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Session title: Underwater Archaeology; Past, present, future

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Thematic block:
Archaeology in the Modern World: Theoretical and Methodological Perspectives

Session abstract:
From the first attempts in the 15th century to explore the underwater archaeological remains, through some great discoveries at the end of the 19th and the beginning of the 20th century, during last 60 years underwater archaeology has gained its position as a respectable branch of the archaeological science. The study of underwater archaeological evidence has made great progress by applying dry-land archaeological techniques and adapting them to the underwater environment. Constant improvement of the diving and underwater archaeological equipment, as well as applying the new technologies in underwater research, help archaeologists to gather more and more information that contribute to the importance of the archaeological excavations in salt and fresh water, as well as water-logged sediments. Relatively recent deep water research opened a multitude of questions about the ancient navigation and managing the underwater archaeological sites.

Specific natural conditions under water in many cases helped to preserve various organic materials from different periods of the human past, as well as many valuable works of art that could have easily perished on land. Numerous remains of shipwrecks from prehistory to modern times represent an interesting and attractive direct evidence of seafaring, trade, cultural exchange and political situations, while abundance of architectural remains and movable finds from the ancient ports or other submerged structures provide evidence for many different aspects of everyday life. They also offer useful data for the interpretation of all kind of geological and climate changes that caused notable changes of the sea-level or inland water courses. Therefore, multidisciplinary studies, becoming more and more frequent, make use of all the rich and various archaeological records provided from underwater archaeological layers and render it useful for many different purposes.

The large number of easily reachable sites, the very limited number of experts engaged in the protection of underwater cultural heritage, nearly impossible permanent control of non
excavated or partly excavated sites, the lack of funding for the accurate excavations and, even more, for the long and expensive conservation processes are just some of the problems to be addressed while considering the future of underwater archaeology. On the other hand, the attractiveness of underwater archaeological research, sites and finds offer great possibilities for sustainable development based on cultural heritage that could offer bright prospects for the future work.

List of arguments to be presented and/or discussed:

- Learning from history; positive and negative experience from the past or on-going underwater archaeological projects;
- Respectable examples; presentation of underwater archaeological sites, excavations or complex projects that strike the importance of underwater archaeology and its achievements;
- Mapping of underwater cultural heritage;
- Methodology of underwater archaeological research;
- New technologies and deep water archaeological research;
- Multidisciplinary studies applied on underwater archaeological sites;
- Salt water – fresh water – water-logged environment; differences and similarities in excavation methodology and conservation processes;
- In situ protection of underwater cultural heritage; how to prevent the sites from constant or occasional looting;
- In situ presentation of underwater cultural heritage; how to manage the attractive underwater archaeological sites;
- Modern shipwrecks and sunken aircrafts - increasing problem in terms of protection
- Private collections and amateur divers; is there a possibility to organize a peaceful coexistence;
- Legislation and practice; coherence or discrepancy.

Paper abstracts:

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UNDERWATER CULTURAL HERITAGE IN CROATIA AND THE IDEA OF SUSTAINABLE DEVELOPMENT

Underwater archaeology, the discipline that studies all traces of human existence and heritage of all mankind, regardless of any state's borders, proves to be a fruitful area for the development of multicultural projects that by their nature initiate cultural co-operation in order to protect and respond to the demands of development.

Since the Greek settlements and colonization from Magna Graecia in the 3rd and 4th century BC encompassed a number of Adriatic islands, and the opulence of Roman reign demonstrated itself in many fabulous cities, the recovery of Greek statue of Apoxyomenos, recently presented in Zagreb and Florence, was somewhat expected.

The systematic underwater archeological research of the Eastern Adriatic began in the
Early sixties of the last century, as a reaction of local museum institutions to the plunder of underwater sites. Today, the central department for underwater archeology is inside the Croatian Conservation Institute. It is also important to mention that Croatia is one of the first countries that ratified and signed the UNESCO Convention on the Protection of the Underwater Cultural Heritage showing our commitment to promote and protect this particular heritage, as international benefit. In Croatia, there are 400 documented underwater sites, of which 100 are inscribed on the List of protected cultural heritage in Croatia.

Today, the Ministry of Culture is working to find resources for the founding of the International Euro-Mediterranean centre for underwater archeology, where cooperation with other countries is a necessity, not an option. The presentation tries to give an answer, based on the Croatian example, to the question present in all of the Mediterranean and Europe on how to find a solution not only to preserve but also to offer the models on how to use the underwater cultural heritage as a cultural resource for sustainable economical development. In situ presentation of underwater archeological sites in the Adriatic Sea (including archeological research in rivers and lakes) is also one of the tasks and objectives of the Centre. Now, it is possible to visit 7 sites that are protected by cages and 80 more accompanied with a supervising diver.

