

D.2.3.2 - Simplified, user-friendly version of the transnational ToolKit

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1. Introduction

According to the AF activity 2.2. Media relation and publications, D.2.2.3 “Simplified, user-friendly version of the transnational ToolKit”, Public institution RERA was responsible to produce simplified version of the ToolKit developed in WP3 which had to be colour-printed on a joint in-design template in a transnational version (100 copies each in Italian, Croatian and English).

In coordination with the whole partnership, Transnational Toolkit: Handbook of good practices named “The “invisible” heritage to the challenge of the valorisation: the UnderwaterMuse Project” was prepared. The project partners participated in composing the text with photographs about the UnderwaterMuse project, partnership, main challenges, goals and methodology, the premises and the founding principles, the methodological approach, research methodology, regional action plans, field activities and application of shared methodologies - pilot projects, surveys, cataloguing / web GIS .

Transnational Toolkit also highlighted activities related to raising awareness through the involvement of cultural and heritage bodies, diving clubs, archaeological associations, general public, etc. The last chapter of the Toolkit pointed out premise and operational / management framework for each pilot site (Torre Santa Sabina, Grado 2 and Siculi/Resnik).

Pi RERA SD designed the brochure, printed 300 copies in total and distributed to the partners and interested stakeholders.

2. Layout of the Transnational Toolkit: Handbook of good practices

“The “invisible” heritage to the challenge of the valorisation: the UnderwaterMuse Project

***The “invisible” heritage to the challenge of the valorization: the UnderwaterMuse Project
Transnational Toolkit: Handbook of good practices***

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THE UNDERWATERMUSE PROJECT

1. PARTNERSHIP

ERPAC - – Regional Institute for the Cultural Heritage of Autonomous Region of Friuli Venezia Giulia (Italy; Lead Partner; <http://erpac.regione.fvg.it/>)

Ca' Foscari University of Venice (Italy; <https://www.unive.it/pag/16561/>)

Public Institution RERA S.D. for coordination and development of Split-Dalmatia County (Croatia; <http://www.rera.hr/>)

City of Kaštela (Croatia; <https://www.kastela.hr/>)

Puglia Region – Department of Tourism, Economy of Culture and Community Enhancement (Italy; <http://www.regione.puglia.it/>)

2. CHALLENGE, GOALS & METHODOLOGY

2.1. The premises and the founding principles

The UnderwaterMuse Project (<https://www.italy-croatia.eu/web/underwatermuseum>, <https://www.facebook.com/Project-UnderwaterMuse-106106884192806>; 1 January 2019 - – 30 June 2022), comprises parts of Italian and Croatian territories and focuses on **Priority Axis 3 “Environment and Cultural Heritage”-Specific Objective 3.1 “Make natural and cultural heritage a leverage for sustainable and more balanced territorial development”**: conserving, protecting, promoting, developing natural and cultural heritage.

The UnderwaterMuse project aims to enhance and promote the underwater heritage of the regions concerned, through the full involvement of local communities, so that it becomes a strategic resource for the sustainable growth of these territories.

It has the ambition to make submerged heritage and landscapes accessible and to make visible the invisible: port areas today below sea level, shipwrecks, underwater stratifications produced by the continuous frequentation of landings.

How? Through two types of action planning:

- bringing people to heritage, through the implementation of underwater archaeological parks/underwater museums or blue trails for direct use, diving or snorkeling;
- bringing heritage to people, through the narrative and communicative use of virtual/augmented reality and digital methodologies for remote/online use. This second line of the project, thanks to the immersive and emotional approach of virtual reality, makes underwater sites accessible to a wider audience, including people with different types of disabilities.

In both ways, we can generate two outcomes: the safeguarding of the heritage itself, guaranteed by the citizens who learn to know it and recognize it as their own, and a strong economic impact deriving from the development of the cultural, environmental and experiential tourist sector.

These aims are based on important principles resulting from the **Paris 2001 UNESCO's Convention on the Protection of Underwater Cultural Heritage** (Rule 1: *In situ* preservation as first option; Rule 7: Public access to *in situ* underwater cultural heritage shall be promoted, except where such access is incompatible with protection and management) and the **Faro Convention** (Council of Europe Framework Convention on the Value of Cultural Heritage for Society, 27.10.2005; fig. 2); these principles need to be incorporated into the policy work as a guidance for the activities (Rey da Silva 2016), 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 Project is also coherent with **Blue Growth long term Strategy** (s3platform.jrc.ec.europa.eu/blue-growth/), for which culture is a driver of local and regional economic growth, innovation and social cohesion (EC 2010/C 135/05).

Furthermore, it is in perfect compliance with the **Maritime Spatial Planning (MSP)** process: *understanding, recognising, and utilising Underwater Cultural Heritage (UCH) as a sensitive asset in the marine space and reconciling its preservation and promotion within the sustainable blue economy perspective is a real challenge* ([New study "How to incorporate Underwater Cultural Heritage into Maritime Spatial Planning" | The European Maritime Spatial Planning Platform \(europa.eu\)](#)).

2.2 UnderwaterMuse specific challenge

From the historical-archaeological point of view, the Adriatic Sea has been an unique basin, for millennia the priority transport link for people living on the seashore. Their transit left numerous traces in the seabed of the areas concerned by these ancient commercial routes, and ruins of landing places, harbors or inhabited villages by the sea remain.

