

Vulnerability Assessment of USS Houston: A World War II Historic Shipwreck from the Battle of Sunda Strait

Wisnu Arya Gemilang
Nia Naelul Hasanah Ridwan
Ulung Jantama Wishu
Guntur Adhi Rahmawan

(Research Institute for Coastal Resources and Vulnerability, Ministry of Marine Affairs and Fisheries)

ABSTRACT

Sea battles between the Allies and the Japanese Navy Fleet during World War II in Indonesian waters left many physical evidences in the form of shipwrecks. One of the most well-known naval battles in the history of World War II in Asia Pacific is the Battle of Sunda Strait which caused the sinking of USS Houston and HMAS Perth along with a number of their crews in 1942. The assessment activities conducted by Research Institute for Coastal Resources and Vulnerability in 2018 show that the American heavy cruiser, USS Houston, is currently prone to various disturbances. USS Houston shipwreck site is located at 15-30 meters deep near Panjang Island in Banten Bay. Site location is influenced by sediment input from the surrounding plateau. The number of river mouths and hydrodynamic conditions of Banten Bay with its strong currents also play a role in sediment transport process which affects the visibility and transport of pollutants and marine debris found on site. Other problems include dense industrial areas in the mainland around the site, sea sand mining activities, bustling sealane activities, warships metal scavenging, and a high intensity of marine spatial utilization by local fishers regarding capture fisheries and aquaculture. All of the above conditions need to be taken into consideration for the protection and preservation of USS Houston site which is also a War Graveyard. Its future site development needs to be in line with the interests of the local fishing communities who have been utilizing the marine space at USS Houston area since long ago.

Key Words: Historic Shipwreck, *USS Houston*, Banten Bay, Site Vulnerability

List of Figures

Figure 1: USS Houston Site Location in Banten Bay. (RICRV, 2018)

Figure 2: Side Scan Sonar lines on USS Houston. (RICRV, 2018)

Figure 3: Side Scan Sonar Lines Mosaic Map of USS Houston. (RICRV, 2018)

Figure 4: 3D Bathymetry Profile of Banten Bay and USS Houston Site. (RICRV, 2018)

Figure 5: Underwater Photographs of USS Houston. (RICRV, 2018)

Figure 6: Several Threats to USS Houston Shipwreck Site. (RICRV, 2018)

INTRODUCTION

Indonesia as the largest archipelago country has extraordinary marine resources. Located in a strategic region, Indonesia is tremendously rich with cultural diversity and heritage remains (Ardiwidjaja, 2016). Indonesia seas from tenth up to nineteenth century were crowded as one of international trading routes. Several regions such as Sumatra, Java, Kalimantan, Sulawesi and Eastern Indonesia were well-known as the main trading ports proven by many underwater cultural heritages (UCH) such as shipwreck sites (Ardiwidjaja, 2017). Those shipwrecks and its cargoes are known from the 4th century until World War (WW) II period (Ariadi et al., 2018).

Based on historical backgrounds, UCH remains, and the strategic position as a maritime country, Indonesian governments declared that the future developments of Indonesia will be focused on maritime sectors (Manurung, 2018). Nevertheless, an extra concern is needed especially in preserving archaeological remains that are imperative for Indonesian history. Since 1980, illegal excavations were often occurred, consequently, many ceramics and artefacts have gone and nowadays it is sold online in various auction houses (Helmi, 2009). Those artefacts are which rarely viewed as historical objects proving that many issues regarding archaeological remains in Indonesia have not been solved yet (Mochtar, 2016).

Due to many UCH that have not been revealed, the loss of archaeological remains still occurred. In regard to historical context, Indonesia had become the witness of WWII tragedy (UNESCO, 2002). WWII was an incident that impacted globally and because of this event, Indonesia had an opportunity to be sovereign. As a result of WWII, many physical evidences such as shipwrecks and underwater archaeological remains (Koestoro, 2005).

One of the biggest sea battles during WWII was happened in Sunda Strait is *the Battle of Sunda Strait* which is very well-known and involving the Australian ship, HMAS *Perth* leaded by Capt. Hector Waller, and American ship, USS *Houston* leaded by Capt. Albert H. Rock. After a heavy battle against Imperial Japanese Navy fleet occurred for several days in Sunda Strait and Banten Bay, eventually HMAS *Perth* and USS *Houston* were sunk in the area of Banten Bay (Adhityatama, 2017). In the *Battle of the Sunda Strait*, HMAS *Perth* and USS *Houston* sank along with two Japanese ships. The number of USS *Houston* victims killed were 696 people, and 368 survivors. Meanwhile, the victims of HMAS *Perth* were 375 people died, and 307 survivors.