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THE PROJECT OF UNDERWATER ARCHEOLOGICAL PARK IN CAVTAT

Underwater archeological sites represent a specific matter regarding the exploration and protection of cultural heritage. As the interest for diving in Croatian Adriatic is growing every year, they can be easily included within the touristic potentials of Croatia. Abundance and diversity of underwater archeological heritage offers many different possibilities of underwater in situ presentation that could attracti either scientists or amateur divers.

In the Cavtat area, in the far south of Croatia, there are five underwater archeological sites, not far away one from another. They include a shipwreck with the amphorae cargo from the 1st cent. BC, a cargo of storing vessels called dolia from the 1st cent. AD, a shipwreck with the amphorae cargo from the 4th cent. AD, a shipwreck from the 18th cent. and an anchorage with many different single finds. The 4th cent. site is protected bay an iron cage.

The creation of an underwater archeological park has been proposed because it would certainly make an important contribution to the existing tourist attractions of the Cavtat area.

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THE ROMAN SHIPWRECK IN THE SHALLOW WATERS OF BUJE IN ISTRIA – AN EXAMPLE HOW TO MANAGE A WELL PRESERVED UNDERWATER ARCHEOLOGICAL SITE

Thanks to a police intervention a well preserved underwater site was discovered on the shallows called Buje near the town of Umag in Istria. During the first underwater archeological survey it was established that it belongs to the 2nd cent. BC and consists of
about 150 amphorae of the so called Greco-italic type.

The best solution for its protection was the placing of the protective iron cage constructed with the removable top-side to be opened during future excavations. This sort of protection also permits the underwater presentation of the site and can serve as a good starting point for training the young archaeologists and scientific divers.

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DECLINE & FALL IN LATE ROMAN CROATIA: ANALYTICAL MODELS FOR MARINE ARCHAEOLOGY

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EXPERIENCE OF THE RESCUE UNDERWATER ARCHAEOLOGICAL EXCAVATION AT VRANJIC NEAR SPLIT

Vranjić is a charming village on a small island between the city of Split and the town of Solin. In ancient times it was situated in Ager salonitanus i.e. the territory of Salona, the ancient capital of the Roman province Dalmatia. Once called Little Venice, its image was heavily damaged by industrial progress during the second half of the 20th century.

Some important underwater archaeological finds disappeared under the modern coastal structures and reappeared after nearly one century, during the reconstruction of the western and southern bank. The medieval structures, made of Roman architectural remains provided a lot of material that indirectly confirmed the existence of the nearby Early Christian basilica and the Roman necropolis. A Greek inscription from the 4th century BC, found by an accident, raised a lot of interest as it seems to be directly associated to the period of Greek colonization of Eastern Adriatic.

The most important and unexpected discovery is represented by the potent Bronze age layer, testifying to an important settlement that was totally submerged and therefore completely unknown.

Diving and working conditions didn’t permit archaeologists to work systematically on the underwater research, making the excavation and the elaboration of documentation extremely difficult. In order to identify all the cultural layers it was necessary to create 5 m high vertical profiles on the less critical points, where the danger of collapsing was reduced to a minimum. This kind of approach was needed because of the importance of the site and, in the same time, pointed out all the limitations and disadvantages of rescue excavations.

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GAZETTEER OF UNDERWATER CULTURAL HERITAGE OF ISLAND OF HVAR
Project of creating database on underwater cultural heritage of the island of Hvar has started in 1983 as a part of international archaeological Project Hvar. Creator of this project is Marinko Petrić, senior curator of Hvar heritage museum.

The idea has been to create a complex database of marine cultural heritage of the island of Hvar, primarily of archaeological nature, but also of maritime and ecological context. It includes collecting information from archaeological research and survey, collecting and sorting data of unpublished pieces of information from archive of Hvar Heritage Museum, evidence from public and private collections of marine cultural finds, and sampling pieces of information from local divers, fishermen, and other relevant sources.

Central part of documentation is Gazetteer of underwater sites. It consists of about 220 sites of various types and of different value, from shipwrecks to single findings of pottery shreds. Gazetteer also covers evidence from different time periods, ranging from earliest finds dating back to 5/4th c. BC, to more recent ones dating from 20th c AD. Map of sites is made in scale of 1/5000 and 1/25000. This gazetteer, in short form, was published together with database of land archaeological sites in "Archaeological heritage of the Island of Hvar", British Archaeological Report, International Series, 660, Oxford 1997.