Archaeological sites are an important tourist, economical and historical resource, yet a remarkable gap in the protection of underwater archaeological sites still exists.

Numerous sites along the Adriatic coasts are currently neglected and subject to constant destructions, illegal depredation, natural or anthropic destructive actions (trawling, modern harbour facilities, etc.).

The challenge of UnderwaterMuse — a unique case and a real challenge in the Adriatic area — is to implement joint strategies for developing coherent and sustainable plans that could fill this gap and reduce the lack of accessibility and knowledge, totally according to the principles of the 2001 UNESCO Convention on the Underwater Cultural Heritage *in situ* conservation (Maarleveld et al. 2013). It occurs going beyond the natural and cultural heritage protection: heritage must be conceived as productive

economic activity with new solutions for long-term economic and social prosperity, developing new tourist attractions, diversifying activities in the protected areas, offering to local communities employment opportunities integrated into the local economy, introducing new management models through substantial participation of stakeholders.

The practices are very different between the two countries, despite they had often work together on the field.

A starting point, unique experience in Italy, are the underwater parks (since 2002) of Baia and Gaiola (Naples) which boast a long experience in protection' policy, but only in the last years are improving concrete strategies of protection and development (Davide Petriaggi, Ricci, Poggi 2016; Ricci, Petriaggi, Davide Petriaggi 2016; Stefanile 2012; Stefanile 2016 with references; Stefanile, Agizza 2012; Secci, Stefanile 2016; Pagano, Gallocchio forthcoming). Also the Region of Sicily, which has a Superintendence of the Sea, 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).

In Croatia, underwater archaeological sites are more developed: parks were created thanks to development projects of the sites through modular protective cages and diving centers authorized by the Croatian Ministry bring tourists to the sites, greatly increasing cultural tourism (Zmaić 2009; Pešić 2011; Mesić 2008, 2014; see also Koncani Uhač et al. 2017). Some new promising experiences, founded on a wider involvements of the locals, are now being experimented, such as the Straton Project: *in situ* preservation and enhancement without cages (Dorušić, Ćuk forthcoming).

However, acting only at the national/regional level is negative as it leads to a variety of regulatory and programmatic efforts towards what is actually a single common and shared resource, the Adriatic Sea.

UnderwaterMuse has tried to overcome this fragmentation in cultural heritage policy with cooperation, pooling together resources, exchanging knowledge, sharing practices and working to guarantee accessibility towards natural-cultural sites offering replicable solutions, engaging skilled professionals towards transmitting cultural heritage values, motivating people to acquire the knowledge to transform the silent past of a society in a captivating story.

Partners developed and enriched the '*UnderwaterMuseMap*', an innovative promotional GIS tool created for widening research results to the community and promoting underwater sites with accessibility standards (see below). The '*UnderwaterMuseMap*', within which different regions stand to benefit from an efficient IT tool and sustainable tourist offer, is promoted at transnational, national and local level, in the Adriatic and beyond, guaranteeing its sustainability and transferability during and after its implementation.

Repeatability in different areas is assured by the different typology of underwater sites chosen and the particular context of reference. The exploitation of the sites to their full-scale protection, reintegrating

them into the local economy as a living and viable economic tourist activity. At the same time, new demand of cultural heritage usage is arising by young generations born in the information and globalization age.

The necessity of VR is also embracing the needs of a wider inclusion of diverse groups of people integrating creative thinking and innovative ideas in exploiting traditional cultural contents. An immersive VR approach renders underwater sites accessible to a wider public, including people with different kinds of disabilities.

The objectives have been to transform the sites into underwater archaeological parks or eco-museums through innovative and/or experimental methodologies and techniques, reducing the loss of important cultural heritages, guaranteeing an economic spin-off with their tourist-cultural promotion, targeting local communities as long-term keepers and animators of cultural landscapes, promoting creative partnerships among tourism and cultural actors, public decision makers, creative and cultural companies, citizens associations, facilitating exchange of information.

The selected underwater archeological sites for pilot actions —Torre Santa Sabina, Grado, Resnik/Siculi – and other interventions (Venice lagoon, Porto Cesareo, Cesine, etc.) — are characterized by strong diversity: we faced both single contexts (the amphoras' cargo of Grado 2 shipwreck, for exemple) and pluristratified and complex sites/seascapes, with numerous and heterogeneous evidence not always well readable/visible. The latest have been our best chance to share methodologies and models.

3. THE METHODOLOGICAL APPROACH

3.1. Research methodology

UnderwaterMuse pilot actions applied on those sample areas a methodological and technological protocol based on **research/knowledge, documentation/cataloging, conservation/restoration, enhancement/communication/accessibility** chain, using traditional and innovative tools, such as the holistic/contextual/diachronic/transdisciplinary vision of the *global archeology of landscapes*, in this case coastal and underwater or, better, "water scapes".

Landscape archaeology or geoarchaeology is "*a coherent sub-discipline of human ecology, neither a form of natural science nor a form of archeology, but an integrated way of understanding humans in dynamic landscapes*" (Barker Bintliff 1999, 207): the primary objective of this systemic vision is being able to tell the story of social groups in changing landscapes, capture their discontinuities, formative processes and identity characteristics.

