Archaeology and Underwater Cultural Resources:

Reviewing a Sea-change in Theory and Practice

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Abstract

Denmark and Greece both possess vast territorial waters that hold irreplaceable tangible cultural heritage including shipwrecks and submerged settlements. With the wide variety of archaeological material recovered – beginning with the Antikythera wreck in Greece over a hundred years ago and the Viking-Age ships at Skuldelev in Denmark over fifty years ago – datasets have increased vastly in number and type. Initially, the traditional approaches to studying datasets of these two countries focused on associating archaeological material with specific historical periods, cultural groups or historical narratives.

Touching upon select examples from Greece and Denmark, this chapter traces the general evolution of approaches to underwater cultural resources through the practice of archaeology and offers a view of possible future directions. As the talks given during the 2023-24 lecture series at the Danish Institute at Athens demonstrate, an intellectual momentum exists to pose more probing and interdisciplinary questions of underwater cultural assemblages. I pose that today the practice of underwater archaeology has reached a stage of reflection: knowledge generated from underwater cultural resources can inform and drive the broader methodological and theoretical basis in the field of archaeology, as well as natural marine science disciplines, and vice-versa.

Introduction

It is estimated that c. 70% of the globe is covered by water.[1] Within such a vast expanse, the tangible remains of evidence of human activities – cultural resources – are numerous. Lost ships alone are estimated to number around 3 million globally, and the number of other finds such as airplanes and submerged settlements are unknown.[2] About 50 years ago, when these resources first started to be investigated more scientifically, the approaches in traditional seafaring nations like Greece and Denmark focused on associating archaeological remains with specific chronologies, cultural groups or historical narratives. This is no longer a tenable or sustainable practice. A wide variety of archaeological material is now available for study and resulting datasets and their types are abundant. Resultantly, the practice of underwater archaeology has, I believe, reached a stage where knowledge generated from underwater excavations can inform and drive the broader theoretical and methodological basis in the discipline, in natural marine sciences, as well as the way data are disseminated. The chapters that are collected in this volume highlight research undertaken in these two countries that illustrate the discipline's sea-change.

In order to provide some background, I first want to give a decidedly limited overview of the develop-

1 NASA, n.d.

2 UNESCO 2007, 4.

ment of studying underwater cultural resources in Greece and Denmark – my perspective from having dipped my toes in the waters of both. In doing so, I point to a few representative projects that I believe illustrate key developments not only in these countries but the field at large. Second, I discuss what I believe are the possible future directions of the practice: the theoretical and methodological turn, including interdisciplinary engagement with natural sciences.

Some terminology

Before we set sail, however, I would like to clarify some terminology. In the last century, "ship archaeology", "underwater archaeology", and "nautical archaeology", have been commonly applied terms used in English to describe our particular field of study. In the last two decades, "maritime archaeology" and "marine archaeology" are now more common; all sometimes applied interchangeably by practitioners, a majority of the time without providing definitions.

For example, George Bass writes:

> …the study of maritime cultures by means of archaeology is not the same as underwater archaeology. … maritime archaeology is still defining itself… Nautical archaeology is the archaeology of the ship, whether the ship is on land, under water, partly on land or under water, or in some cases still afloat. …. the study of ports and harbors and those who peopled them is usually considered a part of nautical archaeology, just as it is in the broader field of maritime archaeology.[3]

Over 30 years earlier, Keith Muckleroy gave an even broader definition, one that I personally prefer:

> …the scientific study of the material remains of man and his activities at sea…maritime archaeology is concerned with all aspects of maritime culture; not just technical matters, but also social economic, political, religious, and a host of other aspects…[4]

Even within Greek and Danish, the commonly-used terms to describe our practice focus on the environment: *Η Εφορεία Εναλίων Αρχαιοτήτων* (translated as The Ephorate of Underwater Antiquities), although *εναλίων* usually is also translated as "marine" in English. The Danish *marinarkæologi* is translated as "marine archaeology".

These various terms reflect the development of the theoretical approaches to the field: some focus specifically on ships, no matter where they are found, and others focus on the environment and yet others on human activity at and by the sea. Regardless of the adjectives set before 'archaeology', the primary source is material culture. Initially, analyses of these tangible remains, and supportive data, were primarily rooted in the humanities, but as with the wider discipline of archaeology, this has expanded considerably to include natural- and social science analyses.