Although not verified in every detail, and not completely standardized in quality of data, this documentation is ground base for all future projects of research, preservation and valorisation of Hvar underwater heritage.

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EXCAVATION AND IN SITU PROTECTION OF THE PERFORATED DOLIA IN THE PORT OF VIS

Considering the historical context, the island of Vis is one of the most interesting islands along the Croatian coast. From the archaeological point of view its importance can be observed from prehistoric times through Hellenistic period, when the famous Greek colony of Issa in the Port of Vis was created, until the period of Roman domination.

An interesting group of finds from Roman period is represented by perforated dolia, large storage vessels that in a second moment have been used for some different purpose. The first such object has been discovered in 1985 near the old slaughterhouse known as Macel. During the surveys in 1992 and 2004 three more partly preserved perforated dolia were found near Macel and in the adjacent Bay of Stonca.

In 2005 Croatian Conservation Institute started an excavation campaign in order to get some more information about the site. Three new perforated dolia were discovered in situ. The continuation of research in 2006 added two more dolia to the present list, rising total number of finds to eight.

During the 2005 campaign research was based on only one dolium. It was established that dolium was buried to half of its original height in coastal bank and was surrounded by irregularly broken stones which were used to immobilize it. During the cleaning of the inside part of the dolium many pottery fragments, rests of building material, mosaic cubes, glass fragments and pieces of wood were found, dating back to the first centuries AD.
The function of perforated dolia still remains an opened question as there are no analogies within the other Mediterranean finds. The usual explanation about their use for keeping the fish fresh is not supported by the data collected in the Port of Vis. However, as the number of sites with perforated dolia increases, the future archaeological research will probably lead us to the right conclusion.

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SALVAGING HISTORY: INTERNATIONAL COLLABORATION AND OUTREACH IN THE NORTH BLACK SEA

Taras Shevchenko University of Kiev’s Centre for Underwater Archeology (CUA) is a recent example of effective international teamwork with regards to underwater archeological research and innovative instruction. Founded by the Ukrainian underwater archeologist Dr. Sergiy Zelenko in 1990, the Centre has continued to grow and is now responsible for numerous projects, including the full-scale excavation of a 13th century ship-wreck begun in 1999 on the northern Black Sea shelf in the Bay of Sudak, Crimea. Since that time Dr. Zelenko has developed an international field school around the site where CUA carries out its stated aim of involving “students, amateurs, sport divers and members of the general public in maritime archeological field excavations and surveys, as well as educating them regarding this fascinating field and the preservation of underwater resources.” Having borne Eurasian and Mediterranean maritime activity for the past two and a half millennia, the coastal waters of the Crimean peninsula now bear that legacy as a remarkable and largely untapped archeological resource of vast potential. CUA’s research of the maritime features that lie submerged there on the northern Black Sea shelf concerns a history intrinsically and intimately interwoven with that of Europe, and benefits greatly from its teams’ international backgrounds. Following such brilliant examples as those set by the United Kingdom based NAS and America and Turkey through Texas A & M’s Institute of Nautical Archeology, the Centre’s work in the Ukrainian waters is embracing the collaborative study of our mutual cultural heritage: it is bringing together students, professionals and amateurs alike to contribute to the research of material that inspires their interest. Today’s increasingly globalized world is facilitating international cooperation in underwater archeology, which in turn facilitates priceless international perspectives on site. Working together, the underwater archeological community is salvaging our history, and indeed building the future of the field.

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COLLABORATION WITH MARINE GEOLOGISTS IN SEARCHING NEW ARCHAEOLOGICAL OBJECT IN THE BLACK SEA (UKRAINE)

The perspective way in archaeology development, in particular underwater archaeology is cooperation with the science geology, and colleagues-geologists. In Europe and worldwide this cooperation becomes common, and suit the modern requirements of Science.
In Ukraine cooperation between archaeologists and geologists can be seen only in the field of terrestrial archaeology these days. Cooperation in progress is specifically in implementing geological methods of survey and research of archaeological site.

Geography is also in on call. Wide application of GIS is getting a standard method in archaeology.

In the field of underwater archaeology it goes differently in Ukraine. Previously marine geological surveys were conducted without archaeologists. This led to significant information loss.

