

# MARITIME ARCHAEOLOGY IN INDONESIA: RESOURCES, THREATS, AND CURRENT INTEGRATED RESEARCH

Nia Naelul Hasanah RIDWAN

Research Institute for Coastal Resources and Vulnerability, Research and Development Center for Marine and Coastal Resources,  
Ministry of Marine Affairs and Fisheries, Republic of Indonesia  
niahasanah79@gmail.com

## ABSTRACT

*With a sea area covering two-thirds of the country, 95,181 km of coastline, and its location at a crossroads of international seafaring and trading routes, Indonesia has a correspondingly rich maritime and underwater cultural heritage (UCH) in the form of shipwrecks, sunken aircrafts, and other maritime sites. This paper will discuss the potential of maritime archaeology in Indonesia and current issues regarding legislations in researching, preserving and managing UCH sites, and will present the various threats to UCH assessed through a number of studies in Bali, Mentawai and Natuna Islands conducted by the Indonesian Ministry of Marine Affairs and Fisheries (MMAF). It will also look at approaches to implementing integrated and comprehensive maritime archaeological research involving a wide range of relevant expertise to meet the challenges of identifying and responding to both human and natural threats to UCH. Presently, maritime archaeological research in MMAF is oriented toward marine heritage tourism. The denomination of sites as nationally protected maritime conservation areas while the same time as denominated marine-heritage tourism attraction is a crucial strategy of MMAF in the hope that these sites can be utilized as tools for poverty alleviation and the enhancement of local communities' livelihoods.*

## INTRODUCTION

Indonesia is the largest archipelago in the world with 95,181 km of coastline and 17,480 islands. Indonesia's vast territorial waters have an extension of 5.8 million km<sup>2</sup> consisting of 3.1 million km<sup>2</sup> of archipelagic waters, and 2.7 million km<sup>2</sup> of Exclusive Economic Zone (EEZ). Thus, 70 percent of the total area of Indonesia is comprised of water (Nontji 2002). These facts point to the huge potential in coastal and ocean resources including maritime archaeological resources, known as underwater cultural heritage (UCH).

According to the United Nation of Education, Science, and Culture Organization (UNESCO) Convention on the Protection of Underwater Cultural Heritage 2001, UCH can be defined as a human trace which is submerged wholly or partly under water. UNESCO (2014) stated that

submerged heritage presents immense potential for education, the gaining of knowledge, and also tourism development. As a non-renewable resource providing a unique opportunity to investigate and learn from the past, Manders (2012) also pointed out that archaeological sites including shipwrecks are seen as a resource for enjoyment and research which have to be managed in a responsible and sustainable manner. Presently, according to Indonesian ocean policy, UCH in Indonesian waters can also be seen as a resource having economic value to be utilized for marine tourism development including shipwreck diving and special interest tourism related to the ocean war graveyard pilgrimage (Ridwan 2015). Several UCH sites particularly shipwrecks and aircraft wreckages from the World War II era (WWII) discovered between Sumatra Island in the western end of Indonesia and Papua in the easternmost, can be utilized as marine resources to improve current understanding of maritime culture and history, and to increase the welfare of society when protected, preserved, and managed appropriately. In the era of regional autonomy, the shipwreck is an essential asset to promote maritime heritage tourism in the region. Furthermore, local authorities and local communities can be encouraged to establish maritime museums associated with the shipwreck located in their areas (Soesilo and Budiman 2006: 307). As such, UCH is covered within the framework of marine resources and economic activities (Dahuri 2009; Ministry of Marine Affairs and Fisheries 2009) which is one of the primary focus in the development plan of Ministry of Marine Affairs and Fisheries (MMAF).

However, a variety of natural and human threats significantly affect the sustainability of underwater sites in Indonesia. Natural factors such as extreme weather, ocean dynamics, coastal erosion, earthquake, and tsunami can be significant threats leading to the destruction or loss of UCH sites in Indonesia as occurred at *USAT Liberty* shipwreck site in Tulamben, Bali. Moreover, a human threat such as "sunken treasure" pillaging committed by salvage companies, both national and international, by local communities including fishers and wealthy residents, as well as by irresponsible government officials occurred in many areas, including for example in the Natuna and Mentawai Islands in 2010, 2011, and 2012 (see hereafter). Fishing activities, both legally and illegally, including

anchoring and ship movement, cause critical damages on UCH and its environment. Additionally, uncontrolled and mass diving tourism might have a significant adverse impact on the shipwreck and site sustainability. Therefore, law protection and enforcement, long-term preservation, regular monitoring, and sustainable utilization are necessary to overcome the issues. Additionally, an integrated and multidisciplinary research in maritime archaeology is required to provide data and information as a scientific basis for monitoring natural threats as well as controlling and preventing human threats.

