# Archaeology:
# Just Add Water

volume II

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# Archaeology:
# Just Add Water
## Underwater Research at the University of Warsaw

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# Preface

Dear Colleagues,

It is our great pleasure to present to you the second volume of the U Supplement Series of the "Światowit" periodical. To a large extent it is based on the papers presented during the *3rd Warsaw Seminar on Underwater Archaeology*, which took place at the University of Warsaw on the 17th and 18th of January 2019.

An efficient and prompt process of editing we owe to the funding from the Ministry of Science and Higher Education, grant no. 959/P-DUN/2018.

Organization of the Seminar and publication of the hereby volume was possible thanks to the co-operation with the Polish Chapter of the Explorers Club, in particular its President, Professor Mariusz Ziółkowski, and the Vice-President, Marcin Jamkowski, to whom we are deeply grateful.

We would also like to acknowledge and appreciate the support of the University of Warsaw, namely the Vice-Rector Ph.D. habil. Maciej Duszczyk, the Dean of the Faculty of History, Ph.D. habil. Małgorzata Karpińska, Professor UW, as well as the Director's Board of the Institute of Archaeology: Ph.D. habil. Krzysztof Jakubiak, Ph.D. Michał Starski, and Ph.D. Marta Żuchowska.

The special thank you we traditionally owe to the Diving Museum by the Warsaw Diving Club, especially the Museum's Curator, Karina Kowalska, and the Club's President, D.Sc. Grzegorz Kowalski, who have been supporting our activities for many years, and constantly guide and help us in numerous enterprises.

We would like to extend our gratitude to all the Authors and Reviewers, who have been extremely diligent and punctual to keep up with our strict deadlines.

During the editing of the volume we have received invaluable consultations in the matter of ancient languages by Tomasz Płóciennik and Ph.D. Joanna Wegner, who we would also like to thank with all our hearts. The post-editing process was successful due to the the kind assistance of Ph.D. Rafał Dmowski, who we owe enormous gratitude.

The whole book was once again skilfully supervised and managed by the one and only irreplaceable Ph.D. habil. Bartosz Kontny, Professor UW. Him we would like to thank for all the advice and help with difficult choices, as well as the dedication to the organizational matters, even though the really tight schedule.

Last but not least, we would like to thank all the Readers who have reached for the hereby volume. We sincerely hope you will enjoy the outcome of our efforts and wish you pleasant reading!

*Aleksandra Chołuj*

*Małgorzata Mileszczyk*

*Magdalena Nowakowska*

# 3rd Warsaw Seminar on Underwater Archaeology


3rd Warsaw Seminar on Underwater Archaeology held on 17th-18th of January 2019
at the University of Warsaw
(photos by: M. Sugalska)

# Foreword

The volume, which we hereby present to our esteemed Readers, is the vivid proof that underwater archaeology at the University of Warsaw is doing more than well. It is the second publication in the ***"Światowit" Supplement Series U: Underwater Archaeology***, issued for now (and we hope this pace will be sustained!) with a frequency of a periodical. Within the book one might find i.a. the texts being an outcome of the international ***3rd Warsaw Seminar on Underwater Archaeology***, organized in the Institute of Archaeology, University of Warsaw. The Readers will discover here the articles presenting broad chronological and geographical range of issues: from the Prehistory until the Second World War, from Guatemala and Peru to Poland and Slovakia. We are trying to reflect this diversified character also by the choice of photographs on the cover.

The leitmotif of all this vast range of archaeological issues is **water**: realm bearing a magnificent symbolic character. Changing its colour (even during the day – from the blackness, through greyness, then blue, until the bloody-red at the sunset, turning again into black) and visibility, it has manifested also other features, which can be contemplated as signs of its animation, such as movement: horizontal (currents, waves, tides) and vertical (fluctuations of the surface). It was also the source of life quite literally, providing food and dihydrogen monoxide, essential for living.

Along with its whole mystery and dangerousness, water may also serve as a refuge (lake settlements from the early Iron Age) and a trade route, at the end of which there is a (hopefully) safe harbour. That is how underwater archaeology marches onto the land... Although, it is neither place nor time for the deliberation about the definitions of archaeology related to water environment; the discussion in this matter has lasted for many years, abound in more and more new terminological propositions, still being far from any resolutions. Whichever position we assume in the aforementioned debate, it is impossible not to notice that the symbolism, the rituals, and everyday casual activities essential for life and connected with water pass through each other, which is well-exemplified by the hereby volume. Objects lost during transportation and other kinds of exploitation of water basins, items put in the water as a matter of rituals, military aspects connected with watery environment, lake settlements, harbours, and trade – all of that and even more you can discover in *Just Add Water 2*. To all the Readers, who are going to immerse themselves into this topic, I wish a pleasant intellectual adventure and... good dives!

*Bartosz Kontny*

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# The Lower Oder: 'Gardens Full of Wrecks'. First Results of Ethnoarchaeological Research

Piotr Maliński*

**Abstract:**

*The project Underwater Ethnoarchaeology of the Lower Oder. Preliminary Research of Shipwrecks in the Selected Sections of the River is funded by the National Science Centre, Poland (grant no. 2018/02/X/HS3/00475) and carried by the University of Szczecin (West Pomerania, Poland) in the time period of 2018–2019. It assumes application of information gathered during ethnological fieldwork for the use of underwater archaeology.*

*During structured interviews with representatives of social groups related by occupation or hobby to the Lower Oder (e.g. seamen, fishermen, divers, anglers, sailors etc.) the data concerning any known wrecks is being gathered – along with the broad context: spatial (localization, position, orientation) and socio-cultural (toponymy, beliefs, convictions of types and provenience of sunken watercrafts). On this basis sections of the river were selected, with the highest number of located wreck sites. These areas were prospected with the use of side-scan sonar and an unmanned aerial vehicle (UAV). The next stage of research (for now yet unaccomplished) is the elaboration of bathymetric maps. The spatial analysis of the data gathered this way will be used to designate areas for underwater archaeological research. It will consist of making the photographic and video documentation during diving reconnaissance, and then descriptive and graphic documentation of selected wreck sites.*