Since 2007 a new stage of Ukrainian UA development has began. The Institute of Geology of Academy of Science invited underwater archaeologists from Centre for Underwater Archaeology of Kiev National University to take part in the geological marine expedition in the Black Sea. The aim of this expedition was searching and exploration of mud volcanoes and methane shows and layering.

Archaeological part of the exploration was limited on the first stage by sharing information and computer data and maps on the shelf zone of the region. The second stage is planned as participating of archaeologists divers on board of the geological vessel and work together with marine geologists on checking underwater targets in the shallow waters of the Kerch Peninsula’s shelf. Also the second stage of cooperation will comprise additional research on climate changes.

The expedition is conducted on the Kerch Peninsula – the region of rich archaeological and historical sites, where the traditions of seafaring were established in the Bronze Age. The ancient and medieval periods of the maritime history of this region can be hardly hard overestimated.

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UNDERWATER INTERDISCIPLINARY PROJECT IN CASKA BAY AT THE ISLAND OF PAG

The theme of this report is presentation of the results of underwater archaeological excavations started in 2005 within several year long project Research, protection and presentation of the complex archaeological site at Caska in the organization of the Department od Underwater Archaeology of the Croatian Institute of Restoration, the Department of Archaeology and the Department of History of the University of Zadar, and Archaeological Museum in Zadar. The creation of the project was initiated by long term devastation of the archaeological finds due to negative natural factors and anthropogenic activities. Complex nature of this site imposed interdisciplinary approach of the research, therefore Croatian Geological Institute and the firms Geographica d.o.o and Georheo d.o.o were involved in the project, making geodetical and photogrammetric documentation of the archaeological remains.

Settlement at Caska near Novalja at the island of Pag presents a part of the complex comprising sites from wide chronological range, since prehistory untill New Age. Ancient remains are very numerous and they show exceptional importance of this region in the first centuries AD, which is strongly confirmed by the remains of the complex water supply system Kolan – Caska – Novalja.

Exploration of the undersea at Caska revealed the remains of ancient stone breakwater which were documented. Cultural layer with archaeological material characteristic for other ancient
ports from 1st to 3rd century was confirmed with several probes next to the breakwater. Wooden ancient anchor was found at the same place, preserved completely. Remains of the ancient architecture are visible on the shore, from the breakwater to the bottom of the bay. Parts of these remains are sunken because of the sea level rising. It is probable that these remains served as an inspiration for legends about the mysterious sunken town.

Integration and interpretation of the information acquired in underwater and on shore explorations, as well as the data from all other disciplines participating in the project, will offer a basis for better understanding and wider and more complete picture of the past of this important sea-oriented site. Finally, cultural heritage explored in such a way should be integrated in economic and social life of the community through quality presentation, becoming in that way one of the basis of the viable development.

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KIZILBURUN SHIPWRECK EXCAVATION, TURKEY

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UNDERWATER ARCHAEOLOGY IN ESTONIA

In the end of the year 2006 a shipwreck was found during the reconstruction works in the Tallinn Harbour. On the basis of only 4 salvaged fragmentary pieces and partly, according to their find-spot, the wreck was directly hypothesised to be a Swedish warship Draken from the 17th century. Without any actual preliminary investigations of the location and/or complementary archival studies, the ship was also said to be in a totally demolished condition. The generally acknowledged expert of Estonian maritime archaeology declared that shipwrecks of this age, type and condition are not worthy of any kind of archaeological research. And the Estonian National Heritage Board agreed, even though they had earlier estimated the wreck to be a find with a high cultural value.

Several problematic issues for the more general discussions on underwater heritage emerge from the above stated example. The choice and evaluation of research material is definitely requisite in archaeology; in case of old shipwrecks, their condition, age, frequency of occurrence and general cultural and scientific importance are probably the most important criteria for evaluation. But, do 4 fragmental ship-details give any information on these matters?! Even without preliminary investigations the first step in wreck-archaeology seems always to be identifying a site, putting a name to it. Thus, why, in so many cases concerning shipwrecks, archaeological material itself is not considered important? Furthermore, statement that 17th century (and younger) shipwrecks are not of interest for the science and are suitable only if these are preserved entirely, is even more distanced and unsuitable standpoint for archaeology. Still, such declarations, more characteristic for antiquarian archaeology, occur frequently in academic maritime archaeology. And for any National Heritage Board to proceed in their decision making from plain hypotheses and from the concept according to which only “beautiful” and entirely preserved object have a value should be totally out of place in today’s archaeology.
CURRENT RESEARCH IN UNDERWATER AND ARCHEOLOGY IN POLAND