#### EXAMPLES OF UNDERWATER CULTURAL HERITAGE IN INDONESIA

Based on the provisions of Indonesian Law No. 11/2010 regarding Cultural Heritage Preservation, human remains dated older than 50 years can be considered as cultural heritage. Underwater cultural heritage in Indonesia includes shipwrecks, aircraft wreckages, and other various types of underwater artefacts that date, so far, from the 7th century CE to WWII. For example, the oldest shipwreck found in Indonesia is dated to the 7th century CE and located in Punjulharjo, Rembang Regency (Priyanto 2011). The most famous and controversial shipwreck sites are the renowned 9th century CE Belitung shipwreck, also known as the “Tang Treasure Cargo” or its reconstruction named the *Jewel of Muscat* (Ridwan 2014c; Vosmer 2010), and Cirebon shipwreck from 10th century CE found in the Java Sea (Tanudirdjo, et. al. 2008). Numerous shipwreck sites dating from the WWII era have also been discovered, for example, the Dutch shipwreck *MV. Boelongan Nederland* in Mandeh Bay, West Sumatra, the American cargo ship *USAT Liberty* in Tulamben Village, Bali, the Japanese cruiser Ashigara shipwreck in Bangka Island, some Japanese shipwrecks in Gorontalo, South Sulawesi, and in the Moluccas Islands (Ridwan 2014b), some aircraft wrecks in Halmahera and Papua, such as a *Catalina* in Biak, and the *P47 Thunderbolt* in Raja Ampat Islands (Indonesian Delegates 2014; Ridwan 2013), and recently, the remains of a German U-boat were identified in Karimun Jawa, Java Sea (Harsaputra 2014). Other unidentified underwater sites with various assemblages of scattered artefacts have been found in many areas including Selayar, Mentawai, and Natuna Islands (Research Institute for Coastal Resources and Vulnerability 2012; Research and Development Center for Marine and Coastal Resources 2011; Ridwan 2011).

#### LEGISLATIONS AND CURRENT ISSUES

In Indonesia, there are some legislations regarding maritime/underwater cultural heritage protection and various related regulations that set technical implementation of research and management of UCH, marine tourism, marine conservation area, and marine environment, namely:

Law No. 32/2014 on Ocean Affairs

Law No.1/2014 on Management of Coastal Areas and Small Islands (Revision of Law No. 27/2007)

Law No.11/2010 on the Protection of Cultural Heritage (Revision of Law No. 5/1992)

Law No.17/1985 on the Ratification of United Nations Convention on the Law of the Sea (UNCLOS)1982

Law No. 32/2004 on Regional Autonomy

Law No. 10/2009 on Tourism

Law No. 4/1982 on Environmental Management

Government Regulation No. 20/1990 on Water Pollution Control

Government Regulation No. 51/1993 on Environmental Impact Analysis

Government Regulation No. 82/2001 on Water Quality Management

Ministerial Decree of Marine Affairs and Fisheries No. 17/2008 on Conservation Areas in Coastal and Small Islands

Ministerial Decree of Environment No. 51/2004 on Sea Water Quality Standard

Besides the legislations mentioned above, an Indonesian national policy also regulates the “utilization” of the valuable cargoes from a sunken ship for economic value including salvaging and auction, according to the National Committee on the Utilization of the Valuable Cargoes from Sunken Ships. This National Committee consisting of 14 ministries and state organizations including MMAF, the Ministry of Education and Culture (MEC), Ministry of Finance, Ministry of Foreign Affairs, Navy, and so forth has a role in assessing and giving an approval on salvaging activities proposed by selected commercial salvage companies, under Presidential Decree No. 19/2007, through the National Committee of Salvaging and Utilization of the Valuable Cargoes from Sunken Ships, and under Ministerial Decree No. 39/2000, through the regulations “Practical Guidance of the Salvage and Utilization of the Valuable Cargoes of Sunken Ships”. However, this commercial utilization policy is a major issue concerning UCH legislations in Indonesia and a subject for extended debates between related ministries and academicians since this policy stands against UCH protection and preservation principles. Therefore, Indonesia imposed a moratorium until present, to temporarily stop UCH salvaging activities while still in an effort to find best practices on how to balance UCH protection and management.

