



The Protection of the
Underwater Cultural Heritage

7 STAB

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AND CULTURAL ORGANIZATION**

CONVENTION ON THE PROTECTION OF THE UNDERWATER CULTURAL HERITAGE

REPORT AND EVALUATION

16-24 June 2015 Mission of the

Scientific and Technical Advisory Body to Madagascar

Chief of Mission: Michel L'Hour (France)

Paris, 10 July 2015

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Executive summary

The objective of the mission undertaken by the UNESCO Scientific and Technical Advisory Body (STAB) to Madagascar was to verify the status of the historic wrecks near Sainte Marie Island and to evaluate an excavation project by a film team, which had announced the discovery of a silver ingot allegedly found on the *Adventure Galley*, a shipwreck associated with the pirate William Kidd.

The research undertaken by the STAB in Sainte-Marie Island can be summarized as follows:

- Several historic wrecks lie in the bays of Sainte Marie Island. They are reasonably well preserved considering the local tropical environment and their extensive research would be of considerable archaeological interest. For any further research it is however recommended to follow closely the regulations of the Annex of the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage, ratified by Madagascar, and to only permit interventions by a competent team led by a qualified underwater archaeologist.
- The work of the film team and its lead-explorer, undertaken in spring 2015, as well as prior work by the same explorer, was distinguished by a media-led approach, which has not respected the regulations of the 2001 Convention, and which jeopardized the scientific understanding of the sites concerned and the preservation of the artefacts recovered. From a scientific point of view the results achieved are unreliable, as illustrated by the following:
 - o What has been identified as the *Adventure Galley* of the pirate Captain Kidd has been found by the experts of the STAB to be a broken part of the Sainte-Marie port constructions. No ship remains have been found;
 - o A metal ingot, recovered in the bay of Sainte-Marie Island, apparently from the above site, is not a 'silver treasure', but is constituted of 95 % lead (pb). It does not contain silver and has been identified as a lead-ballast piece;
 - o What has been identified as the remains of a Dutch pirate ship presumably the *Fiery Dragon*, are in fact the remains of a large Asian ship, most likely build in India, and looted by pirates and then abandoned in the bay of Îlot Madame;
 - o Artefacts recovered from the above-mentioned Asian wreck in 2010, in particular several gold coins, that would facilitate the identification of the site, are absent from the site inventories and the museum;
 - o The recovery, inventory, storage and conservation of the finds have been carried out in an unscientific manner, without the necessary precautions and leading to damage to the sites as well as making it more difficult to understand the historic background of the sites.

A. Objectives of the mission

Madagascar has ratified the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage. Its historic wrecks near Sainte-Marie Island are of great historical interest locally, regionally and internationally. Due to ongoing intrusive interventions and out of concern for their protection, the authorities of Madagascar called on UNESCO and its Scientific and Technical Advisory Body (STAB) to send an emergency mission to the island, as foreseen by the Statutes of the STAB.

The Meeting of States Parties to the Convention, held in Paris from 28 to 29 April 2015, decided to respond positively to the request. The mission, implemented by the STAB, was organized under the scientific oversight of Mr Michel L'Hour, Director of the French Underwater Archaeology Research Department (DRASSM, French Ministry of Culture) who joined a team of scientific experts¹. The meetings with the national authorities took place in the presence of three members of the UNESCO Secretariat, which did however not participate in dives on the site.

The purpose of the work, as defined by the Ministry of Culture and Crafts of Madagascar, and as organized from 16 to 24 June 2015, was to:

- “Verify the state of conservation of the historic wrecks in the bay of Sainte Marie Island, Madagascar;
- Verify the extent of possible intrusions in the wrecks;
- Verify the state of the excavated artefacts, and identify the need for their future conservation;
- Evaluate the project led by the team of October Films especially in light of the Rules of the Annex of the UNESCO 2001 Convention”.

Expected results were:

- “The full understanding of the actual status of the underwater sites around the island of Sainte-Marie;
- Management of the underwater cultural heritage of Sainte-Marie Island in accordance with the advice of the STAB”².

B. The national context

Before addressing the specific case of the mission, the overall situation of underwater cultural heritage in Madagascar and of Sainte-Marie will be presented.

Madagascar is an island State in the Indian Ocean, the world's fifth largest island after Australia, Greenland, New Guinea and Borneo. It is located some 400 km east of Mozambique and is part of the African continent. The Island possesses some 5,000 km of coastline. As almost all seafarers who navigate the African parts of the Indian Ocean must pass by Madagascar, the island possesses a considerable underwater cultural heritage, notably including numerous historic shipwrecks.

¹ In addition to Michel L'Hour (archaeologist) the team was composed of Frederic Lucas (professional diver), Lila Reboul (archaeologist, specialist for treatment in conservation and restoration of artefacts found under water), Frédéric Osada (Photographer), Jean-Christophe Peyre (logistician), Jonathan Sharfman (archaeologist) and Auron Tare (archaeologist). An associated specialist was John de Bry, historian with an archaeological background, who had participated in the prior campaigns around Ilot Madame. The team benefitted from the scientific advice of Frederic Guibal, dendrochronologist, Jean-Bernard Memet, corrosion and metallographic analysis specialist for as well as Zhao Bing, specialist for Chinese porcelain etc.

² This text cites the official Terms of Reference. The site in question was in fact a bay located between the village of Ambodifototra, in the north and the îlot Madame in the south.

Sainte-Marie Island, named by Portuguese seafarers, lies off the east coast of northern Madagascar. Known as "Nosy Boraha" in Malagasy, it is about 50 km long and 5 to 7 km at its widest point. It lies approximately 8 to 12 km off Madagascar's coast. After a long history of seafaring exchanges with the Asian countries and the Arab region, French settlers attempted to establish a colony on Sainte Marie Island in the 1640s, but were thwarted by strong tropical fevers. The island subsequently became a refuge for English, Portuguese, French and American pirates. From the late 17th to the late 18th century it harboured the ships and crews of many popular pirates such as Thomas Tew, Adam Baldrige, William



"The small Island of Sainte Marie where vessel hulls are repaired", ink drawing, Indian ink and ink wash, Roger Gaignières collector (1642-1715); National Library of France

Kidd, Christopher Condent, Henry Every alias John Avery, or Olivier Levasseur, alias La Buse³. Many shipwrecks and remains from this time lie in the waters around the island and constitute part of Madagascar's cultural heritage. The myths of this specific period evoke powerful romantic collective images and are thus also important for tourism and sustainable development.

The following wrecks are believed to have sunken or have been scuttled off Sainte-Marie Island: *l'Armand* (French, 1656), *Saint-Georges* (French, 1656), *Amity* (Bermudas, 1697), *Adventure Galley* (English, 1698), *Rouparelle/November* (French, 1698), *Great Muhammad/New Soldado* (Arabic, 1699), *Mocha* (English, 1699), *Dolphin* (Arabic, 1699), *Flying Dragon* (Dutch, 1721), *Glorieux* (French, 1755), *Cerf* (French, 1757), *Phélypeaux* (French, 1757), *Serapis* (British, 1781), *Berceau* (French, 1846), *Macassar* (French, 1880), *La-Bourdonnais* (French, 1893), and *Cavalaire* (French, 1926).

More ships of local, European, Arabic or Asian origin may well have sunk in Sainte Marie's waters, but have not been registered. Other ships and materials may have been used for the construction of the port, as indicated by historical sources. More extensive historical and archaeological research remains to be undertaken.

From 1999 until recently a team led by Mr Barry Clifford came to Madagascar to explore the pirate wreck sites off the island of Sainte Marie. The exploration was authorized by the Government of Madagascar, specifically the Ministry of Culture in 2012. A concessionary contract was signed on 4 December 2012 for the exploration and salvage of wrecks. The concession foresaw a 50/50 division of the finds between the Government of Madagascar and Mr Clifford. Furthermore the contract foresaw training for the underwater archaeologists of Madagascar and the restoration of the museum in Îlot Madame⁴. The STAB mission was informed that this concession contract is, according the Malagasy

³ See : *Grand Livre des Epaves de Madagascar*, 2010, Pierre Van den Boogaerde, ISBN-10: 287763552X, and *Bulletin de l'Académie Malgache, Nouvelle Série, Tome XXIX (1949-1950). Tananarive 1952, p. 84-89.*

⁴ The STAB mission found the museum's restoration work began recently (2015). Wooden scaffolds were installed against the facade of the museum and the workers were dismantling the wooden ceilings of the porch.

authorities, no longer valid, due to a change in the legal status of the bay concerned and to the fact that in 2015 Madagascar ratified the UNESCO 2001 Convention, which prohibits the commercial exploitation of underwater cultural heritage and requires a scientific approach.

At the time, five wrecks were discovered during the exploration. They were believed to be William Kidd's *Adventure Galley* and *Rouparelle/November*, as well as Culliford's *Mocha*, Christophe Condent's *Flying Dragon* and Captain Chivers' *New Soldado*. A 2010 archaeological report on research on 17th and 18th century pirate shipwrecks at Îlot Madame, Sainte-Marie is available⁵.

Other exploration work has been carried out and in addition to these interventions, looting has been prevalent in the country for several decades⁶. A recent case of the pillaging of an important 16th century Portuguese wreck on the Etoile Reef, in the south-west coast of Madagascar, probably the Portuguese ship *Sao Idefonso* (1527), involved the looting of artefacts and canons, which were partially seized in Madagascar and partially exported and seized by French authorities in Longoni Harbour, at Mayotte.

Madagascar ratified the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage on 19 January 2015, declaring itself bound to the highest international standards for scientific underwater archaeology and heritage protection, thereby changing the legal context substantially.

⁵ John de Bry and Mark Roling, 2010

www.academia.edu/11263356/Investigation_of_a_1721_Shipwreck_off_Madagascar.

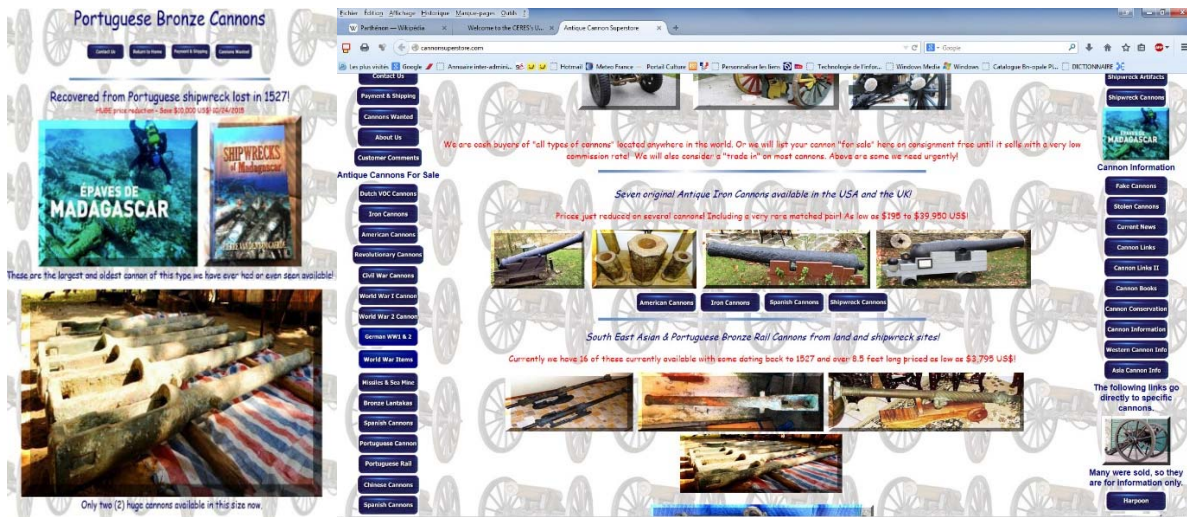
⁶ To these clandestine operations, the salvage of wrecks should be added, which were conducted since the early 1980s with the authorization of the Malagasy authorities. To be remembered is especially the work conducted in 1986, with the repeated help of explosives, on the site of the *Winterton*, a ship of the East India Company lost on 20 August 1792 near the Bay of St. Augustine in the south-west of Madagascar. See Robert Sténuit, *Seeking the trunks of the Winterton*, *Sea World*, January-February 1988, p. 20-29. During that same mission in 1986, the team of Robert Sténuit also intervened on the *Nossa Senhora do Monte do Carmo*, a Portuguese royal ship lost on 7 August 1774 off the coast of the Bay of Salary.



