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THE SAN DIEGO AND PANDANAN WRECKS: Two underwater archaeological sites

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INTRODUCTION

One of the most important sources of archaeological sources can be found underwater. Objects of all kinds have, in one way or another, been placed into the seas, lakes, rivers, and wells accidentally as in the case of shipwrecks or purposely like offerings or for safekeeping. Although the sea and other bodies of water can be potentially destructive to some archaeological materials, it can also be a perfect place of preservation, away from the most destructive agent of all—man himself. Archaeological materials found under the depths are just as important as the materials found inland. Ancient cargoes found underneath the sea can shed light on the trade and commerce between countries; shipbuilding technology, art, history and other important insights that help us understand our ancient life.

Underwater archaeology studies sites and artifacts that lie under any depth of water (Bass 1966:18). This includes a wide variety of sites such as wells, sinkholes and springs; submerged lakeside settlements; and marine sites ranging from shipwrecks to sunken harbors and drowned cities (Renfrew and Bahn 1996:91).

Like dry-land archaeology, underwater archaeology started as treasure hunting and collection of artifacts without considering its context. As early as the 18th century, Sir Charles Lyell in 1872 recognized the potential of underwater archaeology. He noted a considerable number of submarine archaeological materials and wrecked vessels to provide hint of the possibility of archaeology underwater (Hole and Heizer 1969:14).

The first tools used in collecting materials underwater were nets, grabs or grappling hooks (Muckelroy 1978:10). This type of tools remained unchanged for thousands of years until the invention of diving bells in the 17th century. The enclosed barrels for underwater were developed in the 18th century as an improvement of the diving bells. In the 19th century, the 'hard hat' type of diving gear was created and finally, in 1942 the aqualung was invented which revolutionized the conduct of work underwater due to its handiness and longer underwater diving time.

It was only in the 1960s that underwater archaeology became a scientific discipline with the pioneering work of George F. Bass on a wreck at Yassi Ada in Turkey. His team raised a shipwreck from the seabed in its entirety using methods as precise and as scientific as those made on land. During the last thirty years, according to Glyn Daniel (1976:363), "the development of techniques of exploration survey and excavation beneath the sea, has been one of the most interesting features of archaeology."

UNDERWATER ARCHAEOLOGY IN THE PHILIPPINES

The Philippines has been engaging in trade and commerce with other countries since the protohistoric period of the Philippines (9th–12th century A.D.)* as evidenced by a wide array of foreign archaeological materials from different periods scattered around the country. Its strategic position in Southeast Asia makes it very accessible to mariners and traders not only from the neighboring countries but also from other far countries such as Japan, India and the Arab nations.

Scientific underwater archaeology started late in the Philippines although the country has been involved in the exploration and excavation of underwater archaeological sites since 1967. Lopez (1967) claimed that Philippine underwater archaeology was given impetus with the exploration of a wreck believed to be a Spanish galleon plying the Manila-Acapulco route during the Galleon Trade Era (16th–19th century A.D.). However, no official branch of the government took responsibility of developing the discipline during this time. Since then, numerous wrecked vessels in various locations of the country have been explored and excavated. It was only in 1979 that the Underwater Archaeology unit of the Anthropology Division, National Museum was created as a result of the Southeast Asian Minister of Education Organization (SEAMEO) special projects in Archaeology and Fine Arts (SPAFA) training course in Underwater Archaeology. Since 1988, the unit is now with the Archaeology Division when the Archaeology Division separated from the Anthropology Division (Dizon 1992).

Presently, underwater archaeology in the Philippines has progressed from mere explorations to full-scale excavations. However, due to budgetary constraints, most of the excavations were done in coordination with private entities. Nevertheless, Philippine underwater archaeology to date is considered as one of the most advanced in Southeast Asia in terms of the development of the discipline.

Ships played an important role in the maritime activities of man. Ships were used for trade and commerce, fishing, migration, warfare and other activities at sea. As such, its impact has pervaded almost all aspects of culture. In the Philippines, ships provide the principal source of underwater material since our country has been one of the most important trading posts in the past. Ships of all kinds and sizes have been visiting the archipelago since the prehistoric period of the country. Realizing this, the main focus of the underwater archaeology in the country has been locating and studying shipwrecks.

This paper aims to discuss the archaeology of two wrecks, from the time they were discovered until the conservation of the artifacts recovered. It will also attempt to compare the methodology of the two teams working on two different wrecks at different sites and its relevance and contribution to underwater archaeology in the Philippines.