*The results of the ethnological fieldwork allowed determining not only the areas where wrecks are located, but also their socio-cultural context – how they are functioning in the consciousness of people residing by the Lower Oder. On the other hand, the results of archaeological fieldwork will enable to verify the accuracy of convictions and beliefs regarding shipwrecks, and also determine the scope and methods of further research upon discovered underwater archaeological sites.*

**Keywords:**

ethnology, underwater archaeology, ethnoarchaeology, underwater archaeological heritage, wreck sites, survey, side-scan sonar, UAV, Lower Oder River, West Pomerania

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*Introduction*

The Oder belongs to the largest rivers in the drainage basin of the Baltic Sea; in terms of river basin area it ranks third (after the Neva and Vistula). Its sources are placed among the Odra Highlands in eastern Czech Republic, from where through Moravian Gate it flows onto the territory of Poland. Through Upper and Lower Silesia it reaches the Lubusz Land, where it becomes a border river between Poland and Germany. Even further, in the West Pomerania, it flows into Szczecin Lagoon, having travelled over 850 km. Its transboundary nature is a reason to call it 'a river of three nations' (**Fig. 1**).[1] The Oder Valley is not only an ecological corridor connecting different geographical regions and their ecosystems, but also an important transportation, mercantile, and tourist route along the meridian (Jankowski and Świerkosz [eds] 1995; Jirásek 2007; Marszałek 2003; 2007; Zawadka 2007). As Karl Schlögel has written, "*Oder is like an encyclopaedia. Between Moravian Gate and Szczecin Lagoon one can see almost everything that the world of Central Europe has to offer*"[2] (Rada 2009: 7).

In the lower course of the river, its valley creates a unique natural and cultural landscape. The Lower Oder splits there into two branches: the East and West Oder (**Fig. 2**). Between them multiple riverbeds exist, partially separated from the main ones, repeatedly merging and separating within the bottom of the valley (Migoń 1995: 36). This region, called Międzyodrze (literary: 'area between the Oders'), encompasses fluviogenic peat bogs and wetlands, intersected by a web of canals and oxbows (Leszczyńska 2009). At the beginning of 20$^{th}$ century it has been encircled by levees and a system of hydrotechnical devices has been built, forming three polders for agricultural use. After the Second World War the land underwent re-naturalization and now several dozens of river islands of Międzyodrze are a wildlife habitat where in 1993 a Landscape Park 'Lower Oder Valley' has been established (Jasnowska [ed.] 2002; **Fig. 3**).

The eastern branch of the Lower Oder (known as the Regalica) near Szczecin (West Pomerania, Poland) flows into transitory deltaic Lake Dąbie (Szczecin, Poland) with a surface area of 56 km$^2$. The West Oder flows through the downtown of Szczecin, where it becomes a part of the Szczecin–Świnoujście fairway, connecting seaports and shipyard industry centres located in both cities. Within the fairway, the river constitutes officially

[1] The Poles, on the other hand, call the Oder the 'princess of Polish rivers', unlike the longer Vistula River, which bears a symbolic name of the 'queen'.

[2] "*Die Oder ist wie eine Enzyklopädie. Zwischen Mährischer Pforte und Oderhaff bekommt man fast alles zu sehen, was die Welt Mitteleuropas zu bieten hat*" (trad. M. Maliński).

an area of internal sea waters. Below Lake Dąbie, both branches of the Lower Oder merge and flow further north (under the name Domiąża), passing by the seaport in Police (West Pomerania, Poland), to diverge again (into the Wąski and Szeroki Nurt) and flow into Szczecin Lagoon. This coastal lagoon is connected to the Baltic Sea by three straits (the Peene, Świna, and Dziwna), located between islands Usedom (Polish: Uznam) and Wolin and the mainland. As it can be seen, the river mouth system of the Oder is extensive and quite complex (Kowalewska-Kalkowska 2012: 17–21).

## *Oder 1945: 'the River of Blood' and the Graveyard of Ships*

At the end of the Second World War, the Lower Oder has played a significant role in plans of the Third Reich territorial defence. Along the river, the forces of Nazi Germany have established a defensive frontier, at which they intended to stop the offensive of the Red Army (accompanied by Polish Army troops) at the Eastern Front. Colonel-General Alfred Jodl, chief of the operation staff of the *Oberkommando der Wehrmacht*, has allegedly said that "(…) *the outcome of the Battle of Berlin will be decided at the Oder*"[3] (Lakowski 1995). It is where the forces of the 1st and 2nd Belorussian Front have taken their positions, and on the 16th of April 1945 started the Berlin Strategic Offensive Operation (Worobjow *et al.* 1971; Le Tissier 1996). It led to capturing the capital of Nazi Germany and its unconditional surrender. Extremely fierce and bloody battles along the Oder have resulted in tens of thousands of casualties. Therefore, in Polish literature, the Oder has been dubbed 'a river of blood' or 'a river of death' (Mechło and Mechło 2004: 76; Maliński 2017a).

The military operations have caused the Oder's bridges, ports, and shipyards to crumble into ruin, and at the bottom of the river an unimaginable number of sunken watercrafts, military and civilian vehicles, along with different kinds of equipment, armament, and accessories of fighting armies has rested. In an official report of Polish authorities from 1945 it has been stated that 933 wrecks of ships and barges have been located in the Oder; it seems that this estimation does not include wrecks of smaller boats, cars, tanks, planes etc. (Januszewski *et al.* 2001: 97). Most of them have rested in waters of the Lower Oder.

For example, the fleet that found its resting place in Port of Szczecin includes the seagoing ships,[4] floating docks, and crane vessels, icebreakers, tugboats, cutters, barges as well

[3] "(…) *Die Schlacht um Berlin an der Oder entschieden wird*" (trad. M. Maliński).