In this framework dictated by **Seascapes archeology**, the contribution of different techniques and innovative technologies was crucial; **methodologies and tools shared** and used in the various **pilot projects** were **Areal mapping** (topographic survey; UAV/drone ortophoto and photogrammetry), **Underwater survey** (direct/auto-optic; metal detector; Multibeam; Side Scan Sonar; Sub bottom

profiler; ROV; underwater photogrammetry; video-photo documentation), **Excavations** (stratigraphic excavation and documentation; finds recovery; sampling, flotation and sieving; archeometric analyses; archaeozoological and palaeobotanical analyses; washing, consolidation and restoration of recovered materials, etc.), **GIS implementation** (UnderwaterMuse portal; interoperability with CartApulia-Puglia regional cultural heritage GIS; SIGECweb/VIR-National MiC digital archives; SiRPaC FVG - Geographic Information System of the Cultural Heritage of Friuli Venezia Giulia; etc.), **Data/metadata implementation and elaboration** (cataloging; archaeological materials study; spatial and regressive analysis; periodization and interpretation of sites and historical events).

New digital technologies must be considered, not only as an instrument for obtaining 3D models, but as a research method for survey, documentation, research and dissemination. Digital and virtual data represent a powerful source of information for analyzing and studying archaeological sites, especially when the site itself is hardly accessible.

Concerning the photogrammetric survey performed using UAS, it was possible to document the sites and their immediate surroundings thanks to the generation of metric products (orthophotos, digital surface models, and 3D models) obtained via photogrammetric techniques based on SfM (Structure From Motion) algorithms. This was done for the various sites investigated along the Adriatic and Ionian coasts of Salento, allowing for a general overview and subsequent study of specific structures and deposits.

3.2. Dry diving methodology and VR/AR applications

The gained experience shows that the actual multi-image digital photogrammetry is an excellent solution to obtain a three-dimensional model of the underwater archaeological sites. In addition to the importance of a virtual artefact for scientific investigation, this kind of representation of an archaeological site has been used to create a virtual reality promoting knowledge of underwater cultural heritage to a wide public. The creation of the 3D model also allows those who cannot or do not want to dive to use an application that perfectly simulates a virtual dive on the site (Costa, Manfio 2020).

To recreate the virtual reality of the archaeological sites, Unreal 4 Engine software has been used, a cross-platform developed by Epic Games.

This kind of interface can be upload on a web site to allow the fruition by the public and can be used with 3d visors (Oculus Quest 2, for example), to create multimedia designed stations in museum, as in Caorle Museum (fig. 1). The ability to create immersive experiences to be implemented in museum's environments allows to share knowledge about sites and the past, as it happened also in Kaštela and Castromediano Museum.



Fig.1: Virtual navigation on Grado 2 shipwreck (E. Costa)

4. FIELD ACTIVITIES AND APPLICATION OF SHARED METHODOLOGIES: PILOT PROJECTS, SURVEYS, CATALOGUING/WEBGIS

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

4.1. Pilot Project on the shipwreck of Grado 2, FVG

The activities in **Friuli Venezia Giulia** focused on the wreck of a Roman merchantship known as **Grado 2** (3rd century BC), which lies 7 miles off the coast of Grado and 19 m deep.

The intervention, directed by the Superintendency, was carried out between August and September 2021 by ERPAC, with the scientific collaboration of Ca' Foscari University (Department of Humanities), University of Salento (Department of Cultural Heritage) and University of Udine (Department of Humanities and Cultural Heritage).



Fig. 2: Grado 2 wreck. Amphorae cargo, second half of the 3rd. century BC (ph. ERPAC)

The pilot project achieved the *in situ* enhancement of the cargo of amphorae of the wreck (fig. 2), in continuity with the previous interventions implemented between 2012 and 2015 by the Superintendency itself. The containers, most likely intended for storing wine, date back to the second half of the third century BC: it is the oldest load of amphorae in the north-central Adriatic, prior to the foundation of the colony of Aquileia (181 BC), a significant indication of the presence of Rome on the Adriatic scene and of its relations with local communities.



Fig. 3: Grado 2 wreck. The underwater grids for covering, protecting and ensuring accessibility to the site

The pilot action made it possible to highlight the entire load, document it accurately, reposition the existing grids and add others (fig. 3), identical and to completely cover it, thus ensuring the protection

and accessibility for underwater tourists. Excavation trenches were realized, verifying the deposit consistency and the lack of the hull's wooden remains.

The realization of the 3D model through the photogrammetric survey also allows for those who cannot or do not want to dive themselves to enjoy the site remotely, thanks to an application that perfectly simulates a virtual diving on the site, available in the museums involved in the project.

The following step is and will be the development of good practices of "participatory management", to ensure that diving centers, diving clubs and other regional realities can assist the protection bodies, as already happens in neighboring Croatia, in the enhancement of the site, through underwater guided tours, with modalities and protocols always developed within the framework of *UnderwaterMuse*.

4.2. Pilot Project in Torre S. Sabina, Puglia

Torre Santa Sabina (Carovigno, Brindisi) in **Puglia** was chosen for a pilot intervention, due to the quality and variety of the archaeological remains in the bay. The exceptional potential of this millenary landing place is an ideal scenario for a holistic approach to research, that of the global archeology of landscapes, in this case coastal and maritime, or seascapes. It is a "super-site", with stratifications of events which are also significant indicators of the coastal landscape evolution: cargos and hulls, but also remains of quarries and settlements (fig. 4).



Fig. 4. Torre S. Sabina, Carovigno (Br) : aerial view of Camerini Bay (ph. UniSalento-E. Peluso).