* Editors' note: certainly since at least 400 BC when various "foreign" items started showing up at Tabon and other sites; probably even since 2000-3000 BC, but this will be difficult to demonstrate (Solheim, personal communication).

THE SAN DIEGO AND PANDANAN WRECKS

Background of the shipwrecks

The *San Diego* was actually a merchant ship called *navio* or *nao* that was built in Cebu, southern Philippines. The length of the ship was 35 meters while its width was 20 meters. The weight was variedly estimated to be 200 to 300 tons. In October 1600, the ship was converted into a warship fitted with cannons to pursue and engage enemy ships that entered the Philippine seas. The enemies in this case were two Dutch ships under the command of Olivier Van Noort who was the leader of free trade enterprise with the mission of conducting trade with the different countries of the world. In the morning of 14 December 1600, the two ships engaged in a battle that resulted in the sinking of the *San Diego* by the *Mauritius*, Olivier Van Noort's flagship (Dizon 1995).

The Pandanan shipwreck was a trading vessel, possibly a Southeast Asian cargo boat that conducted trade activities in the Philippines. The boat is about 25 to 30 meters long and about six to eight meters wide. Dizon (1998) speculated that the boat sailed from Central Vietnam where a large portion of the boat was loaded, then sailed to the southern peninsula of the mainland to pick up goods from Thailand, then to Malacca, then to Borneo and finally to the Philippines, entering near the southernmost tip of Palawan until its untimely tragedy near Pandanan Island.

Survey and exploration

Two different approaches were employed by the two teams of archaeologists involved in the discovery of the wrecks. In locating the *San Diego*, the archaeologists were aided by historical documents such as Morga's *Sucesos de las Islas Filipinas*; Olivier Van Noort's *My Ardous Journey Around the World* and other related documents which mentioned the battle between the *San Diego* and the *Mauritius*. The researchers did archival work in Spain, Holland, Rome and Paris. However, among the numerous documents studied, not one pinpointed the exact location of the site. The closest location described regarding the wreck site was reported by Morga himself, although his estimate was off by more than six kilometers since he stated the location of the site to be 1.5 leagues (4.5 geographical miles or 7.245 kilometers) from Fortune Island.

The initial survey and exploration of the *San Diego* was conducted in 1991 and 1992. The archaeological team used sophisticated survey equipment in searching for the wreck. Prior to the survey, a positioning network using transponder beacons were placed in different points of the island to assure a reliable and accurate positioning. Franck Goddio, who headed the team, defined a rectangular search area that was parallel to Fortune Island and measured three kilometers long and 2.5 kilometers wide. Crisscrossing the area 30 meters apart in the lengthwise direction covered the search area. A catamaran was used in the survey that towed proton magnetometers that detect metal objects under the sea. Other pieces of survey equipment used were the side-scan sonar and the sub-bottom profiler. These equipment identify anomalies and features found in the seabed. The side-scan sonar transmits sound waves while the sub-bottom profiler emits sound impulses. Divers did bounce dives to verify any anomalies detected until the wreck was found.

The Pandanan shipwreck, on the other hand, was discovered by accident. The discoverer was a long time diver of the Ecofarm Systems Inc., a pearl farm in Pandanan Island. He found jars in the seabed while searching for a missing basket containing giant oysters. The initial survey and exploration of the site was done in 1993 and 1994. The survey only used scuba diving gears since the site was near the island.

Both shipwrecks were found relatively near land. The *San Diego* was located beneath a mound approximately a kilometer from Fortune Island. The Pandanan wreck was found under a coral reef only about 250 meters from Pandanan Island with coordinates 8° 9' 48" North latitude and 117° 3' 6" East longitude (Dizon 1996:64). Further, these two wrecks were lying in relatively deep waters; the *San Diego* about 50 meters underwater while the Pandanan wreck about 40 meters from the surface sea level.

Excavation

Excavation of the *San Diego* was done in two phases: the first phase was conducted in 1992, from February to April while the second phase commenced from January to April 1993. The excavation work of the Pandanan lasted from February to May 1995.

The *San Diego* project employed a total of 52 people in the first phase of the excavation and 60 people in the second phase. These included archaeologists, divers, a diving physician, photographers, a film crew, technicians and crew of the three vessels while the Pandanan project employed a considerably lesser number of people that included archaeologists, divers, photographers, and technicians.