Those shipwreck sites nowadays are quite popular for local and international divers and also the visitors who are the family of the victims of the *Battle of Sunda Strait*. The divers can easily visit these sites and do diving because HMAS *Perth* and USS *Houston* location is quite close to Panjang Island. Moreover, the significant historical context which related to the history of WWII becomes a specific reason for international tourists to visit and dive. To protect those sites, the local and central governments have declared HMAS *Perth* as a Maritime Conservation Area (MCA) in 2018, and declaring USS *Houston* as MCA is still on-going process.

Today, some threats to the preservation of USS *Houston* and HMAS *Perth* sites are identified both by nature or mankind activities. Various vulnerability factors threatening the sites are necessary to be studied as a basis for further protection and preservation efforts. Furthermore, those archaeological remains are non-renewable, finite, and fragile. To preserve UCH, UNESCO promotes the convention declaration in 2001 about UCH protection which one of its principals is in-situ preservation (O'keefe, 2014). Nevertheless, before deciding the efforts to preserve USS *Houston*, an integrated study regarding the site conditions, and threat factors is essential. This article will discuss about vulnerability assessment of USS *Houston* shipwreck site and its threat factors.

SITE LOCATION AND FIELD OBSERVATION

USS *Houston* shipwreck site is located in Banten Bay and close to Panjang Island (Figure 1). The distance from Karangantu Port and Banten River is approximately 8.65 miles. Underwater mapping to verify the exact position of this war ship was conducted on April 18th 2018.

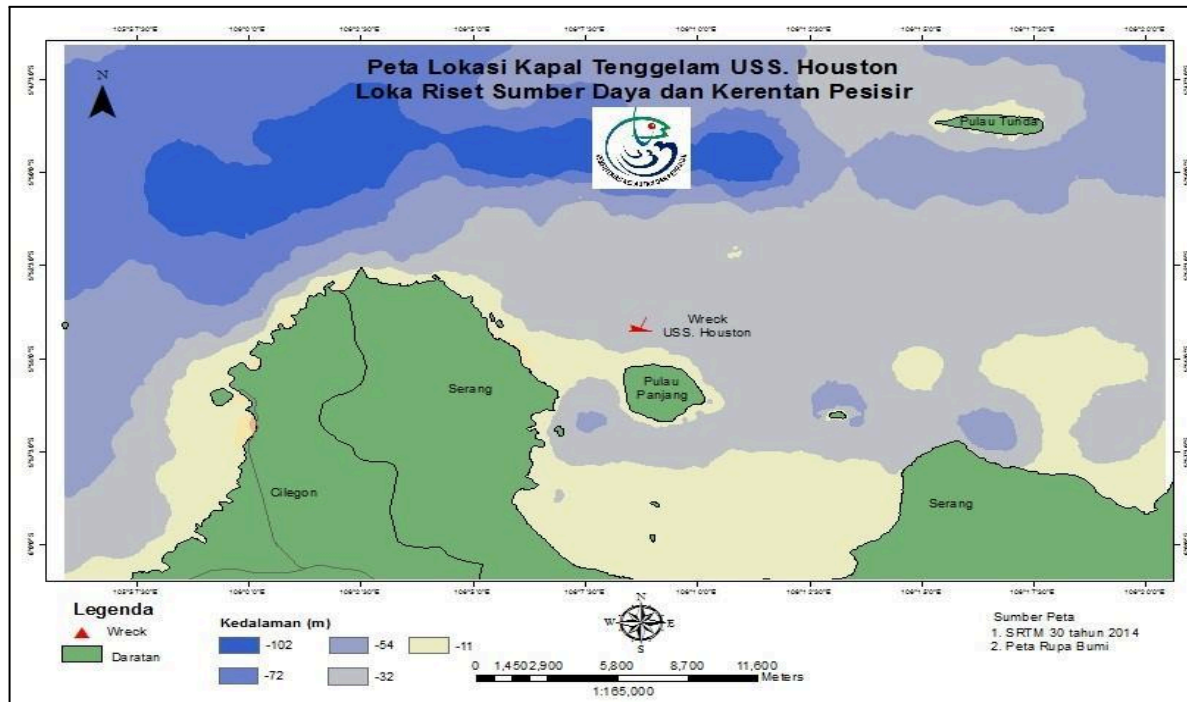


Figure 1: USS Houston Site Location in Banten Bay. (RICRV, 2018)

An integrated study is employed to identify threats that make this site prone to the dangers and need to be preserved. Many aspects are considered such as oceanography parameters, bathymetry survey, water quality, as well as geophysical survey. By utilizing acoustic instruments, an underwater survey to reveal shipwrecks is precisely done (Gron et al., 2015). Side Scan Sonar was used to figure out the shipwreck conditions. Furthermore, diving activities were also conducted to record the USS *Houston* and underwater artefacts found. Marine environment observation and social-economic-cultural analysis due to the presence of local communities' activities were also carried out for the preservation and development assessment.