In addition to domestic regulations, there are two international laws that can be implemented and can be used as guidance in protecting and preserving UCH sites. Indonesia, through Law No.17/1985 on the Ratification of United Nations Convention on the Law of the Sea (UNCLOS) 1982, has ratified the Convention which states clearly at Article 149 and 303 the obligation of state parties to protect cultural remains found on the seabed. Other than UNCLOS 1982, presently the main convention to protect UCH sites is the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (henceforth the 2001 Convention). However, until today, the 2001 Convention has not been ratified by Indonesia because of the aforementioned issues regarding the “utilization” of UCH. Nevertheless, some points in the 2001 Convention

are adopted and incorporated into national laws, and MMAF along with MEC has also been trying to implement the 2001 Convention Annex, "Rules Concerning Activities Directed at UCH", as best practice guidelines to research, protect, preserve, and manage UCH sites. All principles stated in the Annex of the 2001 Convention cannot yet be fully followed due to various limitations which can be seen in many UCH projects in Indonesia.

Another major issue related to UCH legislations in Indonesia is that protection and management efforts of UCH are not yet optimal and some cases are frequently affected by the lack of law enforcement to deal with UCH looting and illegal salvaging problems all over Indonesian waters area (Djalal 2007). To date, no cases of underwater artefacts looting were taken seriously by the government and looters were able to commit their activities without restraint. Additionally, until now, Indonesia has not yet declared legally, under Law No. 11/2010, any underwater sites as an underwater cultural heritage site. It is another urgent issue that the Indonesian government should overcome shortly, because it slows and discontinues UCH protection efforts.

A UCH site can also be designated as "Maritime Conservation Area", according to the provisions contained in Ministerial Decree of Marine Affairs No. 17/2008 regarding Conservation Zones in Coastal Areas and Small Islands. Regarding the decree, a "Maritime Conservation Area" is a zone where UCH, with specific historical and/or archaeological value due to its potential contribution to research in history, science, and culture, is located and should be protected. The decree was established to follow up the Law No.1/2014 on the Management of Coastal Areas and Small Islands, which aims to regulate marine spatial planning and protection as well as management of coastal areas and small islands. Based on the decree, the protection and management of coastal, marine, and small islands' resources should be in the framework of sustainable development which aims to improve the welfare of the society.

To designate formally and legally the underwater remain site as UCH, local governments and MEC should work jointly to make an assessment based on the research and survey results undertaken by MMAF and MEC. This cooperation framework to protect UCH site by law seems not yet maximized. Law enforcement and strong commitment of the authorities are also urgently required to ensure the site sustainability.

#### RELEVANT AUTHORITIES REGARDING UCH

In Indonesia, MCE, through its Archaeological Research and Development Center, and the Directorate General of Cultural Heritage Preservation and Museum Affairs, along with every operational unit offices in the regions, has the role and responsibility to research, protect and preserve UCH sites, under Law No. 11/2010 regarding Cultural Heritage Protection. However, MMAF has also mandates to research, protect, preserve, and manage UCH sites in Indonesian waters, based on Law No. 27/2007 (which was updated to Law No. 1/2014) regarding Management of

Coastal Areas and Small Islands; Law No. 32/2014 regarding Ocean Affairs, and on the Ministerial Decree of Marine Affairs No. 17/2008 regarding Conservation Zones in Coastal Areas and Small Islands. To implement the mandates of these mentioned legislations, therefore, MMAF through its research institute and research centre has an active role in developing surveys and assessments of shipwreck and aircraft wreckage sites in Indonesian waters. MMAF also attempts to preserve and manage shipwreck sites through the Shipwreck Management Division under the Directorate General of Marine Areas Management, and to create a monitoring program of UCH sites through Directorate General of Marine Resources Control and Monitoring. It can be said that the significant difference between MMAF's and MEC's roles and responsibilities is that MMAF's focus is not only to conduct research on underwater archaeological remains itself as carried out by MEC, but also to focus studies on ocean dynamics, other physical environment conditions and changes, and marine biodiversity (for example coral reefs and fish at UCH location), and to identify factors threatening UCH sites. The MMAF research results can support the decision making of long-term UCH preservation that should be implemented by MEC.