Three vessels were used for the excavation of the *San Diego*. The first boat was a catamaran, a boat that was designed for underwater archaeological research. The second vessel, the Osam Service, was a marine construction support excavation vessel that had a platform on the stern of the boat. On board the Osam Service were equipment such as a diving bell, a recompression chamber, two hookah rigs, compressors, scuba diving gears, and a two-man submarine. The boat was also equipped with communication equipment like UHF radios, cellular phones and a facsimile machine (Ronquillo 1993:15). The third boat was a small 15-meter tugboat.

The Pandanan project prepared three wooden rafts for the excavation. The first raft contained a generator for the scuba tank compressor and supplied power to the submersible power pump. The second raft was used as storage for diving gears and wet suits. The third raft was used to lift artifacts that were collected from the site (Dizon 1998:3-4).

Both projects adhered strictly to safety procedures in diving activities, being aware that working underwater can be very dangerous, man being the intruder in an alien and inhospitable environment. The diving activities were scheduled only during the day since night diving increases the risk of danger and inefficiency.

The divers worked for thirty minutes underwater, before ascending and spending about an hour for decompression stops, starting from 15 meters then ascending at three-meter intervals and switching from air to oxygen at the final two decompression stops to get rid of the excess dangerous nitrogen that accumulates in the body during the diver's stay underwater.

The two teams used the grid system in plotting and recording of the artifacts found in the seabed (right). The archaeologists of the Pandanan shipwreck started with the establishment of a centerline that was oriented to a north-south direction. This centerline served as a reference for all measurements and had a one-meter interval for a grid system (Dizon 1998). The *San Diego* archaeologists also established a 50-meter line as a longitudinal reference for the partition of the site. A stainless steel cable was stretched from end-to-end and was marked with a tag every two meters (Goddio 1996:85).

The *San Diego* divers used hydrolifts in clearing away the sediments of the sites (left) while the Pandanan divers used their own fabricated submersible vacuums to achieve the same purpose. All retrieved archaeological materials were photographed and plotted before putting in plastic bags then placed into a cage or basket then hoisted on deck by means of a pulley system of ropes. A barge with a crane on board was used especially for the recovery of the bronze cannons of the *San Diego*.

A submarine was used in the supervision of work underwater in the *San Diego* project. The submarine proved especially valuable in monitoring the work in the shipwreck and in giving instructions to the divers who were preparing to descend and to the divers working at the site (Goddio 1996:86). The second excavation was done in 1993 with the presence of representatives from the National Geographic Society. A Remote Operating Vehicle was used in the photo documentation of the excavation. The team studied the remaining parts of the boat like the wooden hull and other pieces.

Archaeological materials recovered

The *San Diego* wrecksite exhibited a vast variety of cultural materials that exceeded 34,000 pieces from all over the world. Major finds include “Kraak” and “Swatow” wares of the Wan Li period (1573–1619) of the Ming Dynasty (1368–1644); porcelain and stoneware jars from China, Thailand, Burma, Spain and Mexico; European–influenced Philippine-made earthenware, Japanese weapons, metal navigation instruments such as a compass of the period and a rare astrolabe (right); silver coins, iron anchors; animal bones and teeth; and shell remains (Ronquillo 1993; Dizon 1998a).

The Pandanan shipwreck yielded over 4,000 materials that are typical of trading vessels. Tradeware materials dominate the cargo of the vessel. Most of the materials came from Vietnam, although a sizable portion came from China and Thailand. The cultural materials recovered included blue and white porcelains, celadons, stoneware jars, and earthenware. Glass beads were found inside the stoneware jars. Metals such as iron cauldron, bronze gongs, weighing scale balance, and cannonettes were also present. A major find which established the date of the wreck was a coin that belonged to the Yung-le period (1463–1424) of the Ming Dynasty (1368–1644) (Dizon 1998a: 5).

The hulls of both ships were also found but were not raised since conserving them would have been very expensive.

Conservation of artifacts

Conservation of the retrieved archaeological materials is of paramount importance after they are taken out from their place of rest after a long time. The proponents of both projects realized this and proceeded to provide meticulous care in handling the specimens after they are taken from the seawater. Most archaeological materials (porcelain, stoneware and pottery) are surrounded by concretions while metallic objects are coated with metallic salts. The first step in the conservation of the ceramics is the desalination, which is the "removal of salts from the object by demineralized water and chemical soaking" (Abinion 1993:54). After gradual desalinization for a relatively long time, the concretions are removed manually and the remaining calcareous materials are subjected to chemical soaking. Damaged and fragile pieces of the Pandanan wreck were treated with polyvinyl acetate (PVA) in ethanol and PVA in toluene to prevent the glazes from flaking off (Dizon 1998a).