USS *HOUSTON* RECENT CONDITION BASED ON *SIDE SCAN SONAR* AND DIVING ACTIVITIES

Searching for the exact position of USS *Houston* is quite arduous due to the turbid water condition and miscellaneous information regarding its position. After several trials and diving activities, the exact coordinate is finally determined. Side scan sonar (SSS) is used to scanning the seafloor with as many as 23 lines planned within the area of 1.1 km with a distance between lines about 50 meters (Figure 2). Of SSS result, it is known that USS *Houston* lies between 15-26 meters depth beneath the surface.

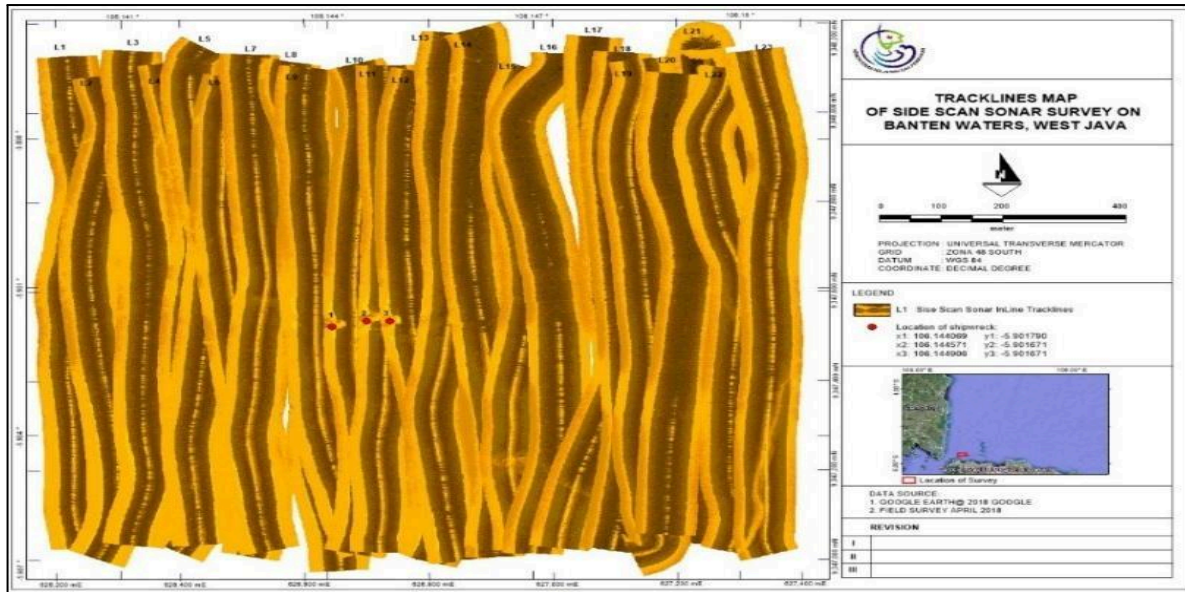


Figure 2: Side Scan Sonar lines on USS Houston. (RICRV, 2018)

Some anomalies were identified between line 11 to 15. Because of the vagueness of the position, the shipwreck position is too far from line 1 where the SSS survey was started. These anomalies are interpreted as the bow of USS *Houston*. Based on the diving result, the bow has been destroyed and collapsed. Moreover, SSS result also illustrates that the seafloor sediment type is silty sand. Mosaic map created from SSS lines shows a quite long anomaly formation with approximately 215 meters long and ranging from 10-40 meters wide (Figure 3). It can be identified that the two parts of anomaly indicate USS *Houston* shipwreck formation. The first anomaly shows a wreck with the length of 70 meters and width of 20 meters.