The wreck of the Sao Idefonso before looting. Today, no artefacts remain on the site. © DRASSM



Copper ingots and cannons looted on the site of the Sao Idefonso © DRASSM



Sale of the cannons of Sao Idefonso on a website (screenshot)

In 2015 a film company sought permission to produce a film on the history of pirates in Madagascar. While initial permission for filming was given on 20 March 2015, it was soon apparent that the film team was in fact excavating and not only filming the fragile wrecks of Sainte Marie Island. The presence of the prior exploitation concession holder for the exploitation of the wrecks in the film team, which had not been communicated to the authorities, became known and artefacts were brought to the surface. The excavations were carried out using water dredges and metal detectors. Due to the intrusions, not covered by the permission granted, the Ministry of Culture and Crafts suspended the filming and diving permission. However as the film team subsequently formally committed to respecting the regulations of the authorization, the ban on filming was lifted.

The excavation work of the film team continued until 7 May 2015. Shortly before, a metal ingot, weighing between 45 to 55 kg, which had been extracted from one of the wreck sites, was handed over to the authorities in a ceremony. It was claimed that the ingot was a silver ingot from the wreck of the *Adventure Galley* and part of the legendary treasure of the pirate Captain Kidd, thus raising considerable media attention.

C. Report

1. Description of the mission

The UNESCO STAB mission arrived on 16 June 2015 in Antananarivo. A meeting with the president of Madagascar, H. E. Mr Hery Rajaonarimampianina, was organized on 17 June. After having underlined Madagascar's commitment to fully implement the UNESCO 2001 Convention, recently ratified by the country, President Rajaonarimampianina invited the experts to take samples of the metal ingot, which had been recovered in Sainte-Marie, and kept in the presidential palace.



H. Exc. Hery Rajaonarimampianina. H. Exc. Brigitte Rasamoelina, General Alphonse Dieudonné and UNESCO STAB mission @ Presidency of Madagascar

The conservation specialist accompanying the mission, Ms Lila Reboul, took two samples, which were sent to two independent specialists for verification.

The mission then met the Prime Minister, H. E. Mr Jean Ravelonarivo, and the Minister of Culture, H. E. Ms Brigitte Rasamoelina, who both expressed their hope that the STAB mission would help clarify the situation of the archaeological sites in Sainte-Marie.

The mission then proceeded to the Island of Sainte-Marie, where four wreck sites were dived on and evaluated⁷:

Wreck Sainte-Marie 1: [GPS location]

Wreck Sainte-Marie 2: [GPS location]

Wreck Sainte-Marie 3: [GPS location]

Wreck Sainte-Marie 4: [GPS location]

⁷ For reference and comparison purposes the entry of the Palais de la Reine / Palais du Gouverneur, with the museum was measured to be located at 17° 00.296 Sud; 49° 50.756 Est.

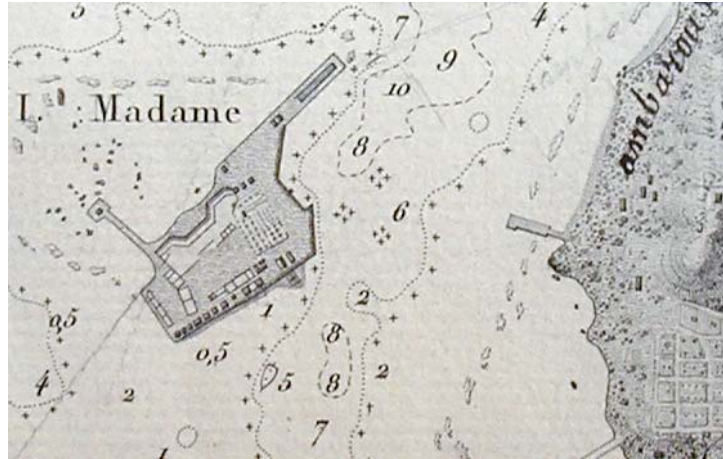


Madagascar. Ile Sainte-Marie. Maps drawn by French engineers. Top left by the Sieur Sanson drawn in 1667; bottom left in 1818, indicating the wreck area. Right - general map of Madagascar.

2. Wrecks

Conditions of the sites and of the research

The harbour of Ilot Madame (Sainte Marie), with its small Island, originally called Ile au Cayes, but later named Ilot Madame, and its Pirate Bay, is likely to hold several shipwrecks. Today a modern causeway constructed during WWII separates the harbour and the bay.



A detailed historic map by Cornette de Venancourt drawn in 1847 (see image) shows dotted lines and crosses close to where this causeway exists today, indicating historic reefs or rocky areas, as well as relatively shallow areas. The crosses on this map might also indicate shipwrecks and indeed they are placed on the areas where the four Sainte Marie wreck sites have been later identified by the STAB mission.

The four wreck sites located by the STAB are lying in very muddy waters and visibility is generally low, between 10 centimetres at slack tide and 2 meters at flood tide. The incessant rains that marked the four days of the operation in Sainte-Marie aggravated these already unfavourable environmental conditions by flooding the bay with silt. Moreover, the wreck area is heavily polluted with waste and much old and contemporary debris has been dumped into the bay by the local population or deported there by sea movements.

The four wrecks researched are located in low water depth. It should thus be kept in mind that materials from the wrecks can be widely distributed over the bay, especially as cyclonic episodes are frequent in the region. It is also important to be extremely careful when movable materials are discovered on the wrecks and it is necessary to verify thoroughly if material found is not an intruder material brought to the site by the local population or major weather events.

Despite the difficulties, the relatively rapid localisation of the sites was possible also due to the cooperation of an expert, who had worked with that team in Sainte-Marie.

The four sites are located close to each other. Other sites are known to be present in the bay, but have not yet been verified.



Google Earth screenshot of Ilot Madame today.

Wreck Sainte-Marie 1

[GPS location]

Wreck site SM1 is the site that was affirmed to be the wreck of the *Adventure Galley*.

The *Adventure Galley* was an English sailing ship captained by William Kidd, a privateer. It was a 287 ton galley that held 34 cannons and 23 pairs of oars. The ship combined square rigged sails with oars for manoeuvrability in both windy and calm conditions. The vessel was launched at the end of 1695 and was acquired by William Kidd the following year to serve in his privateering venture. By the spring of 1698 the ship's hull had become rotten and leaky so that she was no longer seaworthy. According to historic records, it was sunk in Sainte-Marie on shore after having been stripped of furnishings and set on fire to salvage the iron works⁸.



The Charles Galley, a contemporary vessel of a comparable design to the Adventure Galley, Willem van de Velde the Younger

⁸ See: *Grand Livre des Epaves de Madagascar*, 2010, Pierre Van den Boogaerde, ISBN-10: 287763552X, page 180, as well as Graham, Harris (2002). *Treasure and Intrigue: The Legacy of Captain Kidd*. Dundurn Press Ltd. ISBN 978-1-55002-409-8.

Given this context and in view of this historical data, which need to be further verified, it seems unlikely that William Kidd would have considered leaving a treasure in the hold of a ship he intended to voluntarily give up in the low accessible water of a port.

Moreover, if the site were in fact the *Adventure Galley*, one should expect to find the ship's structure to be made from wood of British origin, with artefacts dated no later than 1698 and possibly also traces of burnt wood.



Site Sainte-Marie 1 at flood tide © Frederic Osada/UNESCO

Site verification

On diving site Sainte-Marie 1, the experts of the STAB observed a small mound of stones embedded in the seabed, the latter consisted of loose mud on the surface, which thickened as the depth increased. It is difficult to clearly identify the site as the water is very dirty and visibility rarely exceeds 10 to 15 cm. The site is moreover relatively shapeless.

The site shows no signs of burnt materials. Moreover and most importantly, no naval architecture element has been revealed. We can thus question whether the site is indeed that of a wreck. The mass of stones, mostly basalt, observed on the site, is more akin to a cargo load than to a ballast mount. Consultation of the historical records reveals that building work at the harbour was frequent and that parts of the constructions broke down in a storm flood in the 19th century. It can thus be reasonably assumed that we are in presence of either an intentionally sunk wreck filled with ballast that was used to stabilize the jetty, or, rather, the remains of ancient harbour facilities.

The artefacts

The artefacts found in and around Sainte-Marie 1 reveal very disassociated chronologies and seem to consist of more movable intruder objects (i.e. artefacts not belonging to the original site) than objects related to the site.



On the left, a French coin found on site SM1, on the right a Portuguese coin © John de Bry

The expert John de Bry notified the STAB team two coins that had been found on the site during previous work conducted by Mr Clifford. Both coins have a homogeneous time profile. The coin on the left shows one side of a French 10 centime coin from the Directoire period, minted between 1796 and 1799. On the right the reverse of a Portuguese piece of 40 reis, or 1 Pataco, is shown, which probably dates from 1810 to 1820.

Conclusion

On the basis of this evidence collected the STAB concludes that the site is not the wreck of the *Adventure Galley*. The site, which is not well preserved, probably dates from the 19th century and as such is younger than the wreckage of the *Adventure Galley*. It is unsure if the site is that of a shipwreck.

Preservation

There is no indication that this site may have been touched since the departure of the film team six weeks before the STAB mission. The mud covering the site is evenly distributed and homogenous in form. The site is dotted with stakes driven here and there in no particular order⁹.

Wreck Sainte-Marie 2

[GPS location]

The archaeological report of the year 2010 identifies this site as the wreck of the *Fiery Dragon* or *Flying Dragon*¹⁰, a Dutch ship captured by the pirate Christopher Condent, also known as "Billy One-Hand".