[4] Among them was the steamship *Artushof*, hit by incendiary bombs, which cargo still arouses interests of the researchers. After the war, 38 massive graphite rods were salvaged from its cargo holds, which –

as U-boats (Müller and Kramer 1994; Müller 1996: 72–73). In the mouth of the Regalica, near Lake Dąbie, the Germans have sunken the unfinished aircraft carrier *Graf Zeppelin* – – the only launched vessel of this type in the Third Reich – the steamship *Marienburg*, and a ferry (Breyer 1989; Benken 2013; Maliński 2017b: 70–71). A significantly more serious wreck barrier has been created on the East Oder, consisting of four seagoing ships, two barges, a suction dredger, and several smaller vessels, which have rested under a damaged bridge at highway Berlin–Königsberg (former East Prussia, contemporary Kaliningrad, Kaliningrad Oblast', Russia). This barricade, as it can be assumed from its German name (*Hafensperre*), was meant to block the access to the Port of Szczecin (Steinweg 1954: 104; Dinklage and Witthöft 2001: 271).

It is near the mentioned highway where the Red Army has crossed the East Oder, Międzyodrze, and the West Oder in the second half of April 1945. According to General Pavel Ivanovič Batov, the commander of the 65th Army, 15 landing crossings and 11 ferry crossings have been organized there, and 10 floating bridges have been constructed (Batow 1963: 473–515; 1966: 60). The German documents state that the artillery fire has allegedly sunk 107 landing and sapper boats in this region (Murawski 2017: 327, 405).

More than a dozen of wrecks, including the plane ones, have also rested at the bottom of Lake Dąbie. On the coast of the lake a German town of Altdamm (currently Dąbie, a city district of Szczecin) has been situated. After the war, the town has been governed by the Polish military commandant, Lieutenant Marian Wieczorek, who had been constantly writing down his memoirs in the time of his service. He later published them under a significant title *Ogrody pełne wraków* (literally: '*Gardens Full of Wrecks*', Wieczorek 1985). The title can be successfully related to the entire valley of Lower Oder in 1945.

## *Exploration of the Underwater Cultural Heritage of the Lower Oder*

Cleansing the Oder of the wrecks has lasted for many years after the war. A lot of ships have been salvaged, though some have been repaired and were deployed under the Polish civil ensign.[5] However, a large number of wrecks still rest at the bottom of the river. Some of them

– as Leszek Adamczewski (2009: 240–244, 251–257) claims – could have been originally intended to build one of Nazi Germany's nuclear reactors.

[5] For example, a German steamship *Ruhr* which obstructed the current of the East Oder upstream Gryfino in West Pomerania, Poland (Steinweg 1954: 142; Dinklage and Witthöft 2001: 338); renamed as *Ustka*, it has become the first Polish merchant ship that reached Spitsbergen (Svalbard archipelago, Norway), transporting

have become a subject of interdisciplinary research, in which the author of this text participated – as an ethnologist – in the years 2015–2016. Among others, during ethnological qualitative research (structured interviews and informal conversations with the respondents) oral information about the location and provenience of the sunken watercrafts has been gathered. On its basis, a few wrecks have been located in the Oder and its branches, and three of them have been investigated by archaeologists, identified, and then documented (**Fig. 4**). The mentioned wrecks included a nineteenth-century flat-bottomed fishing boat (Maliński, Filipowiak *et al.* 2016) and two elements of Soviet pontoon-bridge parks (NLP and N2P types)[6] sunk during the Battle of Oder in 1945 (Maliński, Krajewski *et al.* 2016; Maliński *et al.* 2018; Maliński *et al.*, forthcoming).

During the aforementioned research, it has come to light that the representatives of social groups related by their occupation or hobby to the Lower Oder (e.g. seamen and officers of inland navigation, fishermen, divers, anglers, sailors etc.) possess surprisingly abundant knowledge of the river depths and the form of its bottom. This underwater space has three aspects:

- natural (because of the plants and animals living in it);
- social (due to people exploiting it and being occasionally present in it);
- cultural (because the products of material culture can be found there).

Moreover, some regions and places are connected to popular convictions that have arisen on the basis of experience of their users, as well as beliefs based on the oral tradition (Maliński 2018: 54).

The experiences mentioned above have encouraged the author to prepare a research project dedicated to perception of the underwater space of the Lower Oder and the objects of material cultural heritage present in it. Considering the depths of the river as a sphere of cultural landscape, the author has figured that it remains not only the least accessible zone of the Lower Oder Valley, but also the least known in the scientific sense. It could be stated that distinctive elements of this underwater cultural landscape are the wrecks themselves, and some of them should also become archaeological sites, protected by Polish law. Recognition of the potential of the resources of fluvial archaeological heritage has become a main objective of the project *Underwater Ethnoarchaeology of the Lower Oder. Preliminary Research of Wrecks in the Selected Sections of the River*. The project is carried by the University of Szczecin

there in 1957 the scientists of Polish Academy of Sciences, along with materials to build Polish Polar Station Hornsund (Maliński 2017b: 71).

[6] One of these wrecks is described in another text, which has been published in this volume (Maliński *et al.*, forthcoming).

and funded by the National Science Centre, Poland (grant No. 2018/02/X/HS3/00475) as a part of the MINIATURA 2 call (Maliński 2018: 56).

*Research Method and Fieldwork Techniques*

The project assumes the use of ethnological fieldwork techniques (interviews and observations) to locate underwater archaeological sites, in order to prospect and document them. Can it be called ethnoarchaeology? The Polish ethnological dictionary (*Słownik etnologiczny*) notes that in the period of shaping of the contemporary ethnoarchaeology, at the break of fifth and sixth decade of the 20th century, it was "(…) *initially understood as a method of gathering information through ethnographical fieldwork for the use of archaeology*"[7] (Posern-Zieliński 1987: 83). During the realization of this project, the same research process is applied. It can be then considered 'ethnoarchaeological' – with a caveat that it is a return to the earlier, a bit 'archaic' concept of ethnoarchaeology, which through the recent half of a century has significantly developed and gained new connotations and a broader meaning (David and Kramer 2001). Because the research applies to the underwater archaeological heritage, a term 'underwater ethnoarchaeology' has been included in the title of the project, and it could lend the name to the research method. It may obviously seem controversial to some theorists, but it must have appealed to the scientists rating the grant proposal, if the funding for the project has been accepted.