The fruitful synergy between the various involved actors (Puglia Region; Ministry of Culture, through its Offices, such as Superintendency of Archeology, Fine Arts and Landscape of the provinces of Brindisi and

Lecce, National Superintendency for the Underwater Cultural Heritage, Central Institute for Restoration; Universities of Salento, Foggia and Bari; University Politecnico of Turin; Municipality of Carovigno; Hoteliers Association; A.S.S.O. Association; A. Colucci company) and the support of the community allowed the achievement of the objectives of the two research and valorisation campaigns 2020–2021. The interventions were focused on the wreck of the Roman Imperial Age Torre Santa Sabina 1 (late 3rd to early 4th century AD), beached and abandoned at the ancient shore and now submerged due to the relative rise in sea level, a relevant marker of the seascape evolution (fig. 5). This wreck, embedded in the sand and covered by a thick layer (mat) of degraded vegetable materials, is exceptionally well-preserved: it has yielded a few stanchions, deck beams, as well as presumed remains of the hatch, elements only rarely preserved in wrecks, and some amphoras of the cargo (fig. 6).

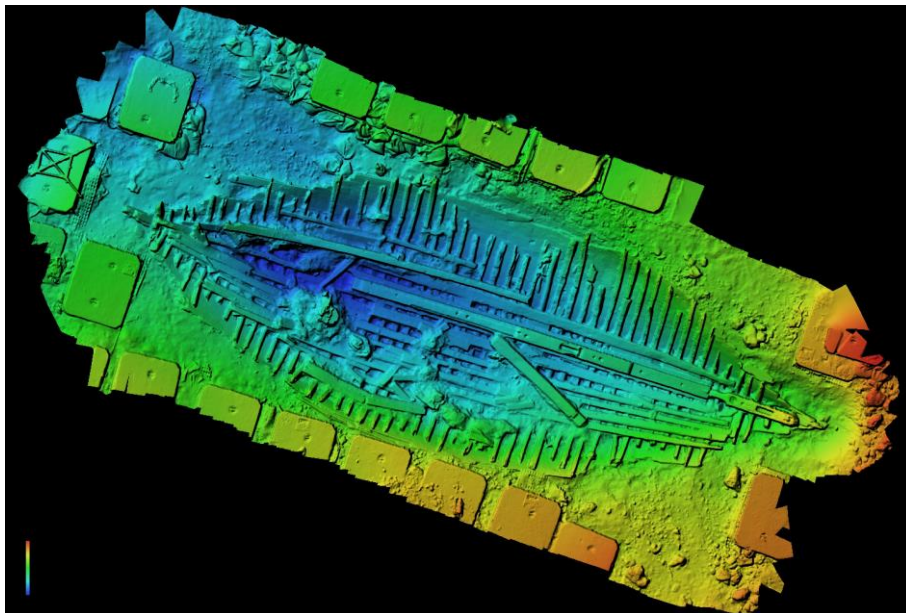


Fig. 5: Torre Santa Sabina 1 wreck. DEM (UniSalento, Politecnico of Turin)

The entire hull was thoroughly documented by photogrammetric techniques to register the day-by-day results and to obtain a complete 3D model (fig. 5), for creating a **virtual “clones”** of the wreck and the original ship, with animations and stories capable of allowing the widest use of this precious common good.



Fig. 6: Torre Santa Sabina 1 wreck. North African amphora, type Dressel 30 (ph. UniSalento – S. Notarangelo)

Other evidence have been explored and identified, so that they will be further, “spots” of the underwater trails. The seabed of Torre S. Sabina will be transformed into an archaeological park, through the **underwater trails’ design** for understanding the precious traces of the submerged past: cargos of ships that have come to crash against the reefs of this trap-bay over the centuries, but also the remains of settlements and activities (Auriemma 2014, 2015, Calantropio et al. 2021, Auriemma et al. 2022). Furthermore, the GIS technology will make available an interactive map for the exhaustive knowledge of the seabed.

4.3. Pilot Project in Resnik, Kaštela, Split County

Excavation and training activities of the pilot project were carried out in the locality of **Resnik, ancient Siculi**, during September 2021 (fig. 7). The research was directed by the University of Zadar, with the participation of the team of Museum of Kaštela; other archaeologists, archaeology students and about twenty members of the Giričić, Rostrum and Spinut diving clubs also collaborated.

Research on the sea bottom confirms the presence of a Neolithic settlement, which has been indicted by previous findings, a late Hellenistic settlement, which shows a presence from the second to the first

century B.C. (Babin 2011; Kamenjarin 2016), with remains of city walls, roads and wooden poles, and the Roman port (fig. 8).