According to written accounts by two members of the team that worked on it in 2010, John de Bry and Pierre van den Boogaerde¹¹, Condent captured a Dutch Vessel in 1718, which he renamed the *Flying Dragon*. The Dutch ships *Meiboom*, a 36-gun vessel, or *Kroonprins van Pruijssen* are believed by de Bry to be the original names of this ship¹². It is further reported by de Bry that Condent also captured another Dutch ship, which he named the *Fiery Dragon*. The possibility is mentioned that this was originally a Dutch East India frigate, the *Compagnies Welvaren*, taken together with several English ships near Cape Verde islands¹³. For two of these vessels, historical records are indeed available and have been verified (see footnotes).

By April 1719 Condent reached Madagascar and established a base at Sainte-Marie. In 1721, after capturing a major Indian vessel, a ship belonging to the son-in-law of Abdul Ghafur of Surat and travelling home from a pilgrimage to Jeddah, Condent obtained from the French governor of the Island of Bourbon a pardon on the condition that he destroy his ships. According to these reports¹⁴, at least the *Fiery Dragon* was thus sunk intentionally in the bay of Sainte-Marie, most possibly by burning the ship. Other ships might also have been destroyed at this occasion. When an English squadron called port at Sainte Marie in 1722 its Captain Clement Downing reported finding the ruins of several ships and their cargoes piled up in great heaps containing also a rich part of spices and drugs.

Should the wreck site be the *Fiery Dragon*, and should the *Fiery Dragon* indeed be a ship of Dutch origin (such as the *Compagnies Welvaren*), then we should expect to find artefacts from before 1721, hull structures and wood indicating a Dutch ship of that period, i.e. oak wood, and other signs of a naval construction indicating a Dutch vessel.

⁹ The STAB experts were not able to verify the exact condition of the site during and immediately after the intervention of the film team. Although the experts invited the latter to communicate information on the work undertaken (scientific papers, reports, photographs and films), the request was denied in writing by email of 16 June 2015.

¹⁰ www.academia.edu/11263356/Investigation_of_a_1721_Shipwreck_off_Madagascar

¹¹ Ditto; as well as Pierre Van den Boogaerde in his *Grand Livre des Epaves de Madagascar*, 2010, ISBN-10: 287763552X

¹² *Kroonprins van Pruijssen* was a smuggler frigate (Lorredraaier) from the city of Rotterdam under the captain Jacob van der Stolk. The frigate was overtaken by pirates in Senegal in November 1717. The only East Indiaman called *Meiboom* that is noted in the archives and was captured (as stated by de Bry) was a yacht built in 1660, captured in 1672 at Wirungla, India. This can therefore not be the one that was converted into a pirate ship. We however do not know for sure if there was another one, however the Dutch Asiatic Shipping (DAS) does not mention any other.

¹³ www.academia.edu/11263356/Investigation_of_a_1721_Shipwreck_off_Madagascar; Indeed records were found by the STAB experts that the Dutch ship *Compagnies Welvaren* (The Company's Prosperity, a ship of the Dutch West India Company WIC) was captured by the pirate Condent in 1719¹³.

¹⁴ See FN 10

Artefact verification

Mr Barry Clifford had worked on site Sainte Marie 2 in the early 2000s and in 2010¹⁵. According to John de Bry, he found 12 gold coins and Chinese porcelain shards on the site.

Unfortunately only two gold coins appear in the inventory of the Sainte-Marie museum, one minted in 1650, the other in 1689. Other coins, which were found on site in 2000 and 2010 according to John de Bry, who was present, are not mentioned in the inventory filed at the museum. Thus, in view of the official inventory one might assume that the *terminus post quem* for the sinking of the wreck at SM 2 was in 1689, but actually it is 1718, as one of the gold coins found in 2010 and not inventoried, was minted in 1718.



Photo of the gold coin SMS 039 discovered in 2010 © John de Bry

The work carried out in 2010 also brought to light some Chinese porcelain. Two fragments of Chinese porcelain similar to those that were left in the Sainte-Marie museum by the 2010 team were identified by the STAB team on the site SM2.

This type of blue and white porcelain shows a great diversity of forms, cuts, flat raised rims, lids, etc. It is undoubtedly a product of the period of the Chinese Kangxi Emperor, who held the longest reign in Chinese history (1661 to 1722). Many pieces of information, especially concerning the forms found on the site and the study of primary and secondary designs observed on the porcelain unearthed in 2010

¹⁵ See FN 11

allow however the experts to refine this timeline and place the time of the creation of the sets of porcelain between 1700 and 1720.



Photos of the porcelains found on SM 2 © Frédéric Osada/UNESCO



Photo of porcelain found on SM 2 © Frédéric Osada/UNESCO

Wreck Sainte Marie 2 can therewith be placed chronologically between two well-dated wrecks, the wreck of Vung Tau discovered by a fisherman in 1989 near Con Dao Island in Vietnam and dated 1690 and the Ca Mau shipwreck, discovered in the South China Sea, off the coast of Vietnam in 1998 and dated 1729.

It is worth noting that a piece of Chinese porcelain found on wreck Sainte Marie 2 bears the stamp of the Chinese Emperor Chenghua. This can be considered a fake brand as it was common practice in the seventeenth and eighteenth centuries to bear stamps on porcelain pieces evoking older productions, which were famous for their quality.



Stamp of Chenghua on the bottom of a small cup © Frédéric Osada/UNESCO

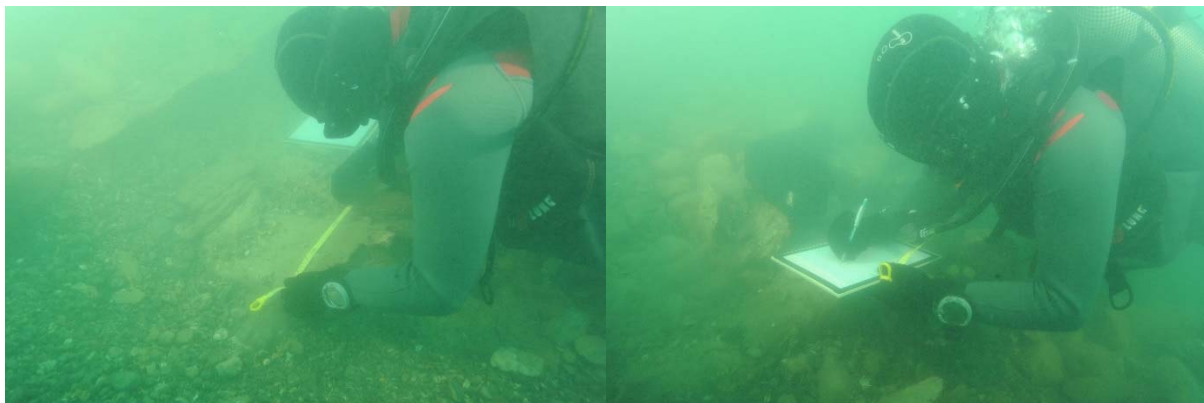
Site and further artefact verification

In diving the site Sainte Marie 2 the STAB team has moreover identified a straight piece of wood and very deteriorated cross structures that are clearly ship frames. A hull bottom is preserved for a few meters in length. The site shows that ballast stones, which covered the bottom of the hull, have recently been displaced as they are stacked on both sides of empty small depressions, i.e. traces of large ballast stones. The section of the hull frames is very large: 25 to 35 cm wide.

The axial piece of wood is much less important as it was literally devoured by time and sea worms. Sometimes frame pieces look like lace because frames are eroded and eaten by marine worms.

A bottle bottom that could date from the nineteenth century, a shard of blue and white china with a 'chocolate' border on the raised rim, a piece of wood which shows a hole of an iron metal pin were found, but it is not certain if they are originally from the wreck site. The mass of ballast is however important.

Wreck Sainte Marie 2 lies on a bearing of 170/350 degrees, but it is impossible to specify where the bow or the stern were located. The frames are oriented at 80/260 degrees. The longitudinal pieces of wood located above the frames could be an eroded axial keelson. The frames are solid, of the order of 25 to 30 cm.



Taking probes on the site Sainte-Marie 2 © Frederic Osada/UNESCO

The most interesting feature is the presence of what might be double planking. The identified measures indicate an inner planking of 5 cm and an outer planking of 6 cm. This kind of 'doubling' has already been found on wrecks of Dutch ships, the *Mauritius*, the ship of the VOC, the Dutch East India Co., lost off the coast of Gabon in 1609¹⁶, and the *Batavia*, lost in 1629 off the Australian coast¹⁷. The dimensions of the hull pieces suggest moreover a ship of large tonnage, probably more than 400 tons.

The hypothesis of the wreck being a European ship of the 17th or 18th century does not stand up to closer scientific examination of the archaeological data collected during the STAB mission. The analysis of wood samples taken from the wreck during the mission leads us to abandon the theory that this ship could be a Dutch ship, but a Dutch ship built in Asia or India.

¹⁶ See Michel L'Hour, Luc Long, Eric Rieth, *Le Mauritius, la mémoire engloutie*, Paris 1989, p.207-216.

¹⁷ See. P.E. Baker, Jeremy Green, *Recording techniques used during the excavation of the Batavia, International Journal of Nautical Archaeology*, 5-2, 1976, p. 143-158.

Indeed, the analyses show that the possible axial keelson, the frames, the ceiling and both interior and exterior planking are entirely made of teak wood. We can therefore conclude that the ship was not made in a European shipyard, as the teak tree species does not grow in Europe. Teak is indeed a tropical tree found mainly in India, Burma, Laos, on the Philippines and generally in the Asian region. It is known that sometimes the Dutch repaired their ships with teak wood. For example there were Dutch wharfs in Thailand, Indonesia and Sri Lanka. So the fact that there is teak does not mean from the outset that a wreck is not a Dutch ship. The *Avondster* wreck¹⁸ (1659), found in Sri Lanka, did have teak in some reparations for example. It is however unlikely that teak would have been used for the frames and the main structures, as these would normally have been part of the original construction in Europe using oak.

No historic sources have been found indicating that a European style ship, built in Asia, was captured on its return to Europe, therefore the STAB team suggests focusing on the identification of this wreck as a non-European ship.

A possible identification could be especially that of the 500-ton Hajji ship belonging to the son-in-law of Abdul Ghafur of Surat, taken by the pirate Condent in August 1720 near Mumbai, mentioned above. According to John de Bry and Mark Roling this homeward-bound ship coming from Jeddah was one of the richest vessels ever taken by pirates. After having been taken by the pirates, we do not know what happened to this Indian ship. It is thus possible that Condent abandoned the emptied and plundered vessel at his return to Sainte Marie Island in the bay. This hypothesis is reinforced by the discovery by the Clifford team of two gold coins of Arab origin on the site (inv. SMS 003 and SMS 008).

¹⁸ www.culturalheritageconnections.org/wiki/Avondster_project



Gold coin SMS 003 found on the Sainte-Marie 2 wreck in 2010 © John de Bry



Gold coin 008 found on the Sainte-Marie 2 wreck in 2010 © John de Bry

Conclusion

The site SM 2 is a large historic wreck sunk after 1718. It is highly unlikely that this ship is of European origin. The wreck site could tentatively be identified as an Indian Haji ship, which was intentionally abandoned in the bay of Ilot Madame, Sainte Marie.

More historic background research on the wrecks lying in Sainte-Marie Island and on their origin is however recommended. It is further recommended that the records of the British East India Company at the British Library be verified.