Anyway, the ethnological qualitative research began in October 2018 with structured interviews, during which spatial (location, position, orientation) and socio-cultural (toponymy, beliefs, convictions of types and provenience of sunken watercrafts) data regarding the wrecks and their context was acquired from the respondents. On this basis, sections of the Lower Oder have been selected, in which most wreck sites are supposed to be found (Maliński 2018: 54–55). The next stage of research works, currently in progress, is the prospection of these basins with hydroacoustic method. For this purpose, a kayak equipped with multifunction chartplotter with side-scan sonar[8] is being used (**Fig. 5**). The sonar images allow verifying the gathered information, if only the wrecks actually rest in the indicated places. What is interesting, in several cases the location of completely submerged wrecks was possible thanks to aerial photos made

[7] "(…) *pojmowana początkowo jako metoda zbierania informacji przez etnograficzne badania terenowe na użytek archeologii*" (trad. M. Maliński).
[8] LOWRANCE HDS7 GEN2 Touch.

by unmanned aerial vehicle, a UAV[9] (Cheng 2016: 160–161), despite the relatively low transparency of water in the Lower Oder (**Fig. 6**).

Here appears another methodological question, concerning creation of sonar images and aerial photographs: should it be categorized as a technique of ethnological or archaeological fieldwork? For the ethnologist, observing wrecks on the screen of sonar or a tablet connected to a UAV controller is – *nomen omen* – an observation (so a basic fieldwork technique used in ethnology). Archaeologists, however, would probably recognize such technique as remote sensing – – in its 'active' (sonar) and 'passive' (UAV) form. It seems that this problem deserves a deeper methodological reflection in the future, but at the present stage the most important concept is the statement that both techniques are effective for the location of the wrecks in the Lower Oder.

In case of discovering the wrecks, the project anticipates the next stage of research (for now yet unaccomplished): basing on measurements registered by sonar bathymetric maps of the respective river sections are to be elaborated. Spatial analysis of the data from bathymetric maps will be used to designate the areas of underwater archaeological research. It will consist of making the photographic and video documentation during diving reconnaissance, and then descriptive and graphic documentation of selected wrecks. All underwater actions will be performed as a commercial service by a professional company, and the diving team is to include an archaeologist with adequate experience and qualifications.

The results of the ethnological research described above will not only allow determining the places and areas where sunken boats and ships rest, but also recognizing their socio--cultural context – how they function in the awareness and memory of denizens of the Lower Oder area. On the other hand, the results of archaeological research will allow verifying the accuracy of the convictions and beliefs concerning the wrecks, as well as determining the scope and methodology for further research upon the discovered underwater archaeological sites (Maliński 2018: 55).

It is worth emphasizing that there is neither library nor internet query among research tasks of the project. In fact, the author has already completed them before the project began. Although the source value of materials collected in this way seems to be significant, most of them refer to wrecks, which have been already raised. Nevertheless, the queries provided plenty of general, contextual, and comparative information which has been helpful during further research (and also useful for writing this text).

[9] A quadcopter DJI Phantom 4.

As to the archive query, it was not originally included in the project, too. However, when the task began several scientists independently of each other advised the author to use the potential of archive historical sources concerning wrecks of the Lower Odra. The author followed this right advice and decided to conduct such a query independently of the project's implementation. It occurred to be an interesting idea and the results obtained so far are very promising; however, collected archive data about wrecks should be verified in the field.[10]

*First Results of the Project*

Although the project has not been completed yet (neither the bathymetric maps were elaborated, nor diving reconnaissance was implemented) the first results were achieved. Basing on the data gathered partially during the structured interviews[11] and also on those acquired earlier (before the project began), several places on the Lower Oder have been selected, where the wrecks were supposed to be located. Most of them have been positively verified using side-scan sonar (or a UAV). On the taken sonar images – aside from underwater fauna, flora, and bottom sediment formation – also numerous objects resting there and diverse types of wrecks and wreck sites can be observed. It is worth noting that the quality of images sometimes allows the preliminary identification of the type of the sunken watercraft. Among them are, for example: fishing boats, passenger cars, smaller and larger river barges (with or without cargo) as well as other, for now unidentified vessels (**Fig. 7–11**). On some sonar images damage of the hulls can be seen, e.g. larger and smaller holes in the plating. On the basis of gathered data the dimensions of the wrecks can be estimated – the largest is 35 m long.

Among the other sunken objects and items, numerous car tyres can be observed (**Fig. 7**). Their presence at the bottom of the river is a phenomenon deserving closer attention.[12] On the margin, it is worth noting that car tyres seem to be a category of artefacts quite attractive for scientific analysis. That is because every one of them is a potential written source,

[10] The author would particularly like to thank Michał Grabowski, Institute of Archaeology and Ethnology, University of Gdańsk (Pomerania, Poland) for tips on relevant resources of the State Archive in Szczecin (Polish: *Archiwum Państwowe w Szczecinie*).

[11] With interview schedule consisting of 10 open questions.

[12] During the interviews performed so far information has been gathered stating that the tyres have been reused on barges as broadside fenders. As respondents claim, the chains on which the tyres were hang have deteriorated during exploitation. Motion of the hull on the water caused tearing on the links of the chain. The weight of the tyre finally broke the most severed link and the improvised fender sank in the river. This hypothesis, at first glance quite plausible, does not explain the matter of displacement of the tyres, particularly the causes of their marked concentration in some locations. What may be interesting is that these locations are not nearby any basins attended by barges.

containing very precise information regarding time and place of its origin.[13] However, the number of tyres resting at the bottom of the Oder (so far several dozen have been found) entices to apply the quantitative methods, e.g. statistical analysis, to analyze this category of finds.