To figure out what can threat UCH sustainability, a detailed combined research is needed, for example, to record erosion on seabed and coastal area at UCH sites, to monitor the effect of climate change causing sea level fluctuations, ocean acidification, seawater temperature changes, and to measure other physical environmental shifts in the area that might endanger the stability of underwater environment where UCH is located. Some commonly used methods include long-term measurement of coastal erosion, long-shore and of cross-shore sediment transport, benchmarking and 3D analysis of ship movement related to ocean dynamics, measurement of pH and temperature changes, and measurement of corrosion rate. These experiments also help us to recognize the impact of larger meteorological episodes of extreme weather that contribute to physical and mechanical damages indicative of disaster. This is an example of how MMAF attempts to combine various research schemes and how the UCH protection is considered as part of the development plans of the MMAF. These initiatives on research on UCH sites are also part of a broader concept of national sustainable development which aim to increase coastal communities' prosperity through sustainable shipwreck diving tourism.

MMAF intends to comprehensively integrate management methodologies in ecology, culture, and economy (Idris 2009) since maritime/underwater cultural heritage in coastal areas and small islands requires an integrated management paradigm to provide maximum benefit to the local community. To support the implementation of UCH and marine resources protection and development policies in Indonesia, some efforts are needed, such as spatial planning of coastal and small islands, integrated coastal management, establishment of maritime conservation areas to protect UCH sites,

management of small islands which includes the support of marine tourism, and community empowerment.

#### NATURAL AND HUMAN THREATS TO UCH

Globally, UCH sites are vulnerable to damage caused by nature or human factors (Flemming 2011). Natural factors in Indonesia include shoreline erosion, internal ocean waves, earthquakes, tsunamis, seismic and volcanic activities, climate change, tidal changes, ocean acidification, sea-level rise and physical environment dynamics (Husrin 2014; Indonesian Delegates 2014; Ridwan 2014a). The condition of many UCH sites in Indonesia are alarmingly precarious, and some are vulnerable to physical environmental conditions that qualify them as endangered. Current understanding of the natural threats to UCH draws upon studies of both the direct and indirect impacts of climate change, the latter including levels of humidity, salt crystallization, pests, biological effects, and chemical changes (Atmojo 2011; Satriawan 2011; Yoesoef 2011).

Primary natural threats to underwater archaeology heritage include physical-mechanical, biological, and chemical (Manders 2012). Physical-mechanical threats can result in objects being removed and displaced. Buried objects that become exposed are more vulnerable to deterioration. Surfaces of objects become eroded, and parts of the site may disappear. The biological threats to underwater sites are, for the most part, dependent on the presence of oxygen. Examples of biological deterioration include marine borers (especially *teredo navalis* or shipworm), fungi, and bacteria. Chemical processes can also affect the integrity of archaeological objects. One of the most common degradation processes is the corrosion of iron and other metals, which happen especially in oxygen rich environments. The less oxygen there is, the less corrosion occurs. An increase in ocean temperatures and ocean acidification leads to damage to shipwrecks associated with chemical and biological threats.

Extreme weather due to ocean dynamics can cause high waves and strong currents and result in physical-mechanical damage on shipwrecks, as well as increased shoreline and site erosion.

Besides natural factors, human activities also threaten the sustainable preservation of underwater/maritime cultural heritage in Indonesia (Ridwan 2011; 2014a; Susanto 2005). Various human activities that potentially damage the underwater heritage sites include looting, destructive fishing methods, anchoring, ship movement, mining operations, infrastructure development, factories, household pollution, as well as uncontrolled recreational diving tourism (Ridwan 2014a; 2014b). From the 1980s until present, the main threat to shipwreck sites in Indonesia is pillaging, treasure hunting or illegal salvaging. Investigations conducted by MMAF in some areas in Indonesia have also exposed many unlawful and destructive fishing activities, such as the use of explosives and poison that destroy marine ecosystems including developed habitats in UCH sites. Anchor turbation or ship's-anchors scraping the seabed often damage and

destroy both underwater natural and cultural heritage (Ministry of Marine Affairs and Fisheries 2012).