Preservation

Again the site is dotted with stakes driven here and there in no apparent order. Ballast and wreckage remains have been visibly moved.

Wreck Sainte-Marie 3

[GPS location]

The site Sainte-Marie 3 is characterized by the presence of wood structures and ballast. A major hole is to be observed on it. During the investigation, a single Chinese porcelain shard of the same type as the porcelain unearthed on Sainte-Marie 1 and a ceramic fragment resembling a piece of a Moon Flask were unearthed. There is no evidence that these shards were not brought to Sainte-Marie 3 by the effects of the sea or even during interventions of divers of prior teams since similar shards were also found near the docks of the Ilot Madame and even in the soil on the dock.

Nevertheless, deeply buried in site SM3, a large very thick lead sheet 2 to 3 mm thick has been found, which does however not resemble sheathing. The wreck SM3 has overall a very similar profile to the Sainte Marie 2 wreck.

It should be noted that the ship was sunk in the axis of the main channel that allowed access to the bay of Forbans (Pirate Bay), before the construction of levees and the *cause-way* that today join the village of Ambodifototra, Ilot Madame and Belle-Vue. It may therefore be asked whether the wreck is not one of those three ships, that were hastily scuttled by their pirate captains in the channel in 1699 in order to block the entrance of a Royal Navy squadron under the command of Commodore Thomas Warren, i.e. the *Mocha*, the *Dolphin* or the *New Soldado*.

The *Grand Mohamed*, later baptized *New Soldado*, was a 600-ton Arabic pilgrimage vessel. The *Dolphin* was also an Arabic vessel, while the *Mocha* was an English frigate of 150 tons. Further verification is needed, but the STAB team did not have the time, during its four-day presence on the sites to take sufficient samples to correctly identify this site.

Wreck Sainte-Marie 4

[GPS location]

The mission did not have the opportunity to investigate more fully the wreck Sainte-Marie 4, which has only been located. It shall simply be noted that Sainte-Marie 4 is also in the axis of the channel which allowed access to the bay of Forbans (Pirate Bay). One can wonder whether this could be the

wreck of another of the three ships sunken deliberately in 1699 to prohibit access to the bay by the Royal Navy.

3. Artefacts

The metal ingot

A metal ingot was recovered by the film team from the waters of Sainte Marie Bay from one of the sites, most probably the site Sainte-Marie 1.

As already mentioned, the President of Madagascar had kindly allowed the STAB team to take two small pieces of the metal ingot¹⁹.

The following can be said about the ingot:

- The item has the form of a typical lead ingot, a so-called 'saumon' of the XVIII^e – XIX^e century, but shows an ancient cutting trace at one end that indicates that it is actually only a part of the original piece and has been cut to fit.
- It shows the signs "IXB" as well as the number "95" in a distinctive script, with a half circle at the end of the number 5, which seem markings of the foundry. It shows also the letters "S" and a double "L" or simple "T", which have been visibly added later to the other signs and are very crude in their form, possibly cut in with a chisel or a similar tool.



Ingot found at Sainte-Marie Island and the STAB team taking probes at the presidential palace © F. Osada/ UNESCO

¹⁹ Note: Initially the fact that a photo of the recovery of the ingot from the bay had been published by the office of the President of Madagascar together with a photo that appeared to be a close-up of the metal ingot, but was indeed the photo of an artefact from another, previously found Spanish wreck, the shipwreck *Nuestra Senora de la Atocha*, had led to some confusion. Several newspapers thus either published the wrong image for the Sainte-Marie ingot (see CNN at <http://edition.cnn.com/2015/05/07/world/feat-captain-kidd-treasure-madagascar-barry-clifford/index.html>) or recognized the ingot and referred to the *Atocha* artefact (see the Spanish news ABC on 11 May 2015 - www.abc.es/cultura/arte/20150511/abci-presidente-madagascar-clifford-atocha-201505111402.html). The confusion had apparently been caused by the team of October Films, which had sent the *Atocha* image alongside the Sainte-Marie image to the president's office in an effort to convince the president's counsellors of the significance and silver content of the Sainte-Marie find (in also confirming publicly the ingot of Sainte-Marie would come from Bolivia). The UNESCO experts noted the presence on this ingot's photo, issued by the President's office, the countermark "V" of Jacob Vreder, who died in the wreck of the *Atocha* in 1622 and concluded that the ingot shown in the photo was one of the ingots on the wreck of the *Atocha* raised by Mel Fisher (it shows indeed bar #A85-479, recovered in 1985, cast at Potosí, and the ship's silver manifest shows that it was being shipped by a man named Miguel de Munibe, a prominent businessman, who was aboard the galleon and drowned when it sank. The bar weighs 86 lbs. 3.2oz (troy)). The fact of publicly comparing the Sainte-Marie ingot and the *Atocha* ingot, instead of taking a probe of the metal and of consulting experts on the Sainte-Marie artefact shows an unscientific approach.

- The ingot is blackened by oxidation, leaving black dust on the fingers of the treating specialist, and was apparently not in concretion with any other items around it, when found. Surface corrosion products are very dark and stick to the metal, and it is most likely that they are lead sulphides, the main lead-corrosion product that appears in anaerobic marine environments. We noticed very little superficial concretions and marine organisms, which seems logical in the case of the ingot being made out of toxic lead.
- The ingot was tested by two independent metal specialists, a local Malagasy jeweller, as well as an international metal specialist office in France, A-Corros, the first using a thermostatic test, the latter using an Olympus metal testing machine (XRF). Both concurred that the ingot is made of lead (*see test results in Annex*).
- The exact result of the analysis of the metal is:
 - Lead (Pb): 94,26 à 94,86 %.
 - Arsenic (As): 3,29 à 3,58 %
 - Tungstène (W): 0,94 à 1,14%
 - Thallium (Th) : 0,56 à 0,67 %
 - Molybdène (Mo): 0,26 à 0,27 %
 - Palladium (Pd): 0,11 à 0,14 %

ELEMENT	+	-
Pb	94.26%	0.3838%
As	3.58%	0.3328%
W	1.14%	0.2033%
Th	6367	537.99
Mo	2646	103.32
Pd	1123	52.84

Non Détecté
Ni ND <317

2 mains ! [XRF icon] [Home icon]

Prêt-Géochim 14:17



Analysing the Ingot found at Sainte-Marie with XRF © U. Guerin/ UNESCO

It can be concluded, that this piece of metal is made of 95% lead. It does not contain any trace of silver.

This is proven by the testing of the metal experts, but is also indicated by the easiness with which it could be cut, by the typical blackish oxidation, the lack of concretion and the lack of covering by sea fauna, due to the toxic nature of the lead as well as his weight. The inscription on it, "95", might indicate the percentage of the lead content.

As such the ingot recovered at Sainte-Marie is similar to the usual lead ingots, used as pieces of ballast in ships, to keep these steady at sea. It may have been cut in two in order to fit the form of a ship.

Given the low monetary value of the ingot it is not surprising that it had been left in the bay possibly as part of a port construction.

It can however today be considered a beautiful specimen of an ingot illustrating techniques for seafaring safely.

Other artefacts

The STAB mission examined the artefacts brought to light in 2000, 2010 and 2015, preserved in the museum of Sainte Marie.

Some remarks have already been made on the porcelain pieces. Further evaluation is difficult, as the objects are listed by lot and materials from various shipwrecks are mixed in the same cases. A “SMS” reference number (for St. Mary Shipwrecks) followed by an inventory number is given in a continuous numbering. It is thus hard to know from which wreck the artefacts come, if not by separating them chronologically, which is contrary to scientific procedures and might also be inconclusive.

Under the same inventory number one can find dozens of blue and white Chinese porcelain shards in a typology that refers to morphologically different forms, i.e. ‘with or without rim’, ‘small cup’ or ‘cup-shaped’, ‘large dish’, etc. Attribution is thus relatively impossible.

As mentioned, the inventory of finds, constituted for the purpose of their sharing between the Government of Madagascar and Barry Clifford and conserved in the museum contains only two gold ducats one of which, an Austrian ducat struck in 1689, was handed over to Barry Clifford, and the other, a Dutch ducat struck in 1650, has been preserved by the museum. The STAB team saw and photographed the ducat of the museum, but it is clear that it is impossible to truly understand and study the site it came from with this single inventoried item.

According to Jacquit Vanghou, responsible for the Sainte Marie museum, there are little means and scientific guidance for the Sainte Marie museum and its artefacts. Conservation measures are sporadic, unguided and finances are lacking.



Storage area of the collections of Sainte-Marie Island. Left: centre, Jacquit Vanghou, collections manager, on the right, Lila Reboul, member of the UNESCO Mission © Frederic Osada, UNESCO

The artefact collection is stored in basins with erroneous markings and etiquettes, often not consistent with the written inventory. A comparison shows evident discrepancies.

The careful study of the museum collections allowed however to establish a number of findings and to elaborate some proposals regarding the future of these collections. For easier reference and because of their complexity they are annexed to this report as **Annex 2**.

4. The film project and its compliance with the UNESCO 2001 Convention

A second point in the Terms of Reference of the mission is the evaluation of the work of the film team.

The purpose of its six-week filming expedition was described in the documentation submitted to the Madagascar Ministry of Culture together with the application of the enterprise requesting to be allowed to shoot a documentary film. It includes the purpose to “document the discovery and the search for important historical artefacts” and “to discover artefacts of historical importance and, where appropriate, to recover them from the harbour waters on behalf of the Malagasy Government in order to ensure that they are not damaged, destroyed or permanently lost”.

According to the same documentation, the film team intended 'when the series and its broadcast is finished to place all information resulting from the scientific work and archaeological investigations at the disposal of both of the Malagasy Government and the educational institutions to be used as they please.'

The waters where filming was to take place are mainly concentrated around Île Sainte Marie (including the harbour on the northern shore of the Îlot Madame, the fort in the northwest of the Île aux Forbans, the Île aux Forbans and the area around the pirate cemetery), the Bay of Ambodimadiro and the Île de Mamoko (Nosy-Bé).

The film team was authorized by a document signed by the Minister of Culture and Crafts on 20 March 2015 (not covering the prior excavations) “to film any artefacts found on the location, and, should historically important artefacts be found, to recover them, after the necessary conservation measures have been put in place, and to see that they are housed in the appropriate museum.”

It was also stipulated that “Following validation of the amended text of the order dated 2 September 2014 on the 'Îlot de Madame Sainte Marie' protected area, that all underwater diving activity must be preceded by a preliminary dive in order to obtain footage to be viewed by the representatives of the film team together with the representatives of the Ministry of Culture and Crafts directed by the Head of the Antipiracy Brigade. All filming activities were to be accompanied by a team of representatives of the Ministry of Culture and Crafts, consisting of the Regional Delegate of the Ministry and two agents appointed by the Director of the Antipiracy Brigade [see document attached in Annex].

In accordance with the Terms of Reference of the mission and with the STAB statutes, the evaluation standard for the experts of the UNESCO STAB mission is exclusively that of the *Rules of the Annex of the Convention on the Protection of the Underwater Cultural Heritage*, which sets Rules for Activities directed at this heritage.