Metals such as the bronze cannon and other implements undergo electrolysis that entailed placing the object in a chemical solution and then passing a weak current to remove the destructive salts.

DISCUSSION

The archaeology of the two shipwrecks represented the state of underwater archaeology in the 90's. The methodology in conducting archaeological underwater investigation has developed from simple collection of artifacts to systematic and organized type of archaeological underwater research.

Notable improvements include the use of state-of-the-art surveying and excavating equipment. The magnetometer, sidescan sonar, and sub-bottom profiler were valuable in the search of the *San Diego* and were able to rectify inaccurate historical documents. The submarine was especially helpful for monitoring and management purposes. Photodocumentation was also very precise with the use of underwater cameras for both projects and the use of a Remote Operated Vehicle (ROV) that is equipped with multi-directional video camera and a laser system that takes accurate measurements of objects for the *San Diego* project.

The establishment of the grid system necessary for systematic excavation has made the excavations scientific since it emphasizes accurate positioning and provenance. Cleaning was done correctly with the use of hydrolifts and submersible

vacuum. Retrieval of artifacts by means of specialized cages or baskets insures the safety of the artifacts.

Overall, the excavation phases such as cleaning, mapping, plotting, and retrieval of the two projects were done accurately under the circumstances. Both projects also emphasized on the preservation of the cultural materials recovered. Most importantly, meticulous recording was done from the onset of explorations to the conservation phase that would be instrumental in disseminating information to the public and be subject to scholarly scrutiny. Moreover, both projects attempted to investigate the material evidence found and strove to provide interpretations based on the materials found to explain the maritime culture of the Philippines.

The discipline has certainly emerged from its antiquarian roots yet problems experienced in the past still continue to this day. A classic example is the budget problem. The National Museum hitherto still cannot fund its own underwater excavation entirely. The excavation of the two vessels were done in coordination with other private institutions, the *San Diego* with World Wide First while the Pandanan wreck with the Ecofarm Systems Incorporated. Working in coordination with other private entities means money for the excavation, however it also means compromises. Working with partners whose purpose is not entirely archaeology means sacrificing accurate scientific methodology and priceless cultural materials for the purpose of profit. However, it would be quite unlikely to expect changes soon, considering the present economic woes the country is enduring.

Did Filipino archaeologists participate fully in the excavation? The ones in charge of the whole operation seemed to be the foreigners and the Filipino archaeologists were relegated to the supervisory role. I also noticed that the National museum staff were only in charge of the accessioning, recording, cataloguing and conserving of the artifacts but the non-archaeologists, such as the French divers, were the ones working underwater most of the time. This problem may reflect the shortage of qualified underwater archaeologists in the country.

Is there a need to recover all the artifacts in one or two excavation seasons? The excavations conducted terrestrially usually left sites for future researchers to validate the present research or if there are new archaeological approaches in the future that can advocate a more advanced viewpoint. Also, stratification of the seabed from both sites was not recorded. Stratigraphy is very important to ascertain the archaeological sequence of the deposits and to detect any disturbances in the seabed.

I also think the duration of the entire excavation season of both projects is much shorter compared to other sites worked abroad such as the Mary Rose where it took 15 years to complete the project. Spending more time with the site increases the chances of more scientific findings and interpretations as opposed to hurried excavations.

CONCLUSION

The wrecks contributed information that led to a greater understanding of our maritime past. This is especially true for the Pandanan wreck since there were no historical documents existing in the Philippines during this time. The Pandanan wreck also surrendered additional insights of the trading activities of our Southeast Asian neighbors during the protohistoric period. The *San Diego* wreck exemplified the historical period and told us the state of wartime activities during the 16th century.

The archaeology done on both shipwrecks has been done scientifically although some aspects could be improved. However, the more important topic here is the contribution the wreck has generated in elucidating the ancient maritime culture and the society that produced them.

EDITORS' NOTE: All photographs utilized in the article were taken from *Treasures of the San Diego* (Desroches *et. al.,* 1996*).

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