#### CASE STUDIES

##### Natural Threats and Uncontrolled Diving Tourism Industry in Tulamben, Bali

*USAT Liberty* shipwreck site in Bali is a good example to understand the natural threats in the form of extreme weather which significantly affects the sustainability of underwater sites in Indonesia. Strong sea currents, tides, and high waves (Figure 1) hit Tulamben beach. They can reach 3-4 m height and even destroyed some hotels' walls located right in front of the *USAT Liberty* shipwreck location. The extreme weather caused physical damage to the site and accelerated the fragility of the *USAT Liberty* wreck and its associated ecosystem. The survey conducted by MMAF found that many parts of the ship's hull were broken and collapsed during three days of extreme weather condition, on 2nd–5th July 2013 (Ridwan 2014a). Pickell and Wally (2010) claimed that coral reefs experienced stress and severe bleaching due to El Nino in 1998. *USAT Liberty* also experienced displacement, from the beach to a deeper location, and elements were scattered between 4 and 35 meters depth due to severe erosion and earthquake caused by volcanic activity when the eruption disaster of Mount Agung occurred in February-May 1963 (Husrin 2014; Ridwan 2014a). Those natural factors threatening UCH sites' stability and sustainability should be addressed since underwater sites are being damaged and lost, resulting in major impacts on the quality and quantity of available maritime heritage. Regular monitoring is required to check the changes on site, and its environment, long-term environmental measurement. Community, including dive operators and tourists, participation can help the authorities to observe new natural threats found on a site, for example, by sending to the associated government updated underwater photographs. Therefore the government has sufficient records to observe threats or changes on site stability and to consider some ways to deal with the issue.



Figure 1: High wave and extreme weather condition at *USAT Liberty* Shipwreck Site Area (Doc. Nia Ridwan 2013).

In addition to the natural threats, *USAT Liberty* is also under threat from mass diving industry. The diving tourism industry is currently growing rapidly in Indonesia, and its development is a double-edged sword. On one hand, the industry can significantly improve the social and economic welfare of the local community, but on the contrary, if it is not handled correctly, it can destroy underwater sites. As Viduka mentioned in 2006, the ravages caused by irresponsible tourist behaviour may not be as dramatic as the physical–mechanical damage resulting from extreme weather and other natural threats like tsunamis and earthquakes, but they contribute progressively to the slow destruction of underwater cultural heritage sites. The *USAT Liberty* site in Bali is an excellent example to demonstrate how mass tourism can impact negatively on the preservation of important underwater sites in Indonesia.



Figure 2: Divers at USAT Liberty area, Tulamben Beach (Doc. Nia Ridwan 2013).



Figure 3: Divers under water on USAT Liberty (Doc. Nia Ridwan 2013).

*USAT Liberty* is a WWII shipwreck which attracts many divers. The site is significant for the local villagers in Tulamben Village and also for other communities and

stakeholders in Bali Province since almost all dive operators in Bali offer a dive trip to the wreck. The excessive number of divers –typically between 200–400 people per day (Figure 2 and Figure 3) – and their impact on ship's preservation and its environment are not well understood by local governments. They do not realize that a large number of recreational divers place tremendous pressure on *USAT Liberty* and its ecosystem. Presently, the local dive guides have denounced the negative changes and damages on the *USAT Liberty* and its ecosystem related to mass diving tourism. They mentioned the disappearance of many fish species from the shipwreck site and many coral reefs are damaged and destroyed caused by the shipwreck-divers' negligence and carelessness (Pickell and Wally 2010; Ridwan 2014a).

A significant issue is that many of divers at the *USAT Liberty* site are tourists learning to dive, and who are in the process of obtaining a diving certification from a local diving operator in Bali. Novice divers who lack in buoyancy control, flap fins improperly, hold on to the hull carelessly, and attempt to penetrate the wreck, obviously contribute in destroying the fragile shipwreck, and disturb the marine life. The divers' inappropriate fin kicking agitates the sandy seabed, which results in erosion, killing local fauna and destroying sensitive coral reefs by covering them with sand (Ridwan 2014a). Moreover, the habit of most divers to feed the fish also affect the fish habits negatively, and is against the rules of fisheries conservation. Thus, it is imperative to provide and implement rules in managing tourism at the national and local level so that the shipwreck diving tourism industry will continue to be profitable while limit its harm to underwater sites. In-depth studies in the future on adverse impact of mass diving tourism and other natural threats are imperative to be carried out at this site to provide scientific basis for long-term preservation due to the significance value of this site for the communities' livelihood in this region.