The experts did verify, if the project and the work of the film team was in line with this legal text, ratified by Madagascar, and recognized worldwide as the international standard for underwater archaeology. The STAB team underlines however that it was not been present during the work of the film team and has thus to rely on written and filmed material as well as on witness accounts.

Of especially valuable help in this regard were the observations of the representatives of the Ministry of Culture of Madagascar, in particular the Director of the Antipiracy Brigade General Dieudonné and

Mr Jacquit Vanghou from the museum, as well as the observations of John de Bry, present during the film team's excavations, which he kindly shared with the STAB experts and who he personally accompanied to the sites and the collections.

a. Absence of a project design

According to Rule 9 of the Annex of the Convention and prior to any activity directed at underwater cultural heritage, a project design for an activity must be developed and submitted to the competent authorities for authorization and appropriate peer review. No planned intrusive activity directed at underwater cultural heritage shall be undertaken without such a project design.

No such project design has however been submitted.

The project design should have included extensive information²⁰, especially on the objectives of the work, methodologies to be applied, team competences and members, the site management programme etc. The submission of this project design would have allowed the competent authorities of Madagascar, i.e. the Ministry of Culture, to fully evaluate the competence and background of the members of the team, while this information was only partially provided.

The project design would have also allowed the authorities to understand the fact that an excavation of the site was intended in addition to the filming and that as a consequence conservation needs would have to be met and an underwater archaeologist with competence for the project at hand should have been present.

The non-submission of this project design, which is however a major issue regulated by the Annex of the 2001 Convention, means that there are gaps in the authorization process. It also means that the activities directed at the underwater cultural heritage have necessarily not been carried out in accordance with an approved project design, which is however mandatory according to the 2001 UNESCO Convention.

²⁰ See Rule 10 of the Annex of the UNESCO 2001 Convention:

- (a) an evaluation of previous or preliminary studies;
- (b) the project statement and objectives;
- (c) the methodology to be used and the techniques to be employed;
- (d) the anticipated funding;
- (e) an expected timetable for completion of the project;
- (f) the composition of the team and the qualifications, responsibilities and experience of each team member;
- (g) plans for post-fieldwork analysis and other activities;
- (h) a conservation programme for artefacts and the site in close cooperation with the competent authorities;
- (i) a site management and maintenance policy for the whole duration of the project;
- (j) a documentation programme;
- (k) a safety policy;
- (l) an environmental policy;
- (m) arrangements for collaboration with museums and other institutions, in particular scientific institutions;
- (n) report preparation;
- (o) deposition of archives, including underwater cultural heritage removed; and
- (p) a programme for publication.

This absence of a project design and of a full disclosure of the project to the national authorities cannot be explained by the fact that some of the artefacts could have been chance discoveries (Rule 13) as they have been actively sought by an intrusive excavation and by using metal detectors.

For any further works on the sites located in Sainte-Marie it is strongly recommended to insist on the submission of an accurate and comprehensive project design.

b. Project objective, methodology and techniques applied

According to Rule 16 of the 2001 Convention's Annex, the methodology of the project must comply with the project objectives, and the techniques employed shall be as non-intrusive as possible. The purpose described, i.e. to "document the discovery and the search for important historical artefacts" was according to the Ministry of Culture of Madagascar understood to mean only the filming of the sites and the recovery of objects found on the surface of the seabed.

It should be reiterated that the absence of a clear project design contributed to the ambiguous interpretations of the activities the film team was allowed or intended to undertake.

Even if the film team had had an excavation permit, this excavation should have been undertaken according to applicable scientific standards, which was not the case.

It is surprising that in this case it was not archaeologists seeking an authorization for archaeological research during which a documentary film of their work was to be carried out, but a TV production company that solicited a filming permit and then paid for a team to undertake excavation work. This approach is extremely risky because the purpose of the project is the realization of the film. Thus, the film becomes a priority, not the archaeological research. Archaeological research should not be undertaken for the sole purpose of producing a film and filling it with content.

Indeed there are many indications that the film team tended to favour spectacular images on the background work and the discovery of a treasure and that operations or discoveries with little media interest, such as inventory and conservation work, were sacrificed for the benefit of operations likely to contribute to the film content. The international 'staging' of the discovery of an ingot immediately interpreted as a silver bullion without any metallographic analysis or even pure expert consultation being performed, demonstrates the shortcomings²¹.

²¹ Thus already before the STAB mission left to Madagascar the STAB experts had doubted the nature of the metal and also the outside metal ingot expert consulted by the UNESCO Secretariat, Corey Malcolm, Director of Archaeology at the Mel Fisher Maritime Heritage Society wrote on 11 May 2015: "The color and tone of the metal (at least from the photographs) and lack of encrustation are in line with lead recovered from a marine environment. And the weight – 55kg/121lbs. – is too high for what would be expected of a silver ingot of that size. If anyone is able to examine the Madagascar ingot firsthand, I would encourage them to identify the metal before anything else."

c. Competence and qualifications of the team

According to Rule 22 of the Annex of the 2001 Convention ‘Activities directed at underwater cultural heritage shall only be undertaken under the direction and control of, and in the regular presence of, a qualified underwater archaeologist with scientific competence appropriate to the project’. Also and according to Rule 23 ‘All persons on the project team shall be qualified and have demonstrated competence appropriate to their roles in the project’.

In the present case the team included several persons that had some experience with underwater cultural heritage²². The review of their CVs did however not reveal any extensive archaeological training that would have been needed in order to oversee independently the research of the sites at Sainte-Marie.

John de Bry, who was present, but was not the supervising archaeologist, commented on the qualifications of this team:

“While the Spanish archaeologist did set up a base line (ligne de référence) and grids, no proper recording of single artefacts took place, no measurement, so the spatial relationship to each other and the exact location of the artefacts was not established [sic]. I also noticed that the divers were fanning and picking up objects outside of the grids. All this is reflected in the way the artefacts are stored and numbered, usually in bunch except for a few rare exceptions. I have not seen any field notes taken by their archaeologist, nor have I seen a report.”

And indeed it shows in reviewing the way of storing and inventorying the artefacts (see Annex 2), in the lack of their proper marking, recording, documentation and storage, that the team lacked the scientific qualifications for the project at hand. Necessary analyses have not been undertaken, and the sites and artefacts have not been documented sufficiently.

The lack of qualifications and the necessary scientific approach led to confusion about the context of the artefacts. Their provenance from a well-identified site cannot be verified easily. The sites have been ill-identified, leading to conclusions favouring the production of the TV film, but not helping the understanding, research and preservation of the heritage site at hand.

d. Conservation and site management provided

According to Rule 24, the conservation programme shall provide for the treatment of the archaeological remains during the activities directed at underwater cultural heritage, during transit and in the long term. Conservation shall be carried out in accordance with current professional standards.

In the present case the recovered artefacts are stored without any logic or care. It is difficult to make out, which artefact came from which site and has been found in which context. A

²² The full list of team members and the CVs of the relevant persons has been provided to the UNESCO STAB team.

more detailed review of this issue is given in Annex 2, accompanied with recommendations for the future follow up.

The STAB mission noted that there was much scope to strengthen the site management programme. It should provide for the protection and management *in situ* of the underwater cultural heritage found, in the course of and upon termination of fieldwork. The programme should also include public information, reasonable provision for site stabilization, monitoring, and protection against interference.

The high-profile announcement of a silver treasure and the relatively concrete indication of the spot where it was found, do not contribute in the slightest to the future preservation of the sites in Sainte-Marie Island.

Rather, they are an invitation to both national and international treasure-hunters. The site-management approach of October Films, could be interpreted as an invitation to hunt for treasure. Instead of verifying the finds, notifying the authorities and protecting the site, the highest possible media coverage was sought.

It is strongly recommended that the local and international population be informed of the fact that the metal ingot found is in fact not made out of silver, for the sake of protecting the shipwreck sites in Sainte-Marie Island from pillage.

e. Lack of the curation of project archives

According to Rule 32 and 33 of the 2001 Convention's Annex, arrangements for curation of the project archives shall be agreed to before any activity commences, and shall be set out in the project design. The project archives, including any underwater cultural heritage removed and a copy of all supporting documentation shall, as far as possible, be kept together and intact as a collection and made available for professional and public access as well as for the curation of the archives. This should have been done as rapidly as possible.

In the present case, and as previously stated, artefacts (such as gold coins and the metal ingot) have not been inventoried. The collections have not been kept together or documented appropriately and have not undergone the necessary follow-up research and analysis.

D. Conclusions

As a conclusion it can be said, that several historic wrecks are indeed lying in the bays of Sainte Marie Island. They are reasonably preserved and their extensive research would be of considerable archaeological interest.

For any further research it is however recommended to follow closely the regulations of the Annex of the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage, as ratified by Madagascar, and to only permit interventions by a competent team under the lead of a qualified underwater archaeologist and under a strict control by the authorities.

The work of October Films and its lead-explorer Barry Clifford, undertaken in spring 2015, was distinguished by an unscientific approach, which has not respected the regulations of the 2001 Convention and which has considerably endangered the scientific understanding of the sites concerned and the preservation of the artefacts recovered. From a scientific point of view, the results of the work can be qualified as unreliable. Examples of the approach and the results obtained are given in the report above.

E. Recommendations

1. **Further archaeological investigations and historical background research on the area off Sainte-Marie are recommended.** The area was subject to heavy ship traffic for centuries, and the large volume of wrecks in the area requires a broad multi-disciplinary approach to inventory and research the highly significant and scientifically important wrecks;
2. **For any further works on the sites located in Sainte-Marie it is strongly recommended to insist on the submission of an accurate and comprehensive project design** in line with the 2001 UNESCO Convention, and to insist on the qualifications of the team proposed and to make sure intrusive interventions on any shipwreck site have a scientific goal and do not only serve media interests;
3. **It is strongly recommended that the local inhabitants and international community be informed of the fact that the metal ingot found is in fact not made out of silver,** for the sake of protecting the shipwreck sites in Sainte-Marie Bay and other areas from pillage;
4. **It is recommended to adapt Madagascar's national law to fully implement the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage,** especially also regarding sanctions for violations and the authorization of intrusive interventions on archaeological sites;
5. **To implement the UNESCO 2001 Convention the elaboration of a national plan for underwater cultural heritage is recommended.** In order to adopt a long-term sustainable plan for the management of underwater cultural heritage in Madagascar a consideration of all possible types of heritage, all kinds of situations and objectives is needed. This should also address the aim of providing for the establishment, maintenance and updating of an inventory of underwater cultural heritage, the effective protection, conservation, presentation and management of underwater cultural heritage, as well as research and education and the establishment of a competent authority;

In the long term, it should also allow for an increase in the public benefits of underwater heritage sites, for instance, through the completion and improvement of the **Sainte-Marie museum**;

6. **It is recommended to increase national capacities.** Only trained and capable underwater archaeologists, site managers, conservation specialists and legal experts can in the long term ensure the protection of Madagascar's underwater cultural heritage. Here, international

cooperation is of crucial importance, and it is recommended to make use of the network provided through the UNESCO 2001 Convention;

7. **It is recommended to augment the security and surveillance of underwater cultural heritage.** In its current situation, Madagascar can accord little capacity to this crucial task. The UNESCO Advisory Body therefore recommends to all States Parties to the 2001 Convention to assist in this matter. It is moreover recommended to prosecute firmly any pillaging, without exception, and to encourage with the help of UNESCO, national authorities of States Parties and Interpol, **to recover looted artefacts, such as those from the Etoile Reef Wreck (*Sao Idefonso*);**

The mission led by the STAB in Madagascar has proven that many artefacts of the Etoile reef wreck, the *Sao Idefonso* (guns, copper ingots bearing the stamp of the Fugger bankers, etc.) are still on the territory of Madagascar and could be recovered during a police operation. It would be important to do so, as the *Sao Idefonso* is one of the very few wrecks in the world bearing witness to the first decades of the Portuguese explorations of the Indian Ocean and of exchanges between Europe and the Far East.