As for the wrecks, it has to be noted that within the fieldwork area there are also those that partially protrude over the surface of the water; therefore no sonar is needed for their location. However, for their photographic documentation a UAV proves very useful **(Fig. 12)**. For the researcher, especially the vertical aerial photographs of these wrecks seem convenient. Such pictures can be quickly and easily taken, and their informative potential is comparable to that of the graphical documentation (top view projection), which requires long and labour--consuming measurements (**Fig. 13**).

The best known and largest wreck of this type in Western Pomerania is undoubtedly the so-called *Concrete Ship* (*Betonowiec*), that protrudes out of the water near the north coast of Lake Dąbie (**Fig. 14**). It is a reinforced concrete hull of the unfinished German steam freighter, about hundred-metre-long, built at the end of the Second World War at the shipyard in Rügenwalde (after 1945 Darłowo, West Pomerania, Poland). In that period, Nazi Germany experienced the shortage of both steel and means of marine transport – as a result, ships with hulls of reinforced concrete have entered mass production (Finsterwalder 1966; Maliński 2019). One of them was *Betonowiec*, now a characteristic element of cultural landscape of the Lower Oder Valley (Maliński 2017b: 71). Rich social context of this wreck deserves special attention – it is a well-known tourist attraction and a frequent gathering place of sailors. On the wreck itself the concerts are organized, as are trainings of water rescue services. There has even been a project proposal, so far not undertaken, of rebuilding the wreck to form the marina. At least for these reasons, the *Concrete Ship* of Lake Dąbie deserves a dedicated scientific description, which would gladly be undertaken by the author in the near future.

*Expected Results and Long-Term Objective of the Project*

After the end of the fieldwork phase and the compilation of its results the answers to several significant research questions could be acquired:

- what role do the wrecks play in the underwater cultural landscape of the examined sections of the Lower Oder?

[13] Of course, assuming that the inscriptions made by the manufacturer were not damaged during the exploitation of the tyre or as a result of post-deposition processes. It should be expected that the marks of exploitation will allow determining if the tyre was reused as a broadside fender or not.

- what is their number, size, state of preservation and displacement in the geographical space?
- do the convictions and beliefs of local people regarding the sunken watercrafts overlap with the actual situation?
- what is the cultural significance of the investigated wrecks for the regional heritage of West Pomerania and the national heritage of Poland?
- what scope and methodology should the further research of the found wreck sites have?

Measurable final effects of the project will be the map and catalogue of wreck sites of the Lower Oder.[14] They will be passed to the West Pomeranian Voivodeship Heritage Office, along with the attached proposal to acknowledge some of them as underwater archaeological sites. The method of setting the limit of proposed archaeological sites will be consulted with archaeologists and specialists from the West Pomeranian Voivodeship Heritage Office.

In addition, more detailed scientific descriptions of wrecks at the selected sections of the river will be compiled. They are supposed to be published, but providing all gathered information to the public is not recommended. It applies specifically to the accurate geographical coordinates of the wrecks. There is a justified fear that such data could be exploited by illegal explorers of underwater archaeological sites, which is not uncommon in West Pomerania. As it seems, they are organized groups of people, with their own professional diving and exploratory equipment, who obtain artefacts for their own private collections or to sell them to sometimes foreign collectors (Święch 2014: 32–33). Though it is very difficult to estimate the losses and damages to the archaeological heritage caused by the activity of those groups, their colloquial name used in West Pomerania has a disturbing tone: '*mafia wydobywcza*' (literally: 'excavation mafia'). Another problem is posed by companies raising or buying steel wrecks to sell them as scrap metal (**Fig. 13**). In the last years at least two vessels of undoubtedly significant historical value have been simply cut and sold as scrap metal in Szczecin.[15]

Publishing data regarding location of wreck sites in the Lower Oder is linked to yet another potential danger. It cannot be excluded that some of the wrecks found (especially those

[14] The catalogue will contain basic descriptive information about each wreck (location, position, orientation, depth, condition, preliminary identification of the type, presumably chronology, etc.) and its sonar image or aerial picture. In case of wrecks investigated by divers, there will be also drawings (black and white, in three casts, scale 1:100) and underwater photographs.

[15] These were: a steam-powered suction dredger *Mamut* and a barge – both of them from the beginning of the 20th century (Słomiński 2009; Jaszczyński 2011).

sunken during the Second World War) still contain dangerous cargo: weapons, ammunition, explosives or inflammable materials (Święch 2016: 154). Eventual attempts to excavate such 'underwater memorabilia from the past' can end with a tragic disaster.

Summarizing, not only wrecks should be protected from the danger of illegal explorers, but also the illegal explorers should be protected from the dangers which are still to be found inside the wrecks. The easiest way of such protection is simply not disclosing the geographical coordinates of the particular wreck sites to the public.

At the end it is worth presenting the long-term goal of the aforementioned research. It is the formulation of another, international and complex research project, encompassing all the wrecks in the entire lower course of the Oder – from the mouth of the Warta River to the Szczecin Lagoon (Maliński 2018: 55). It needs to be stressed that the requirement of formulation of such a project is specified in the regulations of MINIATURA 2 call, under which the National Science Centre, Poland has granted assets to the University of Szczecin, for the research presented in this text. The call is addressed "(…) *to researchers having the PhD scientific degree, who plan to apply for funding the future research projects in calls of the National Science Centre, and its basic purpose is financial support of research activity that serves the preparation of a future research project*"[16] (Janeczek 2018: 1). Because the author will attempt to continue the interdisciplinary research of the underwater cultural heritage of the Lower Oder, he would hereby like to invite to cooperation all the researchers interested in discovering the mysteries of the West Pomeranian 'gardens full of wrecks'.

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[16] "(…) *dla osób posiadających stopień naukowy doktora, planujących ubiegać się o finansowanie przyszłych projektów badawczych w konkursach Narodowego Centrum Nauki zaś jego podstawowym celem jest finansowe wsparcie działania naukowego służącego przygotowaniu przyszłego projektu badawczego*" (trad. M. Maliński).