The terminology of the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage defines its subject matter for the purpose of the Convention as:

> 1. (a) 'Underwater cultural heritage' means all traces of human existence having a cultural, historical or archaeological character which have been partially or totally under water, periodically or continuously, for at least 100 years such as:
>
> (i) sites, structures, buildings, artefacts and human remains, together with their archaeological and natural context;

3 Bass 2011, 3-4.

4 Muckelroy 1978, 4.

(ii) vessels, aircraft, other vehicles or any part thereof, their cargo or other contents, together with their archaeological and natural context; and

(iii) objects of prehistoric character.[5]

Although Greece and Denmark have not yet ratified the Convention, my co-organisers Sanne Hoffmann, Panagiotis Athanasopoulos, Dimitris Kourkoumelis, and I chose the UNESCO definition of "underwater archaeology" for the lecture series as a way to highlight the environment in which a variety of tangible cultural resources are found.

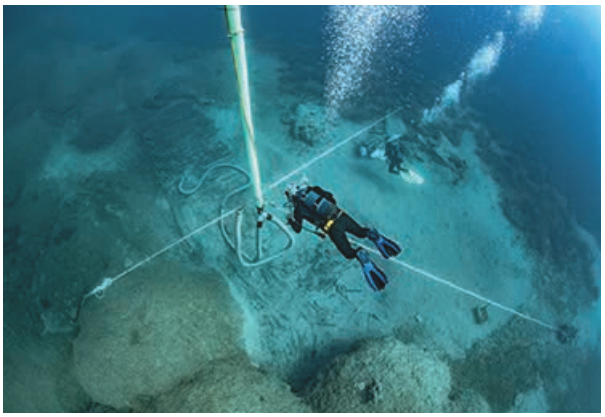

Fig. 1. General view of the *Mentor* shipwreck underwater excavation (Kythera, 1802) (Hellenic Ministry of Culture/Ephorate of Underwater Antiquities/MeSEP. Photo: Yiannis Issaris).

Earlier approaches

Sponge divers have played an important role in locating some of the earliest underwater sites in Greece. When Lord Elgin's brig *Mentor*, which was carrying off to England part of the antiquities removed from the Acropolis when it sank off the port of Avlemonas on the island of Kythera, in September 1802, sponge divers were called upon to recover the ancient cargo. The divers, using surface-supplied air, worked at depths just over 20 m to salvage material in 1802-03.[6] Since 2009, archaeological excavation of the site has been directed by Dimitris Kourkoumelis with not just an eye to documenting the remaining material culture, but also the ship's structure and the marine biological environment of the wrecking site (Fig. 1).[7]

The now well-known shipwreck off Antikythera was discovered at 55+ m depth by sponge divers in 1900, who, with the assistance of the Greek Royal Navy, recovered material culture from the site in 1900-01.[8] This mid-1st century BC wreck carried a cargo largely comprised of bronzes, marble sculptures and the Antikythera mechanism (alluded to in the most recent Indiana Jones film!), the last of which Alexandros Tourtas approaches as a graphic novel in his chapter in this volume.

The invention of the commercial self-contained, demand regulator Aqua Lung in 1943 by French naval officer Jacques-Yves Cousteau and engineer Emile Gagnan meant that the sponge divers and fishermen, who had previously been the ones finding shipwrecks, could be joined under water by explorers and eventually, archaeologists. Cousteau re-visited the Antikythera site in 1953, and subsequent investigation was carried out in 1976 by the Ephorate of Underwater Antiquities and Cousteau's diving team on board *Calypso*.[9] This campaign was engrained in popular memory to English-speaking audiences in the TV programme *The Cousteau Odyssey* as the 1978 episode "Diving for Roman Plunder".[10] Since

5 UNESCO 2001, Article 1.
6 Leontsinis 2023.
7 Kourkoumelis & Tourtas 2014; Hellenic Ministry of Culture 2021.
8 Kaltsas et al. 2012.
9 Marchant 2015.
10 Cousteau et al. 1978; the episode can be accessed on You Tube at: https://www.youtube.com/watch?v=rph2sJqsFyI, Accessed February, 2025.

Fig. 2. The excavation of the Skuldelev ships in 1962 (©Viking Ship Museum in Roskilde, Photo: Viking Ship Museum's archive).