Marking of the Fugger family on a copper ingot found on the Sao Idefonso © DRASSM

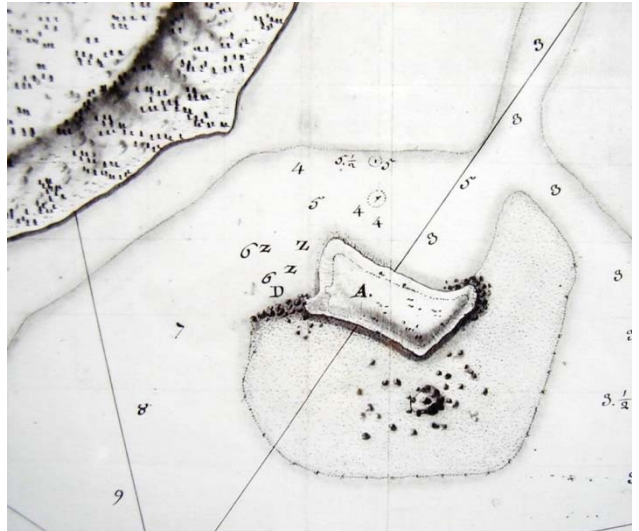
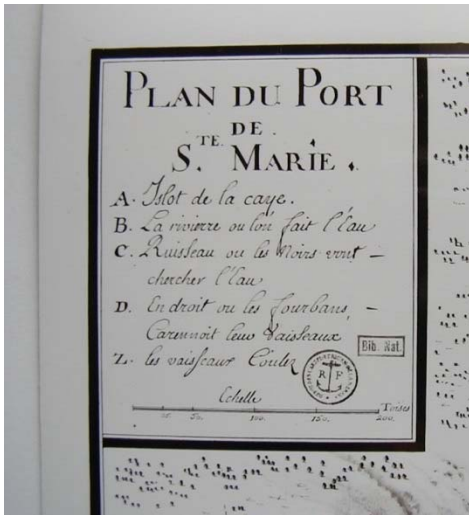
8. **All States Parties to the Convention of 2001 are reminded to bear in mind their obligations under Article 19 and 20 of the Convention.** This includes the obligation to cooperate and assist each other in the protection and management of underwater cultural heritage under this Convention, including, where practicable, collaborating in the investigation, excavation, documentation, conservation, study and presentation of such heritage. Moreover, each State Party shall take all practicable measures to raise public awareness regarding the value and significance of underwater cultural heritage and the importance of protecting it under this Convention.
9. **It is recommended that a community awareness-raising programme be implemented.** This will ensure that local stakeholders are made aware of the value of long-term, sustainable site management in terms of economic and social benefits. Furthermore, an awareness-raising programme can ensure that local stakeholders take an interest in activities carried out on underwater cultural heritage sites and be familiar with the relevant, official reporting mechanisms for policing and protecting such sites.
10. Further detailed recommendations on the **conservation** of the artefacts held in the Sainte-Marie museum appear in Annex 2.

Annex 1 – Artefacts, maps and photographs



Coins recovered off Ilot Madame, Sainte-Marie, in 2010 (coin SMS 103 is represented twice)

© John de Bry





Annex 2 – Conservation report

A. Condition assessment of the artefacts recovered off Ilot Madame

a. Artefacts recovered during the 2000 and 2010 campaigns

Some of the artefacts collected during the 2000 and 2010 operations are preserved on the third floor of the museum in the office of the responsible museum officer, Jacquit Vanghou. They are kept in numbered bags placed in 3 large plastic boxes with fitted cover. One of them contains items still placed in water. We also note the presence of 2 smaller boxes and 3 bowls also containing remains placed in water. In all there are approximately 0.7 m³ of artefacts.

The artefacts seem not to have been cleaned. They are however stored without the necessary care and stacked together.

b. The “laboratory”

A temporary storage of archaeological remains brought to light during the 2015 campaign in the bay of Sainte Marie was installed in the main room on the ground floor of the museum. The artefacts are stored in various containers, bowls or cut plastic bottles. It is surprising that neither the film team nor the previous teams have proceeded with the acquisition of more appropriate storage equipment considering the funds apparently mobilized for the purpose of their operations.

The artefacts appear to have been cleaned only slightly when they were taken out of the water. Sediment covers some objects, which can cause the development of micro-organisms especially on organic materials and bones.

It is also noted that:

- The bins are labelled by making use of different codes, whose meaning is not always immediately clear, as for instance TP3 2.5.15 SMS135; FD.TP2 SIFL 13.04.15; Container 3 MAD.2015.FD.TP 002? 4 Glass; 4.7.16 FD Test Pit # 1 Blue + white porcelain; SMS x4 x1 187 101 in 2% NaHCO₃ in H₂O
- The different markings are confusing and do not facilitate easy identification of the remains.
- In view of this manner of labelling, it seems that the remains have been sorted by area and collection date. They seem to come mostly from site Sainte Marie 2, identified as “FD”, probably meaning “Fiery Dragon”, and seven bins are labelled “AG”, probably standing for “Adventure Galley”, which seems to be the site that UNESCO’s experts have designated by convenience Sainte Marie 1.

Three bins are only designated by the mention of the site and three other bins do not bear any indication of the origin of the materials contained therein.

A sorting by materials was done on some artefact sets. There are thus 63 containers distributed as follows:

Material	total
cowries	1
various, for re-submersion	1
bones	2
stone	2
fruit pits	2
waterlogged wood	2
glass	3
concretions	5
metal	7
terracotta	12
various	26

This set of materials, recovered in 2015, represents a total volume of about 0.35 m³ of archaeological material, without including the ingot stored at the Presidency of the Republic of Madagascar in Antananarivo.

The remains are kept in baths, whose nature is not specified, except on 3 containers containing objects identifiable as copper alloys. The words "in 2% NaHCO₃ in H₂O" are indicated on the container. However, this vague mention is confusing. Indeed, the empirical formula NaHCO₃ is that of sodium bicarbonate, commonly referred to as baking soda, a product generally used for maintenance of machines, for cleaning houses or dental hygiene. For the extraction of copper chlorides and the storage of copper alloys before an archaeological stabilization treatment, the specialist uses a sesquicarbonate solution (equimolar solution of sodium hydrogen carbonate NaHCO₃ and sodium carbonate Na₂CO₃) at concentrations of 1% to 5%. The mission noted that the pH of the baths was between 9 and 11. It is therefore very likely sesquicarbonate.

As can be seen, mislabelling of storage baths can cause confusion or even accidents if the necessary security measures are not taken.

In general, storage in chemical baths involves the establishment of strict hygiene and safety measures: the accurate preparation of mixtures and their monitoring, individual and collective protection of personnel and the identification of bathes and mixtures using pictograms. Finally, disposal and reprocessing of corrosive and polluting chemical solutions should be considered even before having recourse to them. These conditions are not even nearly satisfied on Ilot Madame, since in its current state, the building that houses the collections has neither running water nor an evacuation point. It therefore appears impossible to recycle the chemicals used.

With respect to concerns about the contents of other bins, Jacquit Vanghou informed us that the objects were simply immersed in water drawn from the well. It is noted that the baths are not covered with an insulating film that would limit the evaporation and some objects are not fully immersed.

We did not, however, observe the development of micro-organisms during the assessment. This fact is surely due to the care taken by Jacquit Vanghou, who regularly changes the water. He should be congratulated for this.

c. The 2015 inventory

The inventory provided by John De Bry suggests that there have been 4 sampling areas, numbered FD.TP1 to FD.TP4, on the wreck Sainte- Marie 2, called "FD" meaning apparently "Fiery Dragon". By analysing the inventories it is observed that the sections differ from one recovery area to another and they are not always indicated. No archaeological data is given to justify these variations, which do not allow the easy understanding of the data and generate confusion. An identical inventory common to all sampling locations on the site should be established.

At this stage:

- Inventory "Test Pit 1" contains 6 items: Date; object number (as MAD.2015.FD.TP1 followed by a progressive number from 1 to 18.) material; count; notes; Photos (Y / N)
- Inventory "Test Pit 2" comprises 7 sections: Date; SMS (number); object number (SF or C followed by a number); material; count; Locus (in the form MAD.2015.FD.TP2 followed by an increasing number from 1 to 16 and then 20 and 21 without understanding why the numbers 17, 18, 19 does not appear; photo (Y / N)
- Inventory "Test Pit 3" has 8 sections: Date; SMS bag number (number); Number (POA); material; count; locus = MAD.2015.FD.TP3; Photo (Y / N); notes
- Inventory "Test Pit 4" contains 8 sections: Date; SMS bag number (number); Number (POA); material; count; locus = MAD.2015.FD.TP4; Photo (Y / N); report on the condition.

Many artefacts were inventoried by lot, which can be justified in the case of similar elements, shards of ceramic of the same type or a nail lot for example. However, some remains deserve to be individualized as for instance the Chinese porcelain fragment of the find MAD.2015.FD.TP1.012, which bears the signature of Emperor Chenghua on its bottom. This fragment is isolated in a bag, but the inventory makes no distinction. It is simply recorded in the 132 fragments of blue and white porcelain.

Given the duration of the expertise the experts were not able to carry out the complete inventory of the remains preserved in the laboratory.

Analysing 3 test containers, however, revealed several inconsistencies between the inventory and markings of the remains in this laboratory. The inventory numbers do not always correspond to the labelling of the containers. Inventoried items have not been found and it is noted that remains found in the deposit were not recorded in the inventory.

The lead ingot, presented as a silver ingot, has not been inventoried on any of the Sainte Marie sites, which does thus not allow us to formally identify, from which wreck it was in fact discovered. This is somewhat surprising; given the importance that was given to this discovery.

During the assessment, it was difficult to clearly identify the collections as a result of repeated errors observed between the contents of bins and the official inventory. Thus, in a container noted SMS 101

- SMS 187, we note the presence of 5 copper alloy nails while in the inventory 1 only a single nail is registered under the SMS inventory number 187 and while the N° SMS 101 inventories porcelain, ceramics and bone. The same container carrying the “AG” label for *Adventure Galley*, contains a tin spoon, while only a single tin spoon is found in the inventory and by which the discovery is attributed to the site Sainte-Marie 2 (!).