Fig. 7: Resnik/Siculi. Aerial view of the site

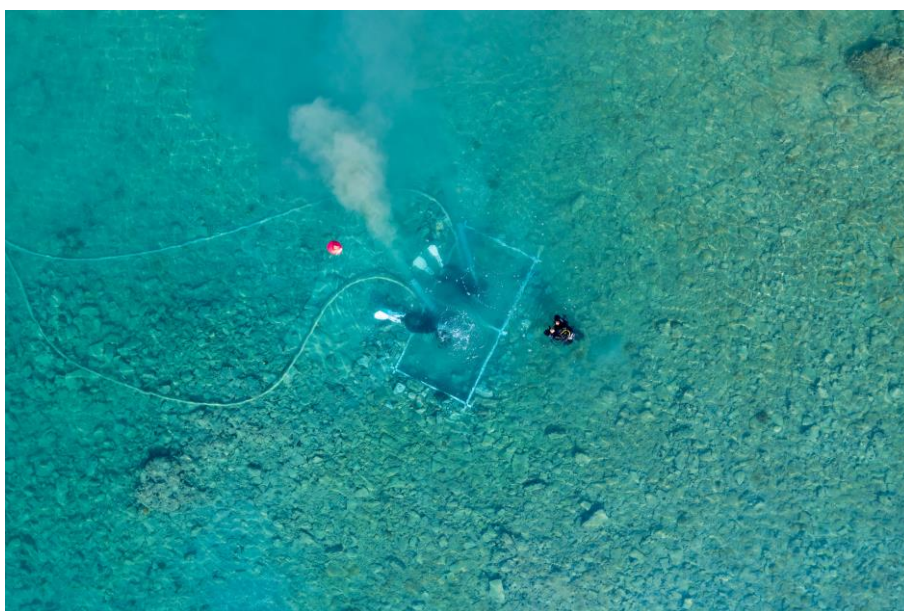


Fig. 8: Resnik/Siculi. Underwater excavations

The results of the research allowed the implementation of an exhaustive tool of knowledge and enjoyment: an immersive AR experience to be used with Oculus or semi-immersive, displayed on monitor, which tells of the evolution of the seascape and the settlement from Neolithic to the Roman Age.

4.4. Surveys in Veneto

The Department of Humanities made investigations in **Veneto** in the Venice lagoon and sea (fig. 9), in collaboration with Superintendency of Archeology, Fine Arts and Landscape for the Metropolitan Area of Venice and the Lagoon and with Idra Srl Company.



Fig. 9: Venice lagoon. Investigations of the archaeological sites (ph. UniVenezia)

The Venice lagoon represents a very interesting case study for the submerged archaeological contexts importance and also for the technical-operational aspects, because it is an “extreme” environment, with strong tidal currents, low underwater visibility and with very sustained boat traffic in certain areas. These conditions make diving particularly demanding and not practicable without adequate experience. In this context, it was possible to test the potential of photogrammetric survey and digital technology for site documentation, which provided excellent results, making visible what remains basically “invisible” in its overall dimension (fig. 10).



Fig. 10: Venice lagoon. The poor visibility

Among the most significant sites under investigation were the so-called "tower" in the San Felice canal, a massive basement made of bricks, and the remains of a "pier" located in the same canal at Ca' Ballarin. Finally, at sea, off the coast of Venice, the so-called "Wreck of the Bricks" was investigated, located 20 meters deep, a large amount of bricks from a cargo probably dated to the late Medieval period, and three shipwrecks dated to the nineteenth century, two off the coast of Eraclea and one near the shore of S. Nicoletto, on the Lido of Venice.

Some of the underwater sites investigated during the project (Bricks shipwreck and Grado 2) have been processed into precise and attractive 3D models that form the basis for Virtual Reality environments (Real Time Render technology). This technology enables also very young or old people and people with disability to access the sites (fig. 11). By sharing information between participating museums (Caorle Museum, Grado Museum, Castromediano Museum in Lecce, Ribezzo Museum in Brindisi, Carovigno Castle Museum, etc.) virtual tours of each other's site will be accessible, virtually travelling also to the most distant underwater sites.

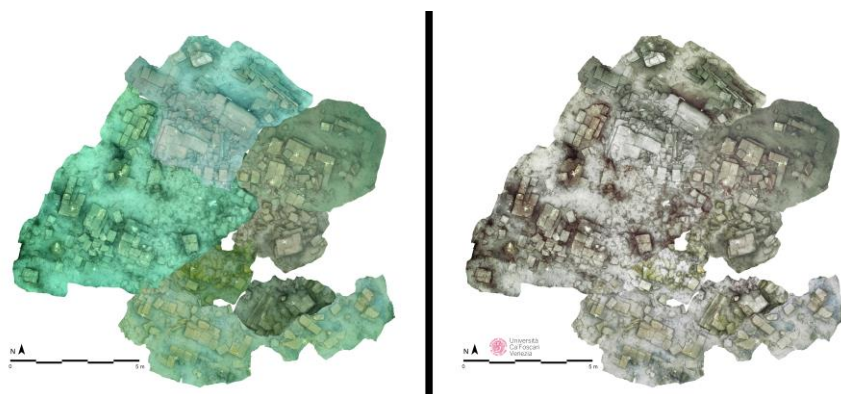


Fig. 11: Wreck of the Bricks. 3D model and VR environment in Caorle Museum

4.5. Surveys in Puglia

Surveys have been carried out in **several** coastal sites of Puglia in 2020–2021 within the UnderwaterMuse project. The activity conducted in the “Le Cesine” Natural Reserve, on the Adriatic Sea, led to the identification of a large port complex probably from the Augustan or Early-Imperial period (fig. 12).