Underwater archaeology has been taught at the University of Torun for almost 30 years. Despite of a long tradition achievements of this course have been hardly recognised outside of a close academic circle. Political, social, economic and technological changes that took place in Poland, and in the rest of Europe, in the last two decades introduced many new challenges for education in underwater and maritime archaeology. On the one hand, private, well funded shipwrecks ‘research’ groups have been established, and they manage to capture a lot of public attention. On the other hand, broad access to the Internet made the exchange of knowledge more accessible. In response to these challenges new projects in underwater archaeology conducted by University of Torun are very open for cooperation with recreational divers and above all with local communities that often are deeply interested in their local past.

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CHALLENGES FACED BY UNDERWATER ARCHAEOLOGY IN LATIN AMERICA AND THE CARIBBEAN, LEARNING FROM EXPIRENCE

Underwater Archeology in Latin America and the Caribbean (LAC) is at starting point. There is an enormous field of action given de Maritime History of the region, including its “discovery” and colonization by European powers.

Awareness of the existence of archaeological remains in water environments and particularly of their potential from a scientific perspective, is still a very recent subject given the relatively new access to the underwater world and to the availability of new technologies.

However, there is a long lasting popular awareness of its existence, thanks to the romantic notion of Spanish Galleons loaded with gold and precious stones as well as to the adventures of English and French pirates that have nourished the imaginations of many through literature and films.

Nevertheless, the region cannot be considered as one entity. The maritime history of the Caribbean Region is a very different one that of countries with coast lines on the Pacific or the Southern Cone.

In the Caribbean, search of historic shipwrecks by treasure hunters has been an issue for more than twenty years. Constant incursion for obtaining permits to explore, and commercially exploit, shipwrecks has put many countries of the Caribbean basin in permanent vigilance and has often been the ground for corrupt agreements within weak political structures. However, this constant presence has had at least one beneficial aspect, which is that in those countries the issue is of public knowledge, though often wrongly understood and mistaken by many as a possibility for raising money for government institutions while enriching the pockets of a very few. Creating awareness of the real potential for a country to preserve and manage its underwater cultural heritage is more of a nature of straightening the institutional potential of research and protection of this heritage than starting from zero.

Owing to the efforts and constant work done by international bodies as UNESCO - through the Convention for the Protection of Underwater Cultural Heritage - governments in
LAC are beginning to understand and value the importance of legal structures for the protection of this new heritage and of its potential for enhancing and protecting cultural identity through serious scientific research, convincing the average person of its existence is not a conflicting process.

If we analyze the cases of Colombia, Panama and Venezuela as an example of countries sharing a common past in Caribbean water and that of countries in the Southern Hemisphere as Argentina and Chile, we can see the differences in approach. It is not an exhaustive listing of but an insight into different experiences that illustrate the complex evolution of UCH protection and the aspects that have driven scientific development of Underwater Archeology in this part of the world. Political, geographical, climatic and cultural differences between these two parts of our continent can be analyzed and used to understand the complexity and maybe give an idea of a different approach to reach the goals of global protection.

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THE EXPLORATION OF THE HELLENISTIC SETTLEMENT SICULI HARBOUR IN KAŠTELA BAY

The submarine findings of ceramic fragments and relief decorated Hellenistic pottery in the location of Resnik in Kaštela bay give a great importance to this settlement. On a vast stone mound and around it, a great amount of ceramic pottery has been found, varying from fine relief decorated bowls to big vine amphorae fragments. Simultaneously, on a neighbouring land, sound and systematic explorations have been taking place, and brought to light pieces of an architecture, as well as the identic Hellenistic material. The material and the findings from the harbour can be dated into the period from the end of the third to the middle of the first century BC.

The most logical attribution of the harbour area and its belonging settlement was connected to Siculi settlement, a place that was, in historical sources, mentioned by Pliny saying that Claudius colonized the settlement with veterans (Siculi, in quam locum divus Claudius veteranos misit.). Moreover, on the Peutinger map the settlement is marked by a greater vignette on the distance of nine Roman miles from Salona and five from Traugurion. As the sources never mention Siculi settlement before the veteran colonization, the findings of Hellenistic harbour and settlement would indicate its prior existance. The two coastal settlements, Tragurion and Epetion, northwest and southeast of Siculi settlement are mentioned as the colonies of the Greek settlement of Issa. They are mentioned in the written sources in 158 BC, when those two cities were jeopardized by Delmati, an Ilirian autochthonic people that lived in the hinterland.