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Fig. 1 – The Oder – 'a river of three nations' – on the map of central Europe. The research area is marked with a red rectangle (elaborated by P. Maliński on the basis of *Europa mapa wektorowa*, freepic.com [online, accessed: 15/07/2019], designed by Freepik, Public Domain https://pl.freepik.com/darmowe-wektory/europa-mapa-wektorowa_333750.htm)


Fig. 2 – Satellite imaging of a fragment of the Lower Oder mouth system. Visible are: Międzyodrze, Lake Dąbie, and agglomeration of Szczecin – capital of West Pomerania. *Miedzyodrze – satellite view*, NASA, commons.wikimedia.org (online, accessed: 10/02/2019), by the original uploader Pa3Widzi at Polish Wikipedia. NASA, https://zulu.ssc.nasa.gov/mrsid/ (transferred from pl.wikipedia to Commons), Public Domain, https://commons.wikimedia.org/w/index.php?curid=6261219

Fig. 3 – A bird's eye view of Międzyodrze. To the left, West Oder and a highway bridge, near which the Red Army crossed the river in the spring of 1945. On the horizon, Szczecin and Lake Dąbie are visible (photo by: P. Maliński)

Fig. 4 – Wojciech Filipowiak (Institute of Archaeology and Ethnology, Polish Academy of Science) taking photographical documentation of the wreck of a fishing boat on the bank of the Domiąża River near the village of Kamieniska (West Pomerania, Poland; photo by: P. Maliński)


Fig. 5 – Underwater prospection with the use of kayak equipped with side-scan sonar (photo by: P. Maliński)

Fig. 6 – The aerial photograph with two visible wrecks of barges in the side branch of the West Oder: one protruding from the surface of water, the other completely submerged

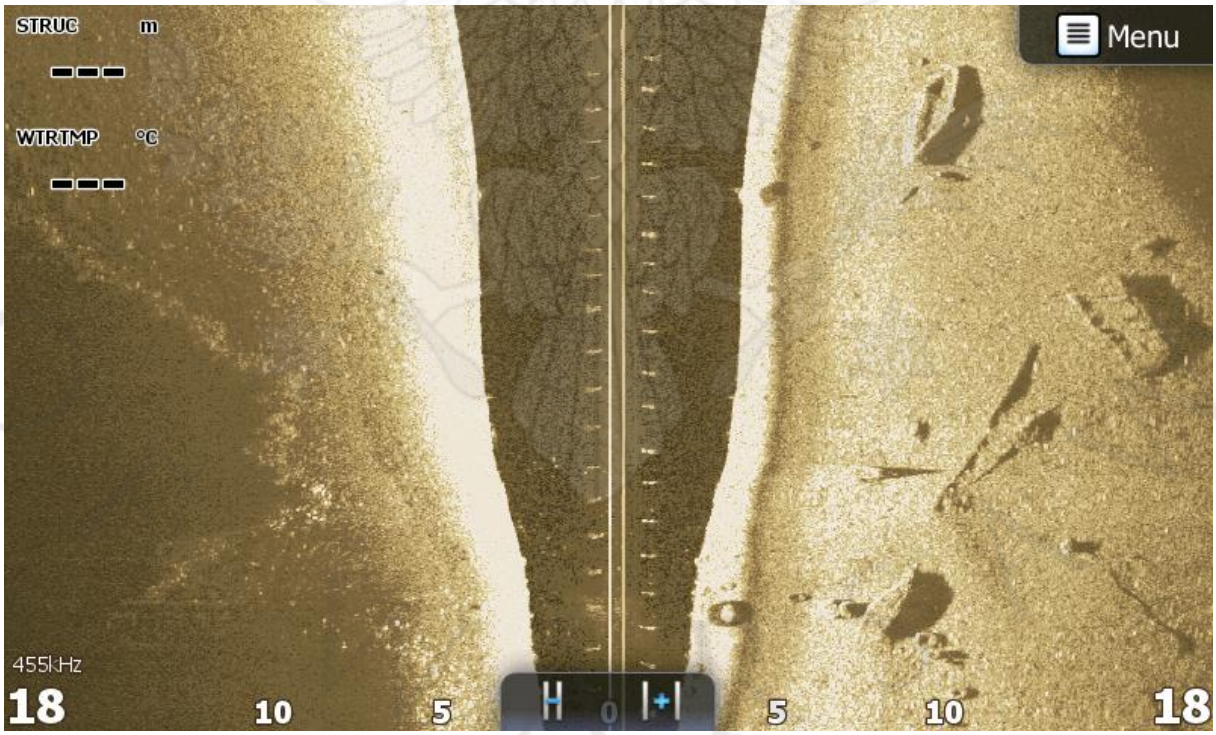


Fig. 7 – The sonar image reveals a wreck site on the bottom of side branch of East Oder. Small round objects visible on the image are car tyres (image by: P. Maliński)