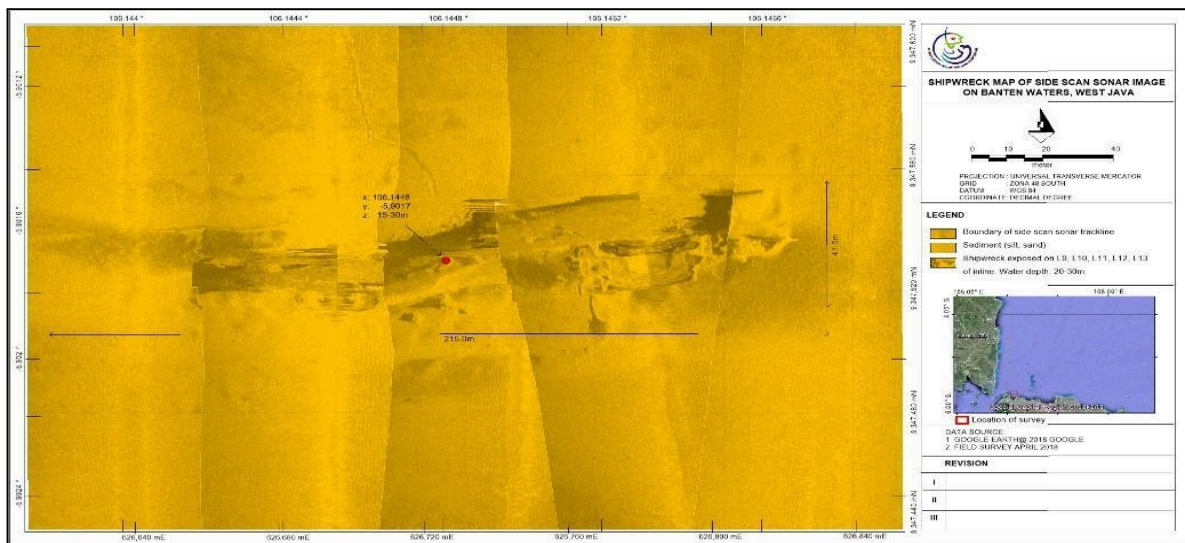


Figure 3: Side Scan Sonar Lines Mosaic Map of USS Houston. (RICRV, 2018)

Side Scan Sonar is an instrument having ability to detect the image of seabed relief in 2-dimentional form but unable to detect sediment materials on the site precisely. However, of SSS image, each material on the seafloor reflects different characteristic such as smooth hue which can be interpreted as a sandy silt to silty sand

sediment material. Those reflections are applicable for detecting the environment of USS *Houston* which is covered by coral reef ecosystems.

Based on diving activities, it can be known that USS *Houston* has become an artificial reef consisted of many types of hard and soft corals. Corals can refract the sonar from SSS so that the bias data cannot be avoided. Furthermore, to gain a detail result in 3D, it is necessary to combine SSS survey with Sub Bottom Profiler (SBP).

SEAFLOOR MORPHOLOGY AND BATHYMETRY PROFILE IN THE USS *HOUSTON* SHIPWRECK SITE

Based on the result of bathymetry survey, USS *Houston* is located in 15-30 meters deep in the northern Panjang Island (Figure 4). The depth in the northern Banten Bay ranged from 0-70 meters, while in the bay mouth ranged from 10-35 meters (Rahmawan et al., 2017: 49). Bathymetry and morphology profiles of site location are significant to support the condition and shipwreck existence. USS *Houston* which lies in in shallow water area makes sediment resuspension in that area is frequently occurred. It is espoused by sand mining in Banten Bay and resulting in elevated turbidity (Figure 4).

In general, the preservation of USS *Houston* site is influenced by a quite large sediment intake from the surrounding plateau which results in higher sediment concentrations in the bay area. In addition, many estuaries located in Banten Bay, resulting in high cohesive sediment concentrations in the area of USS *Houston* site and also causing unclear visibility on USS *Houston* site.