The analysis of the Hellenistic Seculi settlement submarine findings has shown that there was one more Hellenistic settlement – Siculi, in the specified time period. Although it wasn't mentioned in earlier sources it had developed commercial connections with its home settlement of Issa as well as with other Hellenistic centres as far as the island of Delos, the naval and commercial centre of the Eastern Mediterranean in those times.

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The complex underwater archaeological site at Pakoštane

**ANCIENT PORT COMPLEX IN PAKOŠTANE NEAR ZADAR**

Rich archaeological remains from Antiquity were discovered in underwater archaeological excavations in 2004 in Pakostane, north Dalmatian coastal settlement south of Zadar. The manager of the excavations was prof. Dr. Sc. Zdenko Brusic from the Department of Archaeology of the University of Zadar.

A port from the Roman Imperial period was discovered in the bay near Pakostane, although only a small part of the underwater area was explored on that occasion. Its cultural layers revealed rich and versatile finds. Artefacts are often not fragmentary and they are well preserved. Pottery shards are the most numerous finds: amphorae, plain kitchen pottery, *terra sigillata* and lamps. Inscriptions were found on some of the vessels. Glass bottles and glasses are also numerous, some of them appearing for the first time in the region of ancient Liburnia. Different kinds of adornments were also discovered as well as Trajan's and Antoninus Pius' coins. Numerous animal and fish bones were found, and different seeds – probably being discarded food of the sailors. Large pieces of hide, possibly used for sails, pullies and other parts of ship's equipment were also discovered. Bricks and roof tiles, which sometimes contain stamps of the workshops, probably belonged to the port utilities. The biggest part of this archaeological material can be dated to the first and second century AD. The port was situated on an exceptionally favourable position, next to the fresh water source, sheltered from the southern winds by breakwater. Inhabitants of Asseria and some other communities from ancient Liburnia probably used this port.

But that was not all. An exceptionally well preserved ship was discovered few hundreds of meters west from the ancient port. It is more than 20 m long. It can be dated to the Late Antiquity according to fragmented amphora, coin, shreds of north African relief pottery and radiocarbon analysis of wood samples.

Ancient salt pans were also discovered in large bay near Pakostane by members of the Department of Archaeology of the Croatian Institute for Restoration.

Undersea archaeological excavations in the bay near Pakostane resulted with the discovery of the significant port complex from Antiquity. It was probably one of the most important ports on the sea route next to Croatian coast, which was heavily traveled in Roman times.

**ROMAN VIVARIUM NEAR THE KUPANJE PROMONTORY NEAR POREČ**

One of the greatis vivarium, third on the Mediterranean sea, which is composed of four piscine around 7.000 m² of surface and more then 5 m deep (countig from the top of the sea level to the bottom of stone level) he was producing greatis quantity of little fish to make the
sauce called *garum* or perhaps large fish for the imperial dining tables. This vivarium we can date from 1st to 5th century.

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**THE VALUE OF HISTORIC WRECK SITES**

English Heritage’s Conservation Principles support the management of all aspects of the historic environment in a way that is clear, transparent and sustainable and identify value as being an aspect of worth or importance ascribed by people to places. In this context, the places are our Protected Wreck Sites though recent explorations on some of England’s historic wrecks have highlighted the need to identify and define the value of those sites to enable their sustainable management for all. This paper will outline the way in which value is ascribed to Protected Wreck Sites while addressing the process of managing change in ways that will best sustain the values of a place in its contexts, and which recognises opportunities to reveal and reinforce those values.

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**FROM THE SHIPWRECK TO THE SHIPYARD – THE XVI\(^{TH}\) CENTURY ARADE 1 SHIPWRECK (ALGARVE/PORTUGAL) AND THE IBERIAN SHIPBUILDING TRADITIONS: A FIRST APPROACH**

Discovered during the dredging of the rotation basin of the River Arade in 1970, the Arade 1 was excavated between 2001 and 2005 by the underwater archaeological team from the Centro Nacional de Arqueologia Náutica e Subaquática (National Centre for Nautical and Underwater Archaeology) (CNANS - Instituto Português de Arqueologia - Portuguese Institute of Archaeology – Ministry of Culture).

