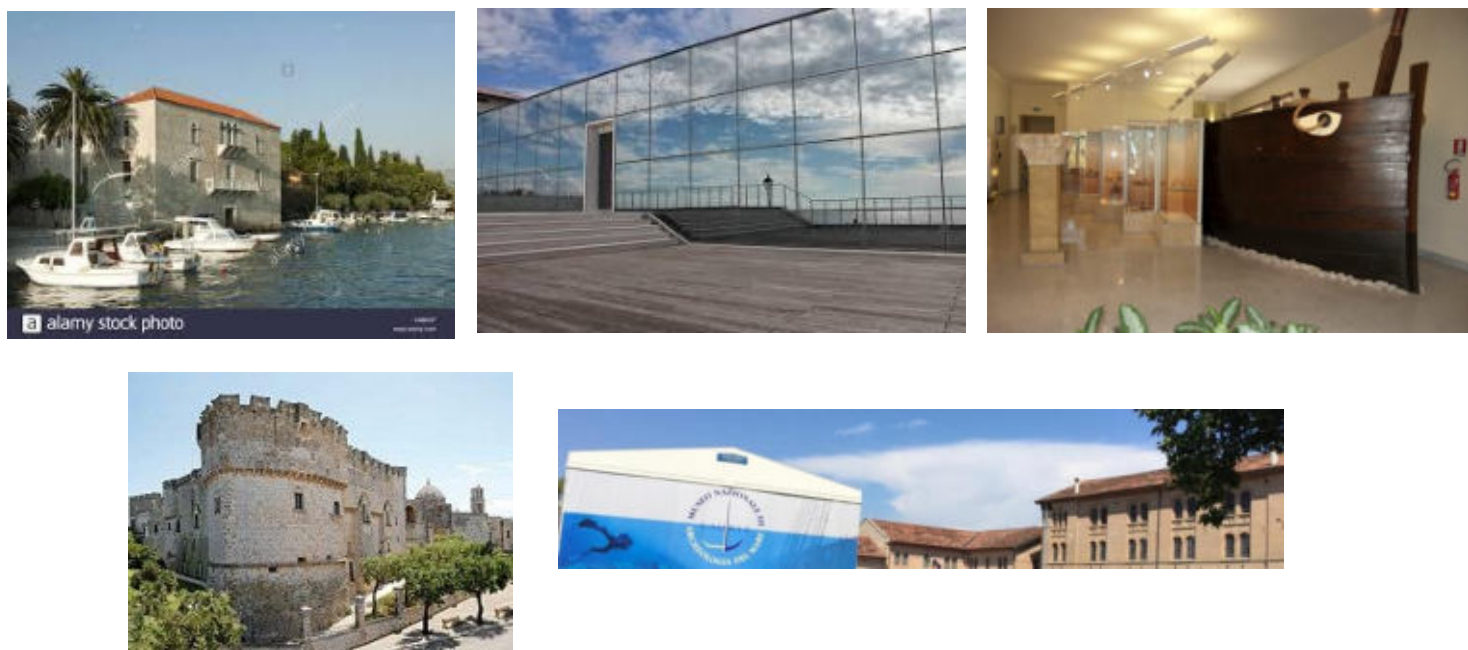


Fig. 4. Project UnderwaterMuse museums: Kaštela, Grado, Brindisi, Carovigno Caorle.

The technology is presented to museum experts at events, in Grado, Caorle, Kaštela and Bari. Stakeholders participate in the decisions regarding the organisation and location of the workstations in the museums where VR becomes available, bearing in mind their accessibility to tourists.

This peculiar pilot action will enjoy the benefits deriving from the established experience and competence in this field of Ca' Foscari University. Beltrame's staff at Università Ca' Foscari has recently produced a virtual dive on the shipwreck of the brig Mercurio (1812) from legacy data (Secci et alii, 2019) which has become a digital workstation in the virtual tour at the exhibition on the Mercurio excavation in the Museo Nazionale di Archeologia del Mare of Caorle, and has also

produced various VR dives from 3D photogrammetrical models made on the cargos of marble of Roman age from Sicily (Balletti et alii, 2016) and Sardinia.

- *in the field of underwater cultural heritage valorization*

The project foresees diverse modalities of enhancement for the diversified cases/sites:

- the shipwreck Grado 2 (or another similar site, if the former is unavailable due to decisions of the new Superintendence): underwater steel cages for its exploration by divers and glass-bottomed vessels.
- the site of Torre Santa Sabina: “blue trails” that encompasses the landing site and exposed portions of shipwrecks, in agreement with Superintendence
- the site of Resnik/Siculi: photographed and mapped in 3D

Exhibition and educational activity programme will be developed for an interactive underwater museum. It is foreseen the dissemination and the collaboration with the schools, considering that children/teens require a different approach to Underwater Cultural Heritage from the rest of the public, but the needs vary considerably depending on age.(Claudino 2016).