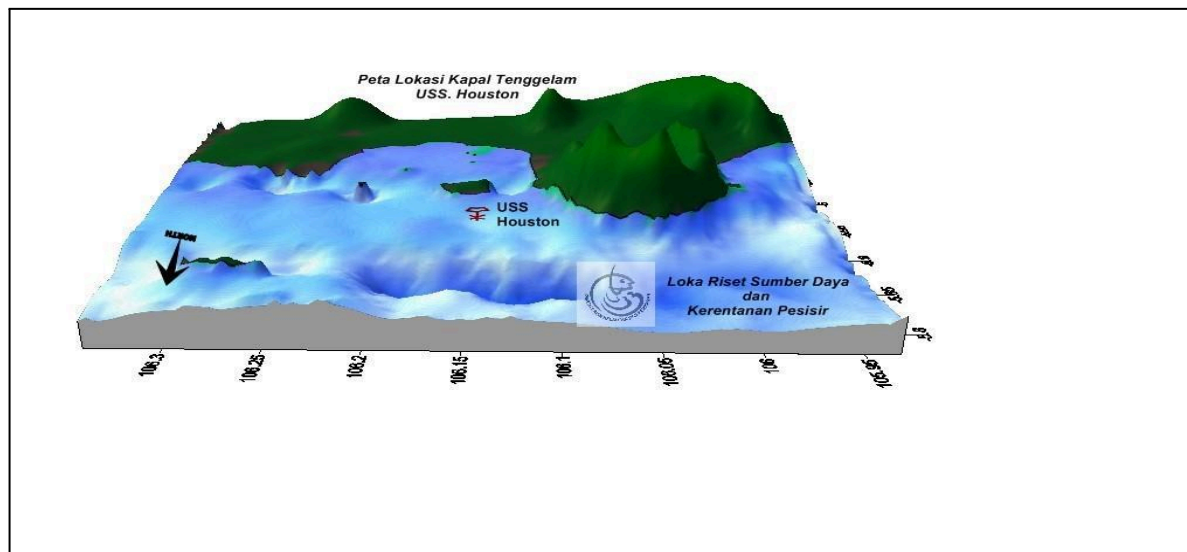


Figure 4: 3D Bathymetry Profile of Banten Bay and USS *Houston* Site. (RICRV, 2018)

HYDRODYNAMICS OF USS *HOUSTON* SHIPWRECK SITE

The hydrodynamic condition within Banten Bay indirectly influences the condition of USS *Houston* and mainly has a role in triggering sediment transport and marine debris distribution that nowadays becomes the trending issue in Banten coastal waters. Banten Bay is directly bordered by Sunda Strait which is one of Indonesian through Flow (ITF) gates resulting in strong current in surroundings waters (Wisha et al., 2015: 104). Due to those condition, it is recommended for all divers to have an advance diving certification before exploring USS *Houston*.

Due to the semi-enclosed water area of Banten Bay, pollutants and marine debris tend to be accumulated within the bay which may hamper USS *Houston* site preservation and utilization in the future as one of diving site in Banten Bay as well as a protected area or Maritime Conservation Area.

RECENT CONDITION OF USS *HOUSTON* SHIPWRECK SITE

The hull of USS *Houston* is still intact with the whole body. However, USS *Houston* is clefted into three main parts. The machine room and scrap metals seem like fall to pieces. Of diving survey, the team could observe some parts of the ship, mortar bullets that are probably still active, and a stern gun. There are many holes on the body ship which looked like bullet or torpedoes marks. Numerous bullet casings and ammunitions were found scattered on almost all parts of the ship which observed by the team (Figure 5). The propeller of the ship is not found yet. The damaged stern is caused by the Japanese torpedo during *the Battle of Sunda Strait*. Furthermore, the diving team could not find the stern identified by Side Scan Sonar because of the strong sea current which made the diving team could not reach the stern part which located beneath 30 meters.

At the location of the wreck of USS *Houston*, many fishing nets were found scattered throughout the shipwreck. The presence of fishing nets of various sizes underwater can be understood because USS *Houston* becomes a huge artificial reef and a favorite fishing location of local fishermen in the Banten Bay area for a long time. Until today, many fishing boats do fishing activities on daily basis on the USS *Houston* site and large number of fish catches from this shipwreck site.