The study of the data showed there to be numerous architectural similarities between the Arade 1 and the Iberian naval architecture of the XVIth and XVIIth centuries and between this ship and the set of vessels from the Iberian-Atlantic tradition dating from the same era. However, the Arade 1 has some primary architectural characteristics which appear to be original, according to the same written and archaeological sources, and which may correspond to construction techniques of the region.

The naval architecture treaties established indeed general rules which were susceptible to not being respected by all shipyards in the kingdom, especially private shipyards set aside for the construction of merchant ships.

The differences between the theoretical principles (process of construction and method of construction) stated in the naval construction treaties and the practices of the naval shipyards of the era, as shown by the diverse archaeological remains of ships, may enable the identification of specific cultural zones with regional architectural traditions within the core of the Iberian-Atlantic tradition.
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AN EXAMPLE OF APPLYING THE SIDE-SCAN SONAR IN DOCUMENTING MODERN SHIPWRECKS

The paper considers the applying of Side-scan sonar in the underwater research of a group of sunken ships from the World War I and II near the island of Pag. Six wrecks were found at the depth of 60 to 80 m, that doesn't permit long and extensive diving. Therefore, in collaboration with the Croatian Hydrographic Institute from Split, a Side-scan sonar has been applied to establish the state of preservation of every single wreck in order to facilitate the organization of future diving.

Some significant examples are shown to illustrate the 2006 documentation campaign. In the forthcoming years the use of Multi-beam sonar will lead to the elaboration of the 3D representations of the wrecks in their present state of conservation.

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COMPARISON BETWEEN USING A SINGLE BEAM SONAR AND A MULTI BEAM SONAR IN ARCHAEOLOGICAL FIELDWORK

The contribution presents a practical account of the techniques and procedures for bathymetric measurements, which can be applied for the benefit of underwater archaeological investigations. The procedure for measuring using a single beam sonar is technically much simpler than the more advanced procedure based on measuring with a multi beam sonar. A comparison of the two procedures will be presented as applied on measurements of select Roman underwater structures along the coastline of the Slovenian shore. The underwater structures at Jernejev zaliv and at Fizine near Portorož were measured using a single beam sonar. The Roman pier at Simonov zaliv and structures at Jernejev zaliv were documented using a multi beam sonar. The latter facilitates a more precise bathymetric system, which at small depths enables an impressive encompassment of details from which maps can then be compiled. This system certainly proffers the best solution for documenting underwater structures, however due to the advanced technology it necessitates and the fact that it needs to be mounted on a larger vessel, it is not always accessible or appropriate for use in shallow, shoreline waters, which is where the majority of underwater Roman structures are positioned. The single beam sonar, which is mounted on a smaller vessel and which allows for recordings to reach all to the coastline, is almost ideal for bathymetric measurements of the shoreline tract.

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EVALUATING THE ARCHAEOLOGICAL IMPACT ON INLAND WATERS AND WET SITES: A PROPOSAL OF INTERDISCIPLINARY METHOD. A CASE- STUDY IN THE VENICE LAGOON

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A new law has been introduced in the Italian legislation on Cultural Heritage. This obliges both the private companies and the institutions to ask either a professional archaeologist or an institute of archaeology an evaluation about the archaeological impact on the territory where a public work is in program. This law has not been already applied in every region and not all its indications are already followed. In any case, this kind of study is currently asked by the local Superintendency of the Venetian lagoon. To answer to this request a proposal of study is in experimentation, considering that the protocol provided by the law cannot be applied on underwater sites. Often the study of the archaeological impact in lagoon has to consider both underwater, wet and dry sites. The last ones are not cultivated lands and are often very populated so they are not easily “visible”. This means that ordinary surveys are seldom possible in this territory. Great attention is given to the historical sources which, from the XIII century, are quite rich and that can advise about possible archaeological presences. Special attention must be paid to airphotographs analysis and geomorphological studies.

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FRESHWATER ARCHAEOLOGY: SLOVENIAN EXPERIENCE

During 10 years of fieldwork the Group for Underwater Archaeology (from 2002 embodied within the public Institute for the Protection of Cultural Heritage of Slovenia) successfully conducted a series of preventive surveys as well as preliminary scientific investigations of underwater sites in the Slovenia's mainland rivers and lakes. The presentation focuses on three different aquatic environments, leading to particular methodological approaches. The remains of the Mesolithic hunter’s camp of Zalog near Verd (ca. 7500 cal BC), one of the oldest known sites on the Ljubljana Moor (central Slovenia) were documented and partially recovered during preventive investigations of the Ljubija Stream, tributary of the Ljubljanica River. Total station survey, combined with hand drawing, was used to record the geomorphologic features, concentrations of resedimented objects and stratigraphic/contextual evidence in the exposed part of the site. Much more difficult proved to be the research in the gorge of the Sava River between Zidani most and Krško (south-eastern Slovenia), a critical part of the major communication route toward Danubian Regions from the Late Prehistory onwards. A number of rope techniques and metal detector survey were used and combined in the rock and pebble-based riverbed with prevailing bad visibility, the substantial depths and strong currents. The research which
took place prior to power plant construction revealed a number of finds from Roman Period, middle Ages and modern times.