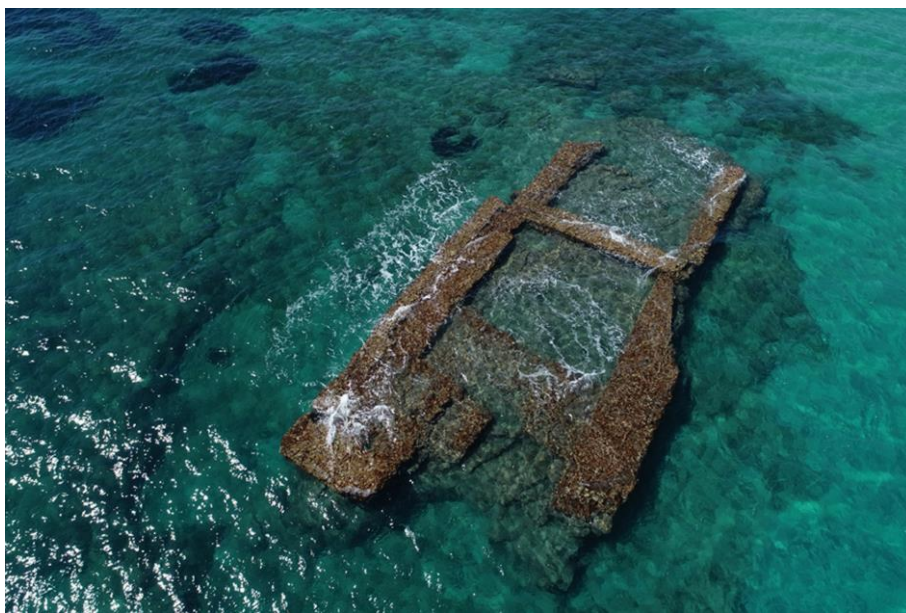


Fig. 12: Le Cesine, Vernole (Le). Submerged foundation of the Roman port complex at (ph. Uni Salento – R. Perrone)

On the Ionian Sea, furthermore, in Porto Cesareo Marine Protected Area, new evidence has been added to the numerous ones already known, such as spectacular formations composed of cemented sherds of Tripolitanian amphorae (2nd cent. AD; fig. 13) and submerged portions of a settlement and necropolis area of the Roman Imperial Period (fig. 14).



Fig.13: Porto Cesareo MPA (Le). Wreck of Tripolitanian amphorae. Conglomerate of sherds (ph. UniSalento – M. Buccolieri)

The photogrammetric survey, both aerial (by drone) and underwater, carried out on all the submerged and coastal structures (fig 38), experimented with some innovative practices such as the use of underwater sensors for GPS positioning, which are being developed. Furthermore, the 3D models obtained in this way give life to digital storytelling, that could evolve further.

In both cases, Cesine and Porto Cesareo, the UnderwaterMuse researches and acquisitions, inserted in the *UnderwaterMuseMap* portal and *CartApulia*, are object of the same protocol applied on the pilot project sites: the evolution in Underwater Archaeological Park (Porto Cesareo) and Blue Trails (Cesine), through targeted solutions.

It's important to point out that Porto Cesareo Municipality, on the basis of the previous researches and last UnderwaterMuse results, deliberated to start the project of realization of the coastal and underwater Park of Porto Cesareo.

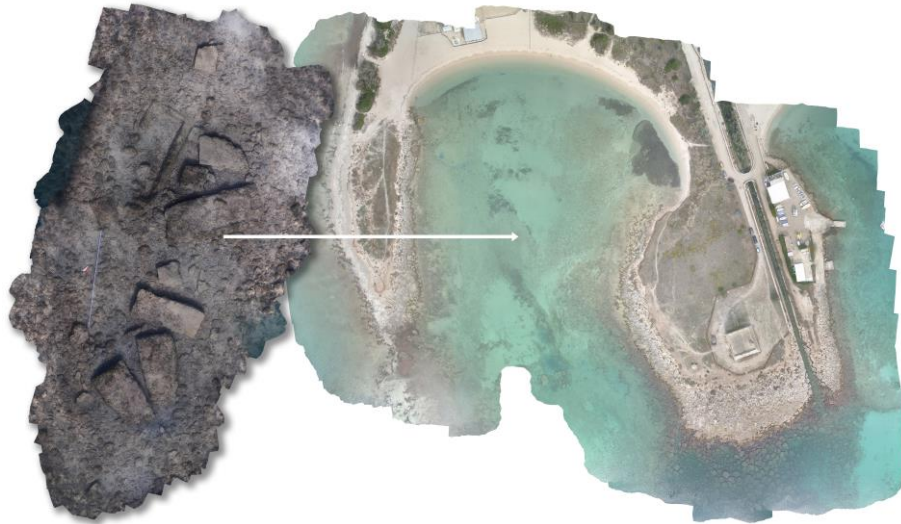


Fig. 14: Porto Cesareo MPA (Le). Drone photogrammetry of the submerged part of the Roman necropolis (ph. UniSalento – E. Peluso; el. L. Coluccia)

4.6. Cataloguing and Portal: UnderwaterMuseMap

The **UnderwaterMuse web portal**, implemented by the University Ca' Foscari of Venice, public and geo-referenced for the virtual exploration of submerged archaeological sites through voice, text, images and animations, also responds to the need to tell this “invisible” heritage to an ever-increasing number of people.

Thanks to a simple navigation on the digital map (fig. 15), it will finally be possible to access a historical heritage that has so far been beyond the reach of potential audiences.

The map can also be visited at the web site (fig. 16): <http://mizar.unive.it/underwatermusemap>.