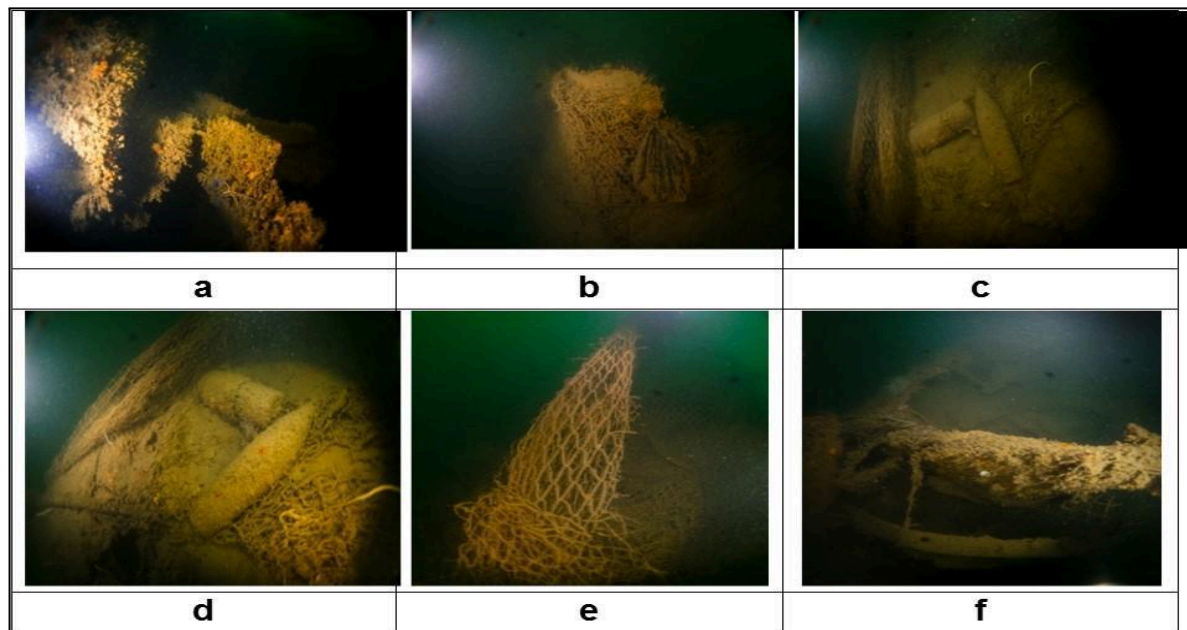


Figure 5: Underwater Photographs of USS *Houston*. (RICRV, 2018)

THE VULNERABILITY OF USS *HOUSTON* SHIPWRECK SITE

The Preservation and protection toward the USS *Houston* Shipwreck site are facing several threats caused by nature or anthropogenic. The main issues are sedimentation, marine debris, coastal development, and industrial sector (Simanjuntak et al., 2012; BAPEDAL, 2006).

Grain size characteristics of seafloor sediment are used for interpreting the distribution and mechanism of transport sediment in the area (Korwa et al., 2013). Generally, the sediment settled in Banten Bay is strongly

influenced by current features which is shown by coarse particles. Moreover, Banten Bay also has many estuaries which in turn to trigger sediment accumulation within the bay. During the high tidal conditions, sea current flows tend to be weak in the estuary so that a mixture of sea-sourced sediment and river-sourced sediment takes place resulting in a coarse material. In contrast, during the low tidal condition, the weaker river flow which induced fine sediments in the form of mud and clay will be deposited. Thus, Banten Bay tends to contain silt and sandy silt sediments predomination which has a role in triggering sedimentation issue including in USS *Houston* site.

Another problem in Banten Bay region is spatial planning of Serang Regency. This area is prone to geological disaster and abrasion. Nevertheless, since 2003 until present, the permission of mining in Lontar Village is still running. As a result, environmental degradation is undoubtedly avoided in Banten Bay which may cause harm to USS *Houston* site.

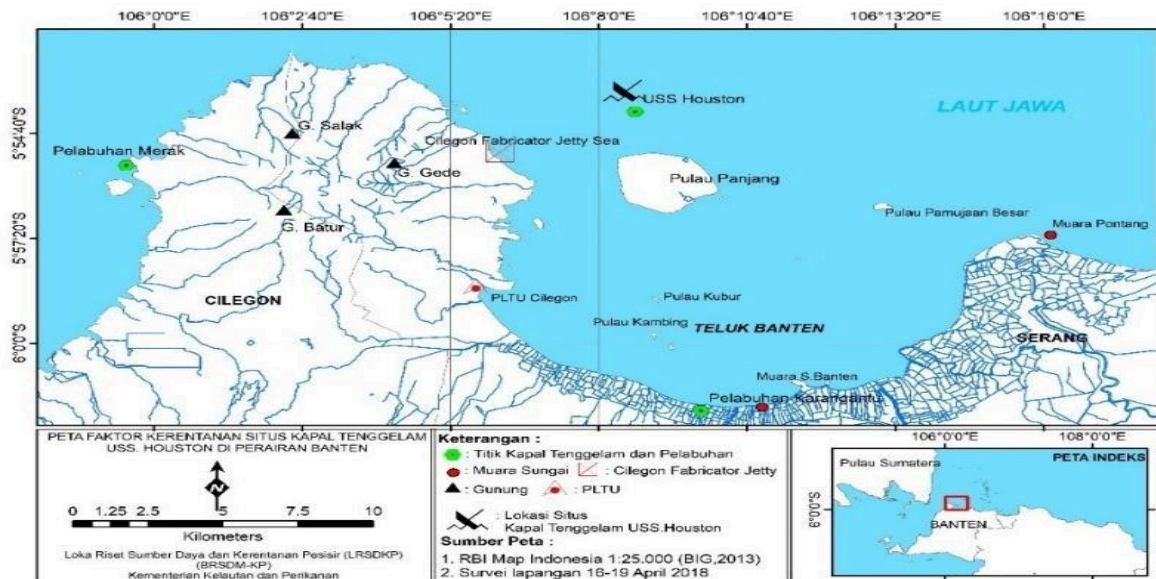


Figure 6: Several Threats to USS *Houston* Shipwreck Site. (RICRV, 2018)