The survey of the planned sewage system line led to the confirmation of the supposed Bronze Age cult site on the outflow of the Lake Bled near Mlino (Gorenjska, northwestern Slovenia). Its existence was indicated by undamaged bronze sword from 14th/13th Centuries BC, discovered by an amateur diver in 1979, and strengthened by the recovery of a contemporary sword during the investigations in 2006. Favorable public response to the presentation campaign, focusing to the underwater cultural heritage in the lake, led to the launch of a financially well supported project, encompassing multi-beam sonar bathymetric measurement, magnetometer and sub-bottom profiler survey, interdisciplinary analyses of the sediment sequence and probe trenching or limited excavations of the identified archaeological sites. The presentation also addresses our experience in the effects of media presence, widening public awareness and some background issues of institutional response, professional ethics and relation towards amateur divers and private collectors.

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TRAJAN’S BRIDGE OVER THE DANUBE. UP TO DATE RESULTS OF UNDERWATER ARCHAEOLOGICAL INVESTIGATIONS

Massive remains of the approaching pears of the Emperor Trajan’s famous bridge over the Danube, built to assist the Roman invasion of Dacia, today could be seen at village Kostol on the Serbian and at the city of Turnu Severin on the Romanian side of the Danube.

In mid September of 2003, exactly 19 centuries after the building of the bridge had started, began the first phase of underwater archaeological investigations of its remains, financed by the Ministry of culture of the Republic of Serbia. The aim was to gather as much information as possible by applying non-destructive methods. Hydrographic measurements using multibeam sonar were performed in the zone of the remains on the whole section of the bridge, while visual diving prospection, video and foto documenting and geophysical investigations using motphometric, seizmometric and magnetometric methods on the water, were localised just on the Serbian side of the river. Also, experiments were made for finding out the best methodological approach for photogrammetric measuring of remains of the bridge situated in this specific underwater conditions.

This paper will present results obtained till now by using all these different non-destructive methods of investigation of this worldwide known masterpiece of Roman architecture.

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ENGAGING AUDIENCES WITH MARITIME ARCHAEOLOGY THROUGH EDUCATION

The Hampshire and Wight Trust for Maritime Archaeology have been involved in maritime archaeology education for the last fifteen years. The last three years have seen HWTMA
become a leader in maritime archaeology education with a number of highly successful initiatives designed to engage and enthuse children with the past. HWTMA have developed many educational materials, organised maritime themed events, run workshops for other education professionals wishing to use maritime archaeology as an educational tool and along the way inspired many children. Most recent work has been supported by the Aggregates Levy Sustainability Fund through English Heritage. This paper will explore the development of the HWTMA education programme and show how maritime archaeology can be used to make a real difference to the experiences of children both in school and out of school and across a broad public audience.

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PERSPECTIVES FOR DEVELOPMENT OF TEACHING OF UNDERWATER ARCHAEOLOGY AND MARITIME HISTORY IN BULGARIAN UNIVERSITIES – PRESENT CHALLENGES AND INTERDISCIPLINARY RELATIONS

Underwater archaeology has long traditions in Bulgarian archaeological studying. Western Black Sea coast has been center of many civilizations for high antiquity.

The knowledge about the maritime history and underwater archaeology is very important for every professional archaeologist.

What are the motivation and the perspective for such specialized education? Has it to be as a discipline in the Archaeology or it has to be a specialized course in a high educational level/degree – for example as a master program?

These two systems are available in the Bulgarian universities – maritime history as a discipline and as a master program. Why?

Is the university training of underwater archaeologist and maritime specialists enough for present tendencies of underwater archaeological investigation with use of interdisciplinary methods?

Which are the main universities, institutions and private organizations managing the underwater archaeological researches? What kind of difficulties do they have while they organize the cooperation – low, financial secure, material equipment, time of specialist etc?

Priority of international times – an interesting understanding.

Do any changes have to be done in education of the Bulgarian universities?