#### Looting Case in the Mentawai Islands

From 2010 to 2012, MMAF collaborated with MEC to investigate illegal salvaging carried out by local fishers and irresponsible local authorities in the Mentawai Islands, West Sumatra. In December 2010 a shipwreck site was first discovered, unintentionally by the Disaster Management Task Force (DMTF) team when they were searching for tsunami victims and monitoring coral reef damage caused by earthquake and tsunami disaster hitting Mentawai on 26 October 2010. After the DMTF team left the site the local people, led by the Head of Coastal Fish Breeding Center Sikakap, Mentawai Regency, started to plunder artefacts from this shipwreck site. The looting team included this official, two staff from his office, one staff from the Office of Fisheries Mentawai Regency, and some local fishers. They lifted hundreds of artefacts to the surface. Eventually, it was revealed that a shipwreck treasure hunting company based in a foreign country funded this operation. The company appeared to be financing all the illegal salvage activities. One of the team members confessed to MMAF

that many masterpieces from this shipwreck site were taken outside the country by this foreign company (Figure 4). Further, several artifacts were distributed to various influential persons, locally and nationally, who are interested to own antiquities. Some other artefacts, especially gold artefacts, were sold to fulfil living needs of the team members, while some were artefacts "entrusted" to the local police department, but no traces of these "entrusted" artifacts have been found until present.



Figure 4: Masterpiece artefacts lifted from Mentawai site by illegal salvagers (Doc. Ade Edward 2012: Padang Express 2012).



Figure 5: Artefact fragments lifted by illegal salvagers from Mentawai site and seized by MEC (Doc. Fatwa Yulianto 2011).

The rest of the artefacts were confiscated by MEC when the investigation was conducted, and now are housed in the Batusangkar Office for Cultural Heritage Preservation, MEC. These latter-mentioned artefacts (Figure 5) are currently being analysed to determine their date, origin, and typology to assist in site identification. Further observations revealed further archaeological material, such as a human skeleton, and disparate artefacts such as a dragon glass jug, some brass weights, Chinese coins, gold coins, silver coins, gold bracelets, American dollars coins dated to 1883, Dutch East Indies government coins dated to 1858, a sleeping Buddha bronze statue, blue-white

ceramics jars, plates and vases, cannon, a bronze Buddha's head, a wooden stamp with the date 1736 written on it, bronze rings, earthenware fragments, lead shot, a gold-plated copper shield, and water kettle lead (Ministry of Marine Affairs Report 2010). Currently, the case is still being investigated by the police department and the prosecutor of West Sumatra Province. In-depth artefact identification and conservation should be continued to determine the identity of the ship. It is clear that enforcing the law, and raising community and local government awareness, are crucial to increasing attention on UCH protection in the Mentawai Islands.

#### Looting Case in Natuna Islands

Another looting case occurred in 2011-2012 in Natuna Islands, Riau Island Province. In 2011, a research team from the Research and Development Centre for Marine and Coastal Resources, MMAF, conducted a marine archaeological survey at the site of Karang Kapal Pecah, administratively located in Sepempang Village, Bunguran Timur Sub-District, Natuna Regency. The team discovered an underwater site in 17 to 19 meter depth, that included the remains of a wooden hull and some metal fragments along with a metal mast. Artefacts found included thousands of bottles (some marked "Royal Germany Spa" and "James Walworth Surrey"), along with piles of square-shaped glass, ceramic fragments, wooden fragments, metal fragments, and lead beads. There is a copper plate inscribed "Water Distilling Apparatus London" (Figure 6). These underwater remains were salvaged by local people, and MMAF was informed that lead beads in significant amounts had been recovered by local fishers over the years. The evidence of salvaging lead beads activities, by local people using household tools can still be seen at the site (Figure 7). According to the identification of the artefacts, the vessel appears to have been a steamship which sailed from or to England in the 1900s. The ship was likely carrying passengers and cargo and was probably passing by the Natuna Islands when it struck a granite rock scattered in the area, to finally sink near Sepempang Village (Ministry of Marine Affairs Report 2011).