Besides the natural factors, another issue is yielded from industrial sectors. Bojonegara subdistrict which located in the northwestern USS *Houston* site has many manufactories with around 1.372 hectares in the coastal area. The manufactures produce basic metals, chemical, shipyard building, engineering and design. These industrial activities release wastes toward Banten Bay including to USS *Houston* site (BPLH, 2011). Based on water quality assessment in the surrounding USS *Houston* site, it is considered that Banten Bay waters is not recommended for marine tourism. The water quality assessment is based on the Standard of Sea Water Quality determined by the Indonesian Ministry of Environment in 2004. The pollution within Banten Bay is the main issue nowadays which also may threatens the USS *Houston* shipwreck site preservation.

CONCLUSION AND RECOMMENDATION

Nowadays, USS *Houston* shipwreck site has not been officially declared as underwater cultural heritage and Maritime Conservation Area (MCA) by Indonesian government. The preservation of this site is threatened by mankind activities and environmental degradation such as marine debris, pollution, sand mining, sedimentation, and shipping-lane activities. There are three main fractured parts of USS *Houston* which

collapsed to the seabed. Moreover, many underwater objects on USS Houston have not been identified yet. The turbid water condition and the Sunda Strait strong currents require an advance diving certification for tourist divers to explore USS *Houston* shipwreck site.

Bibliography

- Adhityatama, S., 2017. The USAT *Liberty* site dive track model: Study of management of underwater archeology resources. *Forum Arkeologi*, Vol. 28 (3): 165-176.
- Ardiwidjaja, R., 2016. Maritime culture heritage preservation: the attraction of traditional boat as traditional cruise. *Kalpataru*, 25 (1): 65-74.
- Ardiwidjaja, R., 2017. Preservation of underwater cultural heritage: shipwreck as a diving attraction. *Amerta*, Vol. 35(2): 133-148.
- Ariadi, A. P., Prayitno, B., & Wihardyanto, D., 2018. Analysis of Tourism Products of Underwater Sites as One of Special Interest Tourism in Karimunjawa National Park. *Lantang*, Vol. 5(1): 45-54.
- [Bapedal] Badan Pengendalian Dampak Lingkungan Provinsi Banten, 2006. Review of problems and handling of water resources, forests and coastal and marine areas. *Laporan Tahunan Keadaan Lingkungan*. Serang. Banten
- Grøn, O., Boldreel, L. O., Cvikel, D., Kahanov, Y., Galili, E., Hermand, J. P. & Reitan, M., 2015. Detection and mapping of shipwrecks embedded in sea-floor sediments. *Journal of Archaeological Science: Reports*, Vol. 4: 242-251.
- Helmi, S., 2009. Potential underwater archaeological remains in sumatra island waters. *Amoghapasa*, Vol. 13: 3-5.
- Koestoro, L. P., 2005. Underwater archaeological studies in Indonesia possibilities and expectations. *Berkala Arkeologi Sangkhakala* Vol. XV (1): 31-46.
- Korwa, J. I. S., Opa, E. T., & Djamaludin, R., 2013. Characteristics of litoral sediments at Sindulang Satu beach. *Journal Pesisir dan Laut Tropis*, Vol. 1 (1): 48-54.
- Research Institute for Coastal Resources and Vulnerability, 2018. Research on assessment of potential maritime conservation areas and determination of underwater remains appointment locations in Banten. *Final Report*. Edited by Nia Naelul Hasanah Ridwan. Padang: RICRV.
- Manurung, H., 2018. Indonesia towards a World Maritime Axis. *Prosiding Seminar Nasional Pakar*: 147-152.
- Mochtar, A. S., 2016. In-Situ preservation as a strategy in managing underwater cultural heritage in Indonesia. *Kalpataru*, Vol. 25 (1): 53-64.
- Nugroho, S. H., & Basit, A., 2014. Sediment Distribution Based on Grain Size Analyses in Weda Bay, Northern Maluku. *Jurnal Ilmu dan Teknologi Kelautan Tropis*, Vol. 6 (1): 229-240.
- O'keefe, P. J., 2014. Shipwrecked Heritage: A Commentary on The UNESCO Convention on Underwater Cultural Heritage. *Institute of Art and Law*.
- Rahmawan, G. A., Husrin, S., & Prihantono, J., 2017. Bathymetry changes analysis in serang district waters caused by seabed sand exploitation. *Jurnal Ilmu dan Teknologi Kelautan Tropis*, Vol. 9 (1): 45-55.
- Simanjuntak, B. L., Handoyo, G., & Sugianto, D. N., 2012. Bathymetry analysis and tidal components for determination of the additional depth of a wharf pool in Tanjung Gundul Bengkayang, West Kalimantan. *Journal of Oceanography*, Vol. 1(1): 1-8.
- Simanjuntak, M., 2012. Dissolved oxygen and apparent oxygen utilization in Klabat Bay Waters, Bangka Island. *Ilmu Kelautan: Indonesian Journal of Marine Sciences*, Vol. 12 (2): 59-66.
- UNESCO (United Nations Educational, Scientific and Cultural Organization), 2002. *Convention on the Protection of the Underwater Cultural Heritage*. Paris: UNESCO.
- Wisha, U. J., Husrin, S., & Prihantono, J., 2015. Hydrodynamics Banten Bay during transitional seasons (August-September) (Hidrodinamika Perairan Teluk Banten Pada Musim Peralihan (Agustus-September)). *Ilmu Kelautan*, Vol. 20 (2): 101-112.