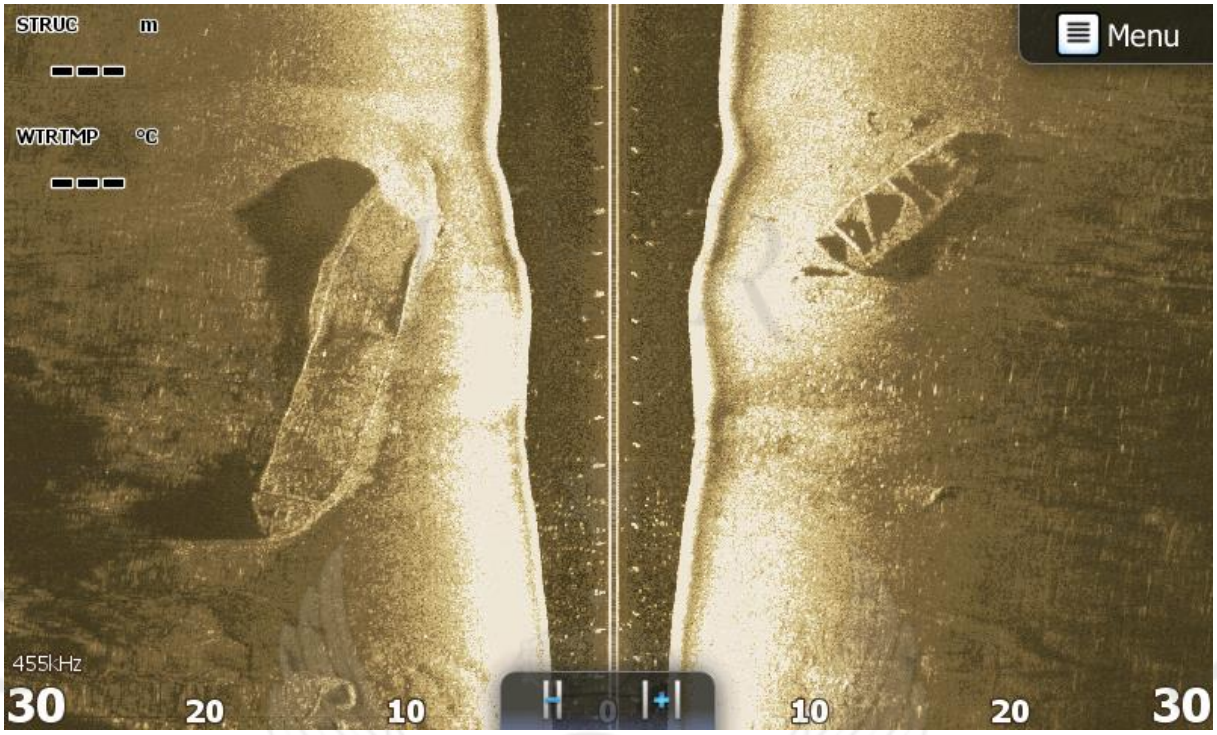


Fig. 8 – Fragment of the wreck site on the West Oder (two of all six wrecks on site visible); on the wreck to the left open deck hatch can be seen, on the wreck to the right – five bulkhead partitions (one being damaged, which might have caused the vessel to sink; image by: P. Maliński)

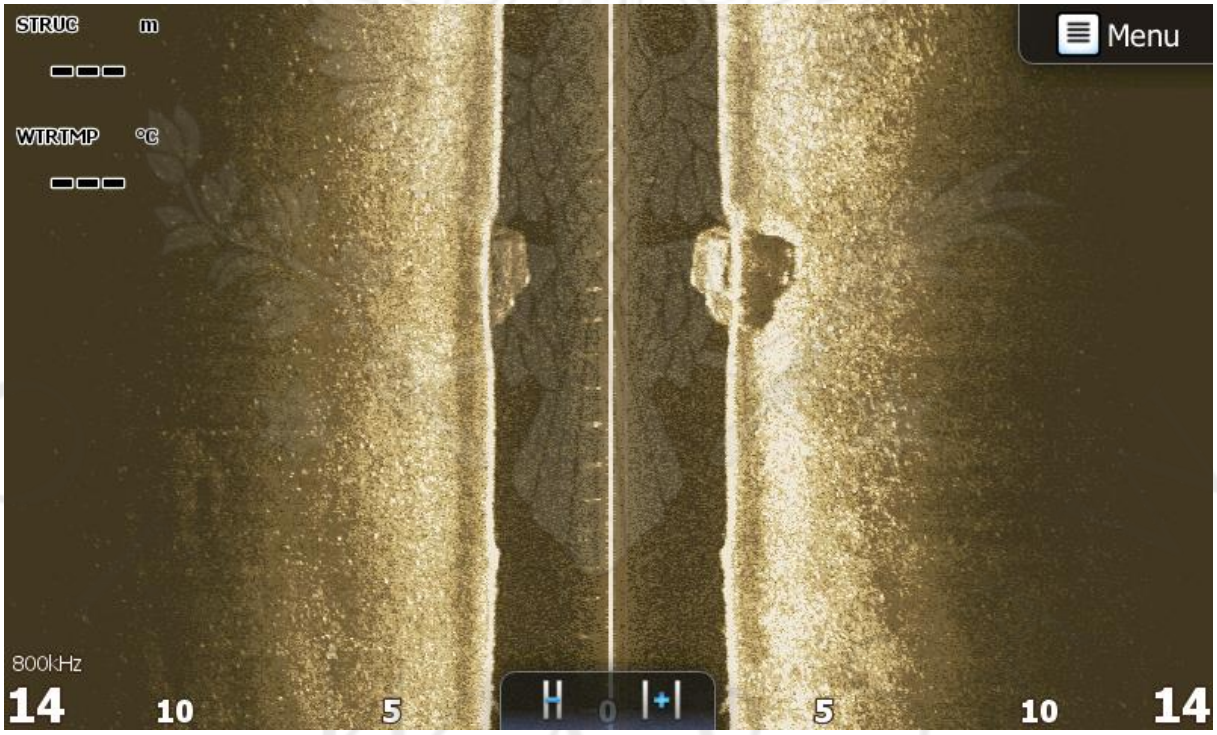


Fig. 9 – A wreck of passenger car (probably Polski Fiat 126p) at the bottom of the East Oder (image by: P. Maliński)