The Karang Kapal Pecah site is important as it provides archaeological evidence for seafaring and trade in this area. In 2012, the local community reported a theft committed by a wealthy and powerful resident of the island, who had hired Vietnamese fishers to raise the artefacts from the Karang Kapal Pecah site. They lifted thousands of glass bottles along with ceramics, metal objects, and others artefacts that resulted in the massive destruction of the site. Most artefacts were removed from the site, but luckily a few were seized by the Police Department of Natuna as crime evidence of this looting activity, and some were put into the custody of Sri Serindit community museum in Natuna (Figure 8). This case is currently under investigation by the Natuna local police and MEC. Meanwhile, news of this theft has been published in a national newspaper (Kompas 2012 5 September/7).



Figure 6: Some findings from Karang Kapal Pecah Site, Natuna (Doc. Nia Ridwan 2011).



Figure 7: Household tool used by local people to lift the lead beads from Karang Kapal Pecah Site, Natuna (Doc: Nia Ridwan 2011).



Figure 8: Underwater artefacts rescued from illegal salvager, and displayed at Sri Serindit community museum in Natuna (Doc. Reportase Natuna 2014).

#### CURRENT TRENDS AND FUTURE DIRECTIONS

The case studies above regarding threats to UCH sites have been conducted by MMAF through its Research and Development Center for Marine and Coastal Resources and Research Institute for Coastal Resources and Vulnerability. In undertaking maritime archaeological research, MMAF always involved researchers or practitioners from MEC and other related organizations, for example, university, local government, NGOs, diving operators, and also local communities including fishers and community elders. MMAF started to conduct research within the field of maritime archaeology since 2000. Until 2005, the focus of the research was to identify, inventory, and map maritime and underwater cultural heritage sites in Belitung, Sulawesi Island, and Java Island. From 2005 to 2011, the focus of research has expanded not only to identify and inventory shipwreck remains but also to conduct maritime archaeological research along with the seawater environment surrounding the site. This change in the focus is aimed at developing research for marine-heritage tourism management in accordance to the policies in our ministry. We also began to use marine and geophysical technology, namely side scan sonar, echosounder, water quality checker, wave and tide gauge, acoustic doppler current profiler and others. Since 2008, maritime archaeological research is also directed to assess the significance of the site as a base for making a decision to protect the site legally and designate the site as protected maritime conservation area.

Facing the increasing need to improve the protection and preservation of the *USAT Liberty* shipwreck site in Bali, and *MV. Boelongan Nederland* shipwreck site in West Sumatra, it became critical to undertake research into the vulnerability of UCH and identify threat factors, both natural and human, in order to develop adequate management strategies. In 2012, MMAF started to conduct a major project on both sites, to determine sites' significance, values, and threats to assess the vulnerability of these sites in order to prioritise resources, since these sites are essential for the local community regarding prosperity improvement in the regions.

In an effort to fulfil mandates from our legislations, MMAF tries to use all available resources to carry out integrated and multidisciplinary research involving various fields of expertise such as physical oceanography, marine ecology, underwater archaeology, seascapes in geography (with the use of Geographic Information System software) and marine geology. The aim being to measure currents, tides, waves, and other ocean dynamics in environmental changes and extreme weather contexts; to measure the sedimentation rate, erosion, and shoreline changes in shipwreck site areas; and to measure the changes in temperature, salinity, pH, and other water quality parameters, both physical and chemical. The results of our research are expected to provide data and information about the value of UCH and the threats they are under, based on a scientific approach, and also to provide practical recommendations to related institutions, local governments

and local stakeholders responsible for managing UCH sites in their region.

The limitation in research activities and application of science and technology associated with UCH, coastal resources and their vulnerabilities result from a lack of funds, time, and human resources can be an issue occasionally. Maritime archaeology research is also intended to raise awareness among local governments, the public and other stakeholders. By involving all, we hope our research could inspire them to pay more attention to the importance of the efforts necessary to protect, preserve and develop the UCH located in their area. Therefore, the public may actively participate in preserving and protecting UCH in Indonesia. The purpose of maritime archaeology is not only to be “preserved for the records”, but also to seek solutions through developing management policies that will benefit local communities, increase local revenue, and increase foreign exchange. Planned research, protection and conservation are urgently needed in Indonesia in the interest of society at present and for future generations. The Annex of the UNESCO 2001 Convention should be applied to guide the sustainable management of our UCH resources, and Indonesia can start to consider ratifying the 2001 Convention for better protection and preservation effort.

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