Torre S. Sabina, 25 km to the north of Brindisi, is a real challenge for this project, because it’s a pluristratified site, with very different evidences, some of them really fragile and vulnerable; first, some **wooden remains** of various shipwrecks, above all TSS 1 wreck, dated back to the late Imperial age (around 300 BC), that seems to be the most preserved hull of that period in the Mediterranean, with surviving stanchions, beams and significant remains of the deck; these wooden remains obviously can’t be left without protection, exposed to the elements. Secondly, the **stratigraphical sequence**, constituted by the overlapping of various cargos of the ships crushed against the reef and sank; these cargos were scattered at the foot of the reef, forming layers alternating with the natural sediments and with the materials dumped as part of the normal everyday activity of the landing place.

We can recognize 2 or 3 distinct sinking episodes, represented by the layers, from the deepest to the most superficial: 1. an archaic wreck, with Aegean amphoras and pottery, coming from Greece; 2. a Late Republican cargo, with local production (in particular oil and wine amphoras of Salento origin) and fine ware of eastern provenance, such as the batch of Megarian bowls. The identification of the deposit with the remains of a cargo is supported by three elements: 1) the position of the pottery finds, often upside down; 2) the high concentration of non-local pebbles in the upper layer ; and 3) the discovery of burnt wooden remains between the pebbles. 3. Finally, in some points, we have scant traces of a third cargo pertaining to the Late Antiquity (Auriemma 2014, Auriemma 2015, Bandiera et al. 2015, Antonazzo, Auriemma 2018).

Also Resnik/Siculi is a pluri-stratified and complex site that presents many affinities with Torre S. Sabina but it shows also an underwater structure of a stone jetty/pier presumably of the Hellenistic age (Babin 2011; Kamenjarin 2016).

An hypothesis for the pluri-stratified sites could be the replica of a schematic stratigraphic sequence in the museums of the partnership (Grado, Caorle, Kaštela, Brindisi Museums) and others, related to the same UCH (Carovigno Castle Museum)⁵⁰, but also under water, on the sea-bottom at the foot of the reef, with specific materials .

For the well-preserved Torre S. Sabina 1 wreck and the other wooden remains in the bay, that cannot be left exposed or uncovered, the best solution after the setting up of a passive protection system (barrows or strongboxes⁵¹; Negueruela 2000; Koncani Uhač et al. 2017), could be 3D models to enjoy with underwater viewers when the divers are on the site. In parallel, with other funds and institutional agreements, also the recovery and the restoration of the ship could be studied and planned, as well as the ship's physical replica construction.

The solutions are diverse and they can be tested on the diverse evidences: stratigraphy and archaeological materials in situ reproductions; signals, labels, tags and QR codes; 3D Viewers and tablets; ships replicas, etc.

We have to answer all these questions, but especially we have to think of the valorization of our UCH in a logic of economic, environmental and social sustainability.

4.2. At the end....

Joint methodologies and tools developed in WP3 are applied to the problems identified in WP3 and tested in the context of specific pilot examples in WP4. The information that derives from this process is elaborated in WP5 to generate draft action plans and a ToolKit to be used in future studies or projects of underwater cultural heritage valorization and improved accessibility. The transnational ToolKit synthesizes good practices on efficient underwater cultural heritage valorization and increased accessibility, responding to gaps revealed in the analysis phase, gained from the pilots and from other relevant experiences of partners and RSGs .

In other words, we would like to implement a replicable model of site management plan or programme capable to guarantee the sustainable use of the site and a vision for the future that implies the economic balancing of costs and benefits for society. This model should aim at promoting access and research, public education, efficient and continuous dissemination and experiential tourism. Moreover, it should identify risks for the site stability and conservation, proposing a policy framework of adequate measures.

An authentic site is a joy forever, as a monument for those associating themselves with its history, or its environment, as well as for the local economics of recreational and touristic visits.

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⁵⁰ In the Carovigno Castle Museum the permanent exhibition shows a replica of the stratigraphical section of the Torre S. Sabina sea-bottom with all the distinguished layers and the included archaeological original materials representing the overlapped dispersed cargos.

⁵¹ Large metallic modular strong boxes, constituted by a framework to which independent plates are fitted, were used in the excavation of the Mazarron shipwrecks by the Spanish National Maritime Archaeological Museum and in those of the Zambratija wreck by the Archaeological Museum of Istria, Pula.

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