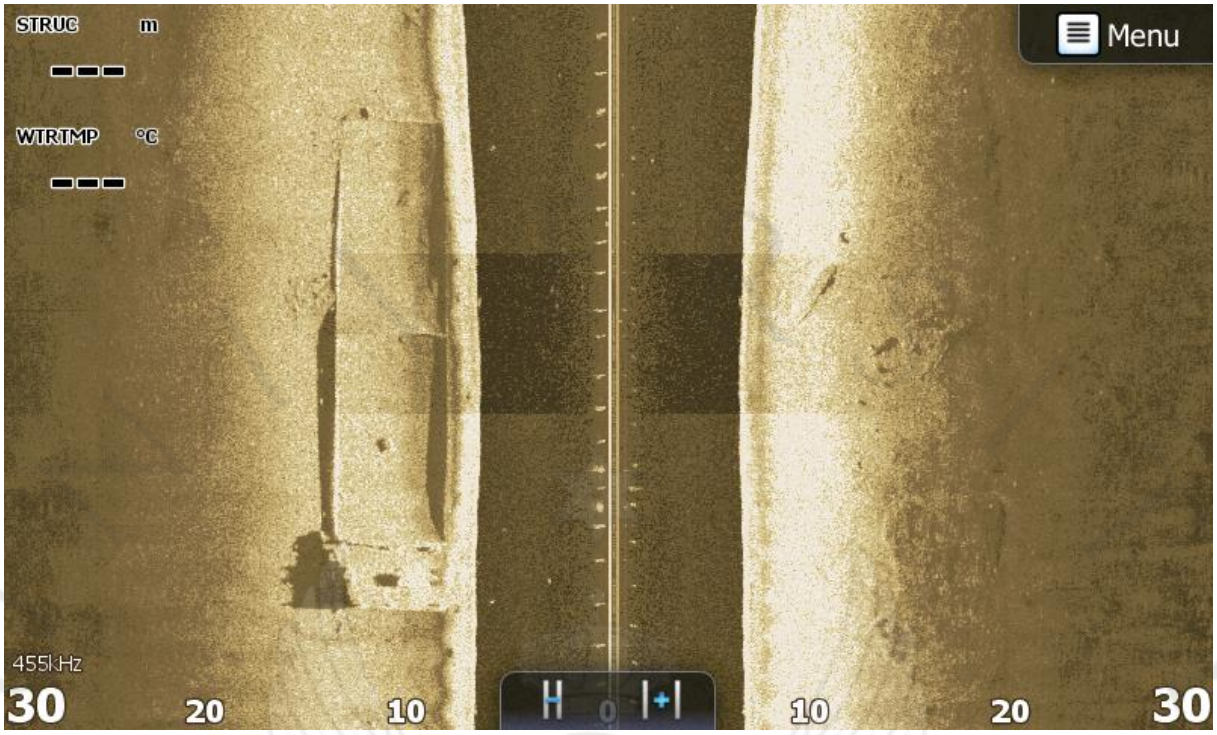


Fig. 10 – A distinctive element of underwater cultural landscape of the Lower Oder – a wreck of the 35-metre-long river barge (probably BP-400 type). On the bow deck an anchor windlass is visible (image by: P. Maliński)

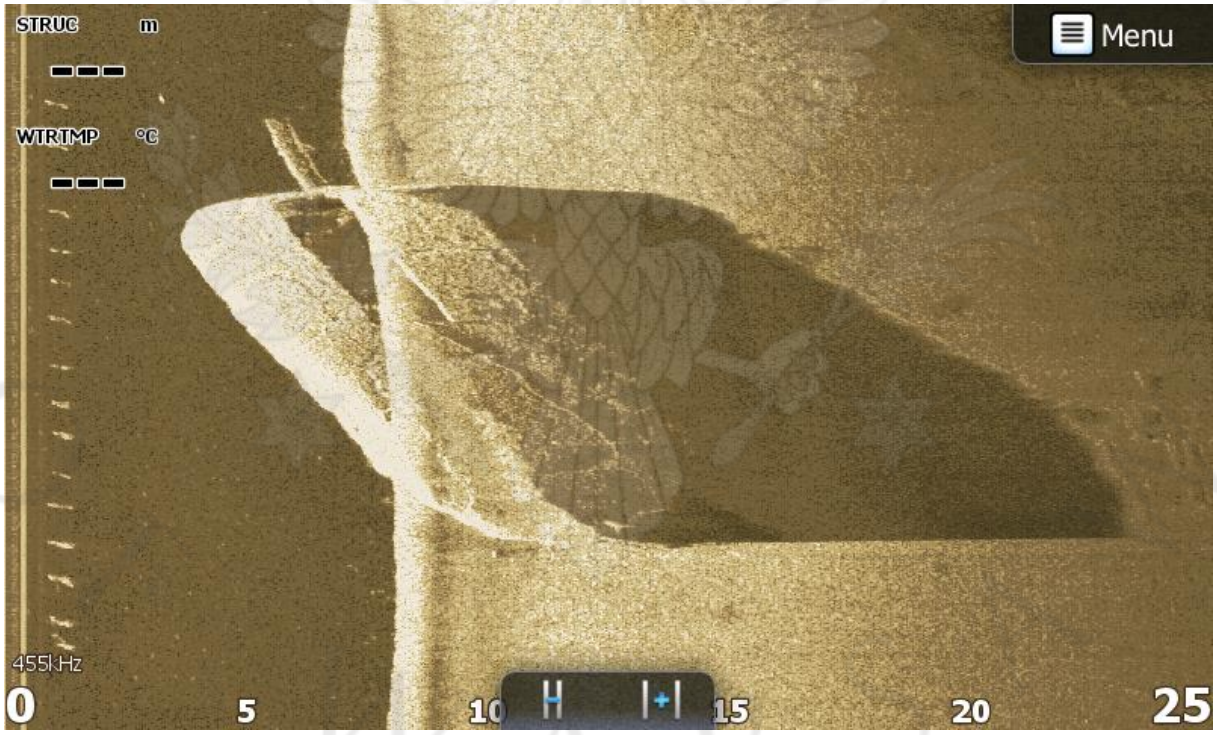


Fig. 11 – A wreck of unidentified watercraft found in the East Oder (image by: P. Maliński)

Fig. 12 – A shipwreck stranded on a shore of Lake Dąbie near the village of Lubczyna (photo by: P. Maliński)

Fig. 13 – Vertical aerial photograph of the wreck of a pontoon (partially cut for scrap metal) in side channel of the West Oder (photo by: P. Maliński)

Fig. 14 – Reinforced concrete hull of an unfinished steam freighter, embedded on the bottom of Lake Dąbie. In the background, visible are the buildings of Skolwin, city district of Szczecin (photo by: P. Maliński)

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