2012, several teams have been recovering material from the deep site with the Return to Antikythera Project, using re-breathers and testing 1-atmosphere pressure suits.[11]

The invention of the Aqua Lung – or Self-contained Underwater Breathing Apparatus (SCUBA) – and the freedom it presented for discovering material culture under water also was put to use soon after its introduction in Denmark. In 1956 some worked wood – identified as belonging to a Viking ship – was discovered at a site called Skuldelev, near Roskilde, off the island of Zealand. Diving campaigns were undertaken between 1957 and 1959, led by Curator of the Medieval Department at the National Museum of Denmark, Olaf Olsen and soon-to-be Curator of Maritime Archaeology and Ships at the National Museum, Ole Crumlin-Pedersen. Although only several metres deep, the site was difficult to excavate in unclear waters. Complicating matters, the site appeared to be comprised of several ships, pilings, and large stones. In 1962, a cofferdam was built around the site and five ships, purposely sunk in the 11th century to block a navigable channel, were documented and excavated (Fig. 2).[12]

In these examples, access to the sites, although limited, was first or only gained by diving – a costly, potentially dangerous, and time-consuming way to be able to approach submerged cultural remains compared to terrestrial projects. These are still important factors in investigating underwater sites. With implementing the still-costly cofferdam solution to excavate at Skuldelev, in order to make it a relatively 'dry' site, more people could work at one time, and more work hours could be spent excavating, making it possible to complete investigations in a campaign of months instead of years.

After the 1976 season at Antikythera, investigations in Greece continued to focus on surveying and excavating shipwrecks using SCUBA. This can be

11 Return to Antikythera 2025.

12 Crumlin-Pedersen & Olsen 2002; Trakadas 2002; 2011, 41.

due to a variety of factors of some of the shipwreck sites: generally good visibility, warm waters and shallowness – that is, under 30 m, the generally safe maximum operating depth of SCUBA. Since the late 1980s, the Early Helladic wreck at Dokos (dated to 2200 BC), the Bronze Age wreck at Point Iria (dated to 1200 BC), a Classical shipwreck off the Island of Kythera (dated to the end of the 4th century BC), the Classical-period shipwreck off Alonnisos/Peristera (late 5th century BC) were partially excavated.[13] These were found due to, and subsequently investigated because of, their large ceramic cargoes (the ship at Alonnisos having carried c. 4000 amphora), which are visible and tend to survive under water as opposed to the comparatively poor preservation of the wooden hulls in the Mediterranean marine environment.[14]

Shipwrecks, however, were not just the main attraction in Greece. Remote-sensing methods were adopted early on as a proven methodology to locate and document sites, instead of simply SCUBA diving or relying solely on reports from sponge divers and fishermen. In the 1950s and 1960s, investigations of now-submerged settlements began to take place using photography, stereoscopy and geophysical (acoustic) methods – the Hellenic Federation of Underwater Activities (EOYDA), along with partners from abroad, investigated submerged settlements off the Peloponnese – Classical-period Helike and Halieis, Roman Kenchreai, Bronze-Age Pavlopetri and Roman Asopos/Plytra – and Neolithic Agios Petros in the Northern Sporades, to name a few.[15] Geophysical investigations were carried out to investigate the harbour of Gythion, the Bay of Sami on Kephallonia, and the harbour of the island of Poros.[16] Similarly, recent international interdisciplinary research projects have involved geophysical surveys of ancient port infrastructure at Kyllene and Aegina.[17] The Classical and Hellenistic slipways and ship-sheds in Piraeus were re-surveyed beginning in 2002 by the Danish-Greek Zea Harbour Project based at the Danish Institute at Athens.[18]

In Denmark, perhaps due to the situation of relative sea level change creating shifting coastlines, some of the major excavations of shipwrecks have been taken place on land. Since the 1990s, this comprises the nine Roskilde ships – including the longest Viking longship at c. 35 m, the medieval Gedesby ship, and the eight well-preserved Renaissance shipwrecks at Christianshavn in Copenhagen.[19] Underwater investigations do continue: more recent projects include the surveys of the 17th-century shipwrecks in Femeren Belt and the excavation of the Kolding cog.[20] These were all projects undertaken by museums, conducting developer-paid archaeology prior to building works; the last was a research project conducted by the National Museum's Centre for Maritime Archaeology (1993-2003). The challenges faced in conducting research when carrying out developer-paid archaeology is addressed by Klara Feidler in her chapter in this volume.