Fig. 15: Caorle, National Museum of Maritime Archaeology. The digital workstation of Underwatermuse project

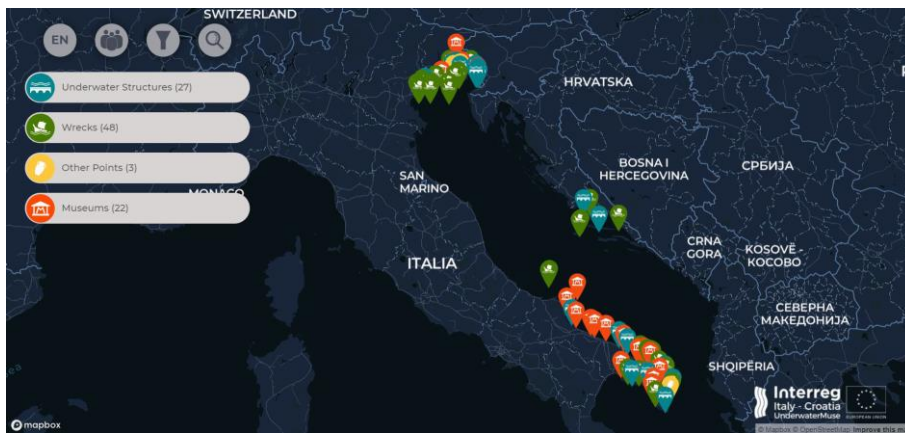


Fig. 16: The UnderwaterMuseMap from the website

5. INCREASING AWARENESS THROUGH PARTICIPATORY PROCESSES

5.1 Heritage community & target groups' involvement

Several actions to fully involve stakeholders and meetings regarding the role of new social policies and innovative business models in sustainable tourism (Regional Stakeholder Groups) were implemented during pilot interventions.

In **Resnik**, parallel to excavations, attempts to include as many stakeholders as possible have been made since the end of 2019, at the project's presentation in the Vitturi Castle. Local diving clubs participated (in total, 18 divers from diving clubs Giričić, Rostrum and Spinut) through an underwater archaeology course. Apart from amateur divers, archaeology students who had already actively participated in underwater excavations organized by Zadar University and Museum of the Town of Kaštela also participated in the investigations. Divers' education was conducted *in situ*, with introductory lecture on the site and the excavations conducted up to that point both on land and in the sea, lessons on underwater excavations techniques and methodology and drills with archaeological finds to better understand how to recognize them during the excavation. Most of the participants had previous experience in archaeological excavations, successfully acquiring new skills, while those who didn't have previous experience were assigned to work with expert archaeologists.

At **Torre Santa Sabina**, administrations and local community supported the Project with concrete and spontaneous actions: the Carovigno Hoteliers' Association offered room and board to all staff for the entire duration of the excavation campaigns; the Municipality made available spaces for equipment storage and materials laboratory.

The local community followed the work with great participation, visiting the laboratories and asking for information on the Project progress. The research team welcomed visitors to the site on a daily basis, describing in detail the activities underway and the objectives of the project.

Particularly engaging events were organized, between which the *open day* of the excavation (fig. 17) and the *Roads of Sand Festival*, with various musical and theatrical events dedicated to the sea.

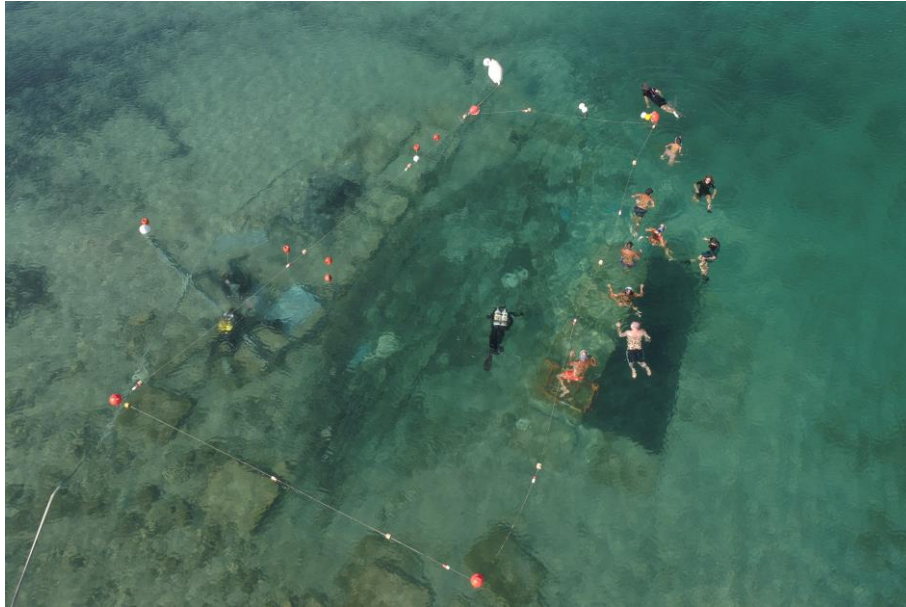


Fig. 17: Torre S. Sabina, Carovigno (Br): open day on the site - 25.09.2021 (ph. UniSalento – E. Peluso)

In **Grado**, the diving sport clubs, particularly sensitive to archaeological issues, visited the site and enthusiastically supported the project, also providing a small technical support (fig. 18). The municipality of Grado, for its part, supported the project by providing logistical support on land and organizing a promotional event (29 August 2021) to communicate to the citizens what type of operations were taking place in their sea and what could have been the developments.