Furthermore, in a bucket labelled SMS 136, we find a label SMS 198 and 4 bone fragments, one fragment of a coconut, 1 folded lead plate, two pieces of glass, 6 fragments of terracotta and 13 fragments of porcelain. Meanwhile, in a plastic bottle bottom we find another label indicating the same number SMS 136, and we count the presence of 7 porcelain fragments, 1 piece of terracotta, 1 piece of bone, one metal concretion, 2 coconut fragments and 1 small angel's head, maybe of ivory, crowned with wings. If the two containers are combined, we find therefore under the inventory number 136 SMS: 5 bone fragments, 3 coconut fragments, 1 folded plate of lead, 2 glass fragments, 7 fragments of terracotta, 20 porcelain fragments, 1 metal concretion, 1 small head of a crowned angel with wings and 1 numbered label SMS 198. However, in the inventory, we found under the SMS 136 and SMS 198 numbers:

date	SMS	object number	material	count	locus	photo
26.4.15	136		wooden carving	1	MAD.2015.FD.TP2	Y
	136		porcelain	8	MAD.2015.FD.TP2	Y
	136		concretion	1	MAD.2015.FD.TP2	Y
	136		bone	1	MAD.2015.FD.TP2	Y
	136		ceramic	3	MAD.2015.FD.TP2	Y
	136		Cu Alloy nail	1	MAD.2015.FD.TP2	Y
2.5.15	198		porcelain	12	MAD.2015.FD.TP2	Y
			cowry	1	MAD.2015.FD.TP2	Y
			bone	3	MAD.2015.FD.TP2	Y
			glass	4	MAD.2015.FD.TP2	Y
			lead	1	MAD.2015.FD.TP2	Y
			ceramic	6	MAD.2015.FD.TP2	Y
			ceramic	10	MAD.2015.FD.TP2	Y

This totals 4 bone fragments, 0 coconut fragments, 1 lead element, 4 glass fragments, 19 ceramic fragments, 20 porcelain fragments, 1 concretion, one fragment of carved wood, 1 copper alloy nail and 1 cowrie. Thus the comparison between the objects brought to the inventory and the artefacts found in the storage shows that two glass fragments, one nail and one cowrie brought to the inventory were not found in the trays. 3 coconut pieces, 11 ceramic fragments and one bone fragment found in storage are missing from the inventory...

In general, we finally note that these inventories are very brief and that except for a few nails, a cowrie and a tin spoon, the remains have not been identified. It does not seem that these artefacts were systematically photographed and none of them were apparently measured.

These inventories inform therefore only on some of the materials collected in the bay, and without reflecting all of them, and indicate for each of them only a vague non-exploitable area of origin in the absence of a plan.

B. Recommendations for the conservation of the artefacts and their inventory

a. Cleaning

Archaeological remains should be cleaned thoroughly in running water and using small, specific tools, brooms, brushes, and wooden picks. If there is no running water, the cleaning can be carried out in sea water in a basin. In general, make sure to work over a mesh or sieve that can easily retrieve small items. Cleaning aims at eliminating the soft sediment, sand, algae or more that mask the surface of the object. It aims also at enhancing the visibility of the profile of the surface of the object and shall limit the development of micro-organisms. The objects should however not be freed of concretions. These protect the object and its surface. An over-cleaned object will degrade prematurely. Concreted metal objects should be stored in water. They can be X-rayed to determine the relevance of a conservation-restoration treatment.

b. Separation by materials and labelling

Archaeological remains should be sorted by material. Although confusing, the current labelling of the baths and artefacts should be scrupulously preserved in order to be ultimately confronted with the information that should be made available by the Barry Clifford team.

c. Inventory

It will be necessary to establish a comprehensive and detailed inventory of the remains found in the laboratory and those kept in the office of Jacquit Vanghou to identify the following:

- inventory number
- name, which means to sort the remains which can be inventoried individually or by batch
- brief description
- material
- recovery location
- dimensions
- brief condition report
- photo
- sketch
- drawing with characteristic elements
-

d. Selection of collections

The conservation-restoration treatment of archaeological remains from submerged areas involves scientific and technical skills, heavy equipment and the use of chemicals, which cannot be ensured in Madagascar at present. For artefacts, requiring extensive treatment, the first step should therefore be to limit their degradation. This is the objective of the recommendations of the present document.

Secondly, it will be necessary to sort these remains to determine, based on the study of the site and the possibility of a public presentation, which remains should be kept and sent to a conservation-restoration laboratory. This selection should be made in the framework of the museum, based on the scientific documentation that can be drawn from the archaeological sites and remains. The joint expertise of an archaeologist, museum staff and a conservator will be necessary.

After this selection, some remnants can be dried after suitable desalination. Other materials should be stabilized. Finally, a certain number of artefacts should be re-immersed directly on the site to ensure at least their *in situ* conservation. This option should be preferred in the absence of means of conservation and presentation.

e. Freshwater storage awaiting a stabilization treatment

Metallic and organic remains and fragile objects consisting of bone, ivory, glass or fine ceramics cannot be dried without prior treatment. For short-term storage, the remains must be completely immersed in water. The containers filled with water need to be covered with a polyethylene film. The identification number needs to be attached to the container and to be put into the container. No wedging material should be left in the long-term storage bins as these materials degrade and cause mould growth.

Similar objects may be placed in the same tank, but it is necessary to ensure that there is no friction between them and that they are clearly individualized if they do not have the same inventory number.

The water level of the tanks and their sanitary status should be monitored regularly. The water should be changed regularly, every week or every two weeks, to avoid the development of microorganisms. In case of the infestation bins, including tanks containing organic materials, every artefact should be cleaned, with clear water and then with ethanol. The bin must also be cleaned with a detergent and then thoroughly rinsed.

This water storage mode is for a very short-term storage, a few weeks to a few months, and needs to receive regular monitoring.

f. Desalination

Some materials, unworked bone, ceramics and glasses, must be desalted before being dried. In no case an object should be dried without being desalted. Desalination is carried out by fresh water bathes with tap water, well or rainwater. This treatment, simple and effective, requires, however, large

amounts of water and time. The duration of the desalting needed is varying. This variation is due to the porosity of the objects and their volume.

The extraction of soluble salts should be regularly monitored by measuring the conductivity of the desalting bath, which ensures a complete desalination. In fact, the salts present in the water increase its electrical conductivity. If you do not have a conductivity meter to check the desalting it is important to extend the desalting to the maximum duration especially if the object is large and thick. The same applies to ceramics covered with a glaze, like lead-glazed pottery, for which treatments can be very long. Their desalination is indeed hampered by the presence of the impermeable glaze-layer. Several months will sometimes be necessary if we are to avoid the risk of crystallization of salts in the glaze.

Desalting using a conductivity meter

Conductivity meters are sold by Manutan, Fisher Bioblock, Lab and Co and by other providers from 60 € onwards. Care must be taken to use a device with a measuring range between 0 and 3999 micro Siemens. The probe must be rinsed with deionized water before and after each measurement. The desalination treatment takes place over several weeks, it is imperative to note on one card all information collected at each stage. The protocol is as follows:

Start of treatment: Placing in bath

- Measuring the temperature and conductivity of the initial tap water,
- Immersion of items per batch,
- Covering the bath with a polyethylene film and of the container with a lid to minimize evaporation,

Every week or every two weeks, continued desalting treatment:

- Agitation of the bath before each measurement,
- Measurement of the conductivity and temperature of the solution,
- When the conductivity of the bath is stable for several weeks, the bath should be changed and the same procedure repeated as at the beginning of the treatment.

End of treatment:

- Stop baths when the conductivity of the bath is similar to that of the start of the treatment (tap water)

Desalting without conductivity meter

In the absence of a conductivity meter, desalination will take longer to ensure its effectiveness. It will be necessary to change the bath every week, for a period of 6 months minimum. This amount of time, chosen arbitrarily, should be sufficient to desalinate the various terracotta materials, glass and bone present in the laboratory of Sainte Marie, as long as the baths are changed regularly. If the bath cannot be changed weekly, the duration of the desalination should be extended to one year.

Drying after desalination of the following materials: unworked bone, ceramic and glass and markings

The objects must be dried in the open air in a cool and shaded place. They should not be dried in the sun. The most characteristic items should be marked. A transparent varnish marking needs to be placed on a non-visible part of the object, the bottom or its interior. The inventory number should be written in black ink or white ink based on the colour of the object. A second layer of varnish needs then to protect the marking (take care to let dry between each step).

g. Storage

Once objects are dry they should be stored by material in bags or plastic boxes and it should be ensured to always keep their inventory number with them. The inventory number needs to be noted on the bag or container. Also slide a label bearing the same information inside.

It is important not to store wet objects in closed bags. Moisture trapped in the bags entails the development of microorganisms, harmful to the remains. Given the humidity in Sainte-Marie cardboard boxes should not be used for storage and more sustainable corrugated boxes or plastic polyethylene boxes favoured, as those currently used in the museum.

All artefacts currently recovered in the bay represent less than 1m³. A small shelf and some boxes would properly store the remains and make them available for study and possible presentation.

C. Recommendations for further museum development²³

The recommendations regarding the museum at Sainte-Marie relate to 4 areas:

- a. The study of the collections, which is an indispensable preliminary task;
- b. The programming of curative conservation treatment and restoration of collections;
- c. The establishment of partnerships with national cultural institutions, indispensable to the survival of the museum;
- d. The finalisation of the construction work in view of creating a museum.

a. The study of the collections, indispensable preliminary work

According to the ICOM Statutes, adopted at its 21st General Conference in Vienna (Austria) in 2007, a museum is a permanent non-profit institution in the service of society and its development. Open to the public, this institution acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of study, education and enjoyment.

UNESCO's recommendations of 14 December 1960 concerning the most effective means of rendering museums accessible to all, define "by the museum any permanent establishment administered in the general interest to preserve, study, enhancing by means various and basically expose for enjoyment

²³ We will not discuss here the crafts collection, presented by the museum before its closure for renovation, since the mission was not focused on this collection.

and education of the public a set of cultural value: artistic objects collections, historical, scientific and technical, botanical and zoological gardens and aquariums."

The international community is committed to putting heritage, tangible or intangible, at the heart of the definition of the museum. But a collection is not limited to the accumulation of objects, even if aesthetic. For objects to build a heritage, they have to have a cultural value, a context and a story. Archaeological remains from the wreckage of the Bay of Sainte-Marie Island are for the moment being amputated of a part of their cultural value for lack of scientific evidence, correct research and analysis.

The above recommendations for the conservation of the remains and their inventory should be put in place and be followed imperatively by the scientific study of the sites and the archaeological material. This study should involve particularly the recovery and study of all data collected by previous teams: inventory, photographs, drawings, minutes, sketches, and the further research on the sites.

Without a true scientific study of the sites and relics, the museum cannot claim to present them to the public.

b. The programming of curative conservation treatment and restoration of collections

After the sorting of artefacts is completed, there will remain 3 categories of materials, which will constitute the objects collection:

- The remains that can be dried after thorough desalting. This could possibly be done by Jacquit Vanghou following the recommendations of this document and with the advice, even over distance, of a conservation-restoration laboratory;
- Artefacts to be sent in conservation laboratory;
- Artefacts to be re-immersed. The re-immersion will be conducted by archaeologists and must be documented.