A notable project, however, that involved private citizens conducting investigations offshore includes the 19th-century English ship-of-the-line HMS *St George,* which ran aground near Thorsminde on the western coast of Jutland in 1811.[21] It was repeatedly salvaged since it sank, but in the 1980s more regular campaigns took place, which now form the col-

13 e.g., Vichou & Kyriakopoulou 1989; Phelps et al. 1999; Hadjidaki 1992; 1996**;** Kalamara 2022.

14 Kalamara 2022.

15 Shaw 1967; Jameson 1972, 195; Harding et al. 1969; Efstratiou 1985.

16 Scoufopoulos & McKernan 1975; Stavrolakes 1975; Stavrolakes & Edgerton 1974.

17 Pakkanen et al. 2010; Georgiou et al. 2021.

18 Lovén 2011; 2021; Lovén & Schaldemose 2011; Lovén & Sapountzis 2019.

19 Gøthche 2006; Bill 1998; Lemée 2006.

20 Johansen 2019; Hyttel et al. 2015; Thomsen 2011; 2012; Hocker & Daly 2006.

21 Jepsen 2019.

lection of the Strandingsmuseum St George, which Anders Jensen discusses in detail in this volume.

These projects focused on well-preserved wooden shipwrecks sometimes fully excavated and conserved, like the original Skuldelev ships were, at the National Museum of Denmark. The methods applied are time consuming, and costly – which Kristiane Strætkvern and Angeliki Zisi discuss in this volume. However, because of the excellent environmental conditions that can create optimal circumstances for the preservation of organics, there are also present in Denmark the extensive remains of submerged prehistoric sites in shallow waters. Particular mention should be given to the Tybrind Vig site (Ertebølle Culture site, c. 5300–3950 BC) excavated between 1978-87 in just 3 m of water. Several more key Stone-Age sites have been since investigated, including Tudse Hage.[22] The research of these types of prehistoric sites is touched upon in this volume by Klara Feidler and Peter Moe Astrup.

Although a very brief list, the projects that I've referenced above illustrate some overall points:

1. *Expanding site-types*: The practice of underwater archaeology doesn't concentrate solely on shipwrecks but includes port infrastructure, submerged settlements, and even airplanes. The level of preservation, due to the cold, and less saline waters of the Baltic and North Seas are quite different than what is experienced in the Aegean and larger Mediterranean basin. Given the level of preservation of wooden shipwrecks in Danish waters, there initially has been a focus on their constructional classification and place within technological developments of shipbuilding. Indeed, dendrochronology has a robust history withing Denmark and Scandinavia as a whole, as illustrated by Aoife Daly in this volume. Similarly, the early shipwreck investigations in Greece followed perhaps a Mediterranean-wide preoccupation with focusing on the cargoes of these vessels – understandably, as it is usually the more durable remains of ceramics or worked stone and not the wooden hull that is well preserved in warmer waters populated by destructive marine borers. This has impacted material cultural studies, centring on assigning specific cultural groups or historical narratives, or assisting in establishing ceramic typologies.[23]

   A transition of looking at the land-sea interface began in the early 1990s, with a theoretical approach of the "Maritime Cultural Landscape", developed first by Christer Westerdahl in Scandinavia.[24] Although not a methodology *per se,* it is a theoretical framework that, when investigating the past, considers the environmental parameters of the sea, winds, currents, and seabed. This has not only been significant when investigating shipwrecks and site formation processes under water, but it has been key for establishing paleoenvironments for a considerable number of now-submerged prehistoric settlements both around the coasts of Denmark and Greece, inhabited by populations that lived along the coastline and exploited marine resources.

2. *Developing methodologies:* Although SCUBA diving is still a technique used to access archaeological sites under water, there remain challenges, as George Koutsouflakis discusses in this volume: remote-sensing techniques like geophysical surveys are now more commonly applied for documenting archaeological sites – contributing to a reduction of people-power, sometimes cost, and providing the benefit of efficient large-scale and deep-water coverage. This is demonstrated by new documentation of submerged settlements such as Bronze-Age Pavlopetri,[25] and in this vol-

22 Andersen 2013; Gregory & Matthiesen 2023.

23 Harpster 2023, 18-22.

24 Westerdahl 1992; 2007.

25 Henderson et al. 2011.