Fig. 18: Grado. The working team and diving club members on the boat

Lastly, in the **Final Event** (Lecce-Porto Cesareo, 3–5 June 2022) an **International Conference** was held, entitled *General States of the bottom-up management of underwater heritage* (3 sessions, 24 lectures, 38 authors, filmed in live streaming via Facebook: <https://www.facebook.com/ESACpuglia/> and <https://www.facebook.com/ArcheoSubUniSalento/>), aimed at a constructive comparison of virtuous examples, which respond to the principles of the Faro Convention: heritage as a common good, fundamental for the cultural, social and economic development of individuals and communities. The same Final Event provided a **snorkeling and walking tour** for the participatory experimentation of underwater trails in Porto Cesareo MPA (fig. 19)



Fig. 19: Porto Cesareo MPA (Le). Snorkeling tour of underwater trails (ph. Puglia Region - E. Peluso)

5.2. Community involvement & cultural tourism offer: the exhibition

On April 27, 2022, an exhibition dedicated to the results of UnderwaterMuse project was opened in the Museum of the Town of Kaštela, in Vitturi Castle, among the Permanent museum exhibition (fig. 20).



Fig. 20: Kaštel Lukšić. The exhibition "Submerged Siculi" in the Museum of the Town of Kaštela

The exhibition, titled "**Submerged Siculi**", shows the results of underwater archaeological excavation at the multilayered site Resnik/Siculi conducted as part of the project. Along with the new results, the material found in previous underwater excavations were presented, as well as the material collected by local divers.

5.3. Community active involvement: online photographic contest

The online photographic contest on the topic "*Underwater man-made landscapes in the area of the Adriatic Sea*" – which started in July 2021 and ended in February 2022 – aimed at raising awareness about the project among youngsters and their peers (school friends, families), as well as professional underwater photographers, and thus contribute to an overall increase in potential visitors of the Project's underwater pilot locations.

During the voting period, March 1–10 the contest reached around 550,000 people via Facebook announcement while around 2.000 people reacted with comments, shares or likes on the posts. Finally, the winners of the photo contest were announced on March 16 2022, respectively Božidar Vukičević (category over 35 years; fig. 51), and Lorian Marović (category under 35 years; figs. 21-22).

The photo exhibition "*Underwater man-made landscapes*" was firstly presented during the Kaštela museum exhibition, "*Submerged Siculi*" March 27, 2022., in Vitturi Castle/Kaštel Lukšić, and then in the framework of the *UnderwaterMuse* final event in Lecce, Castromediano Museum, June 3, 2022, with participation of the winners of the contest.



Fig.21: Božidar Vukićević photocontest winner photo Fig.22: Loriana Marović photocontest winner photo

5.4. Heritage community & stakeholders' specific training

5.4.1. Diving clubs & centers' training in FVG

The first step for the involvement of local diving centers, whether they are sport clubs or tourist diving centers, is their training. With this assumption and following the pilot project of Grado 2, which saw the participation of diving clubs' members during the field activities, a "heritage education" project has been carried out, aimed at making diving members and other possible stakeholders to know both the Grado 2 site and other submerged sites in the Region and to formulate a possible offer to use them through the same clubs. The recipients of this training project were about 25 divers belonging to the sports clubs of the region, diving centers and Marine Protected Area of Miramare;

The training included a series of modules:

- a first theoretical workshop, carried out by University professors and professional underwater archaeologists;
- two days of diving on the Grado 2 wreck;
- another three days intended to expand the regional offer, with visits to submerged sites especially near the coast, to be reached both diving and snorkeling, such as the small piers of Muggia and other sites in Grado and Marano lagoons (fig. 23).



Fig. 23: Muggia, P. Sottile (Ts). Diving training. Guided visit on archaeological sites for regional diving clubs and centers

5.4.2. Training for diving guides and tourist guides in Salento, Puglia

A total of 100 hours training course has been carried out in Porto Cesareo MPA (Lecce), aimed at 20 young people, mostly women, under 35, to make them archaeological-naturalistic diving and local tourist guides, including also the achievement of diving license.

The course was articulated in the subsequent modules:

1. The invisible inheritance. The coastal and submerged heritage of the Puglia Region: the state of the art and information systems.
2. The invisible inheritance. The coastal and submerged heritage and the prospects for enhancement. The UnderwaterMuse projects, Puglia Seascapes, FISH & C.h.i.p.s., the ESAC Center. The invisible heritage chain and the actors.

3. The coastal and submerged heritage in the Museums of Puglia – guided tours of the Ribezzo Museum of Brindisi, the Castromediano Museum of Lecce, the Ancient Sea Museum of Nardò, permanent exhibition of Torre Chianca.
4. Making the invisible visible: photogrammetry and 3D modeling techniques.
5. Making the invisible visible: underwater photographic and video shooting techniques. The use of the drone and external shots.
6. Telling the invisible heritage: communication and storytelling.
7. Everyone's heritage: the legislation on underwater heritage, the 2001 UNESCO convention, the 2005 Faro Convention, the National Superintendency for Underwater Heritage.

Furthermore, field – underwater activities have been carried out (fig. 24): diving prospecting and video-photographic documentation of the submerged sites of the AMP of Porto Cesareo, of the Natural Reserve of the State Le Cesine (Vernole, Lecce) and of the Emperor Hadrian pier in S. Cataldo (Lecce).



Fig. 24: Roca, Melendugno (Le). UnderwaterMuse Training for diving guides and tourist guides in Salento

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