Biographies

Wisnu Arya Gemilang is a geologist graduated from the Geological engineering Department of Jenderal Soedirman University in Purwokerto, Central Java, Indonesia. Nowadays, He works as a scientist in marine geology-related fields under the Ministry of Marine Affairs and Fisheries. Together with research team from Research Institute for Coastal resources and Technology (RICRV), he conducted some maritime archaeology research projects. One of which is a study to reveal the spice routes in Ternate and Tidore, North Moluccas which was the first voyage to prove that the earth is round and where the Trinidad shipwreck was possibly sunk. He had completed his excavation training in Thailand in 2015 that enhanced his diving skills. During his tenure in RICRV he collaborated on more than 30 publications in the form of journals, books, magazines, and

frequently presented his research in the national and international conferences. Moreover, he is responsible for identifying and assessing the vulnerability in a shipwreck site that is crucial to be concerned as an effort to do preservation.

Ulung Jantama Wisna is an Oceanography Research Scientist who has been working in the Ministry of Marine Affairs and Fisheries since 2015. He graduated from Oceanography Department of Diponegoro University in 2014. Until present, he has contributed in several research projects related to underwater archaeology sites in Indonesia funded by Ministry of Marine Affairs and Fisheries. In 2015, He has completed a summer school which organized by Institute of Archaeology and ICOMOS-ICUCH experts in Hoi-An City, Vietnam which introduces him with a knowledge about maritime archaeology. His research interest is an applied oceanography fields, including maritime archaeology, ocean modelling, and marine pollution. He has achieved 67 marine-related publications in the form of books, journals, proceedings, online news. Having a participation in conference and symposium is frequently done by him. Furthermore, he used to be an instructor of ocean modelling training in some universities in Indonesia.

Nia Naelul Hasanah Ridwan is a Maritime Archaeology Research Scientist working since 2005 in the Indonesian Ministry of Marine Affairs and Fisheries, and a Head of the Research Institute for Coastal Resources and Vulnerability. She studied Archaeology in Gadjah Mada University, and Environment and Heritage in James Cook University. Nia's interests include the relationship between Underwater Cultural Heritage (UCH) and the environment, UCH community engagement: threats to UCH; maritime museum affairs; illicit trafficking of underwater remains; and sustainable marine-heritage tourism. She has led a number of marine archaeological research projects throughout Indonesian Waters. Nia had attended some UNESCO Courses on UCH, ICCROM - SEAMEO SPAFA – Getty Foundation training courses, The Netherlands Cultural Heritage Agency Course on Sustainable Conservation of Cultural Heritage, ICCROM Forum, UNESCO-University College London Expert Meeting on the Serial Nomination of UNESCO World Heritage of the Maritime Silk Routes, and UNESCO-French Government International Meeting on Underwater Cultural Heritage. For her dedication, The President of Republic Indonesia awarded her the *Satya Lancana Wira Karya* Award in 2015. Nia has published her research in 69 publications including books, journal papers, proceedings, and articles in magazines and newspapers, and also published her research results in numerous national, regional, and international conferences.

Guntur Adhi Rahmawan is Geomatics Research Scientist working in Indonesian Ministry of Marine Affairs and Fisheries since 2015. He was graduated from Department of Geomatics Engineering, Diponegoro University. His research interest is a coastal resources and vulnerability, particularly in Hydrography area. Guntur has involved in some underwater archaeological research in RICRV and has led the project of surveying SS *Aquilla* shipwreck in Ambon Bay to provide data for establishing Maritime Conservation Area of Ambon Bay. He also frequently contributed to other archaeological researches and having role in bathymetry survey of underwater sites and making the shipwreck sketches in complementary analysis of coastal resources.