A planning for the above should be implemented according to conservation emergencies and budgets that can be allocated to the treatment.

c. The establishment of partnerships

The current museum manager, Jacquit Vanghou, is extremely isolated. In the view of establishing a museum it is essential that a team be formed. To limit this isolation and ensure continuity of the museum it would be appropriate to establish partnerships with national and international cultural institutions. These partnerships would provide assistance to the museum of Sainte Marie in developing a museum and possibly allow sharing resources.

d. The finalisation of the construction work from a conservation point of view

The climate

The museum building and the staff efforts have to satisfy certain temperature requirements. Standards define the climatic conditions needed for the conservation of each material. It is possible to simplify and to consider only two types of environments or "climates":

- Materials such as ceramics, glass, stone, bones and dry organic materials should be stored in a deposit maintained at an average rate of 50% Relative Humidity (RH) (+ or 5% variation acceptable) and a temperature between 15 ° C and 25 ° C (+ or 5 ° C of variation allowed).
- Metal should be stored in a dry climatic environment: less than or equal to 35% RH and a temperature between 15 ° C and 25 ° C (+ or- 5 ° C permitted variations).

These standards are very restrictive, even if one takes into account only two major categories of materials and only 2 types of "climates" to be created and managed. It is thus indeed futile to consider obtaining strict and equal weather conditions in Sainte-Marie and in the museum. It is nevertheless most important to ensure the stability of the climatic environment of the archaeological artefacts. Variations in day / night temperatures or in relative humidity at the time of major rains may be more dramatic for archaeological remains than a stable homogenous environment, even if it does not meet the highest museum standards.

To overcome an unsuitable 'climatic environment' it is essential to establish a regular monitoring of the state of conservation of the archaeological remains especially of those which are sensitive to climatic variations such as organic materials or metals. Other materials need also to be monitored, as in a very humid climate (greater than 60% relative humidity) even dead materials, terracotta and glass, may develop mold if they are dusty.

Storage and Safety

An area of storage, however small, should be installed in the building to allow preserving the remains that are not exposed or even organize rotations depending on possible temporary exhibitions. This storage must be secured, equipped with storage shelves and furniture to allow safe handling of objects. In case there are valuable archaeological artefacts in the collection, it is moreover imperative to put effective security measures in place.

Electricity and running water

It is essential that the building is equipped with electricity and running water. Internet connection may also be helpful.



Diagnostic et expertise en corrosion et conservation des patrimoines

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A l'attention de Michel L'HOURL
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conseil consultatif scientifique et
technique de l'UNESCO
7 place de Fontenoy
75007 PARIS

Paris, le 19 juin 2015

Réf : 146/15

Objet : Analyses élémentaires d'un échantillon de lingot

Monsieur le Chef de la Mission Scientifique,

Ce jour, 19 juin 2015, vous nous avez confié pour analyses un échantillon de lingot métallique transmis par Monsieur le Président de la République de Madagascar et prélevé sur le site archéologique de la baie de Sainte-Marie à Madagascar.

Je vous confirme avoir réalisé les analyses élémentaires de composition par la technique de fluorescence X portable dès la remise en main de cet échantillon. Vous trouverez ci-joint les résultats complets de ces analyses sous la forme d'un tableau.

Les conclusions de ces analyses sont formelles : l'échantillon prélevé est issu d'un lingot base plomb (94,50%) dans lequel les éléments suivants ont également été découverts : Arsenic (3,4%), Tungstène (1,13%), Thallium (0,62%), Molybdène (0,27%) et Palladium (0,13%). Le complément de teneur à 100% est fait par des éléments dit « low elements », non détectables en fluorescence X portable.

En aucun cas, et même si la teneur en plomb peut être « pondérée » lors d'analyses réalisées en laboratoire (grâce notamment à une meilleure préparation de surface), cet échantillon ne peut en aucun cas avoir été prélevé sur un lingot d'argent.

Je soussigné, Jean-Bernard MEMET, fondateur - cogérant de la société A-CORROS et Docteur en sciences des matériaux atteste l'exactitude et la conformité des résultats livrés dans le rapport d'analyse.

Jean-Bernard MEMET
Fondateur - Cogérant
A-CORROS

Copie : Mme Ulrike GUERIN, secrétaire générale ICUCH - UNESCO

A-CORROS Expertise

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Identification anatomique d'un ensemble de 5 pièces de bois recueillies sur l'épave Sainte-Marie 2 (Madagascar).

Les pièces analysées sont : une pièce de bordé externe, une pièce de bordé interne, un élément de vaigrage, une membrure et la carlingue. L'expertise anatomique a nécessité un examen, au microscope optique en transmission, de coupes minces obtenues à l'aide d'une lame de rasoir selon les trois plans traditionnels d'observation (transversal, longitudinal tangentiel et longitudinal radial) montées entre lame et lamelle.

Toutes les pièces correspondent au même type anatomique de bois.

Description anatomique.

Bois à zone poreuse à semi-poreuse. Vaisseaux du bois final isolés ou accolés radialement par 2 ou 3. Parenchyme paratrachéal et localisé en bandes marginales. Perforations simples. Ponctuations intervasculaires disposées en quinconce. Ponctuations radiovasculaires distinctement aréolées, identiques aux ponctuations intervasculaires. Rayons larges de 2 à 4 cellules, homogènes, composés de cellules couchées et à parois peu ponctuées. Hauteur des rayons allant jusqu'à une vingtaine de cellules. Présence de fibres trachéides et fibres libriformes. Thylles présents.

Identification.

Tectona sp. Teck.



Coupe transversale Coupe radiale

Photos : F. Guibal



Frédéric GUIBAL

CR1 CNRS

Aix-en-Provence, le 30 juin 2015



MINISTRE DE LA CULTURE ET
DE L'ARTISANAT

LE MINISTRE

N° 108 - 2015/MCA.-

PROTOCOLE D'ACCORD

**CONCERNANT LE TOURNAGE DE FILM DOCUMENTAIRE EN ARCHEOLOGIE MARINE ET
TERRESTRE diligenté par la société OCTOBER FILMS POUR UNE PERIODE DE SIX
SEMAINES A MADAGASCAR**

Lieu de tournage bien délimité :

- Site 1 : Ile Sainte Marie ;
- Site 2 : La baie d'Ambodimadiro et l'île de Mamoko (Nosy-Be).
- Site 3 : Fianarantsoa (Alakamisin' Ambohimaha).

1. PREAMBULE

Considérant que d'une part, L'OBJECTIF DE L'EXPEDITION DE TOURNAGE DE SIX SEMAINES D'OCTOBER FILMS tel qu'il ressort de la lecture du dossier de demande d'autorisation de tournage de film documentaire émise par OCTOBER FILMS (reproduction textuelle, p. 2), consiste en ceci :

- a) Documenter sur la découverte et la recherche d'objets historiques importants au nom du peuple malgache ;
- b) Découvrir des objets d'importance historique et, le cas échéant, de les récupérer des eaux du port de la part du gouvernement malgache, afin de s'assurer qu'ils ne soient pas endommagés, détruits ou perdus à jamais ;

Considérant que d'autre part, selon le même dossier L'OCTOBER FILMS prévoit qu'« à la fin de la série et de sa diffusion, toutes les informations résultant des travaux scientifiques et des enquêtes archéologiques seront mises à la disposition à la fois du gouvernement malgache et des établissements d'enseignement de Madagascar pour être utilisées comme ils l'entendent » (reproduction textuelle, p. 2) ;

TOUTEFOIS,

Considérant que depuis la suspension de l'autorisation de tournage par lettre n° 007/2005-MCA du 09 mars 2015, diverses démarches diligentées par la société OCTOBER FILMS « pour avoir gain de cause » avaient abouti jusqu'à la saisine du Conseil du Gouvernement pour solution ;

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[Crest] REPUBLIC OF MADAGASCAR

[Crest]
MINISTRY OF CULTURE AND
CRAFTS

THE MINISTER
NO 108- 2015/MCA.-

AGREEMENT

**FOR THE SHOOTING OF A DOCUMENTARY FILM ON MARINE AND LAND
ARCHAEOLOGY by the company OCTOBER FILMS FOR A PERIOD OF SIX WEEKS IN
MADAGASCAR**

Exact filming location:

- Location 1: Île Sainte Marie;
- Location 2: Baie d'Ambodimadiro and Île Mamoko (Nosy-Be).
- Location 3: Fianarantsoa (Alakamisin' Ambohimaha).

1. BACKGROUND

On the one hand, the purpose of THE SIX-WEEK FILMING EXPEDITION BY OCTOBER FILMS as described in the documentation submitted in the application for a permit to shoot the documentary film issued by OCTOBER FILMS (see copy, page 2), is as follows:

- a) to document the discovery and the search for important historical artefacts in the name of the people of Madagascar;
- b) to discover artefacts of historical importance and, where appropriate, to recover them from the harbour waters on behalf of the Malagasy Government in order to ensure that they are not damaged, destroyed or permanently lost.

On the other hand, according to the same documentation, OCTOBER FILMS intends 'when the series and its broadcast is finished 'to place all information resulting from the scientific work and archaeological investigations at the disposal of both of the Malagasy Government and the educational institutions to be used as they please.' (see copy, page 2);

HOWEVER,

After the suspension of the filming permit by letter No 007/2005-MCA dated 09 March 2015, various requests were made by the company OCTOBER FILMS to the Governing Council for a decision 'in order to achieve a successful outcome';

[Stamp:]
MINISTRY OF CULTURE AND CRAFTS

THE MINISTER
[Initials] [Initials]

Page 1

Rules concerning activities directed at underwater cultural heritage

I. General principles

Rule 1. The protection of underwater cultural heritage through in situ preservation shall be considered as the first option. Accordingly, activities directed at underwater cultural heritage shall be authorized in a manner consistent with the protection of that heritage, and subject to that requirement may be authorized for the purpose of making a significant contribution to protection or knowledge or enhancement of underwater cultural heritage.

Rule 2. The commercial exploitation of underwater cultural heritage for trade or speculation or its irretrievable dispersal is fundamentally incompatible with the protection and proper management of underwater cultural heritage. Underwater cultural heritage shall not be traded, sold, bought or bartered as commercial goods.

This Rule cannot be interpreted as preventing:

(a) the provision of professional archaeological services or necessary services incidental thereto whose nature and purpose are in full conformity with this Convention and are subject to the authorization of the competent authorities;

(b) the deposition of underwater cultural heritage, recovered in the course of a research project in conformity with this Convention, provided such deposition does not prejudice the scientific or cultural interest or integrity of the recovered material or result in its irretrievable dispersal; is in accordance with the provisions of Rules 33 and 34; and is subject to the authorization of the competent authorities.

Rule 3. Activities directed at underwater cultural heritage shall not adversely affect the underwater cultural heritage more than is necessary for the objectives of the project.

Rule 4. Activities directed at underwater cultural heritage must use nondestructive techniques and survey methods in preference to recovery of objects. If excavation or recovery is necessary for the purpose of scientific studies or for the ultimate protection of the underwater cultural heritage, the methods and techniques used must be as non-destructive as possible and contribute to the preservation of the remains.

Rule 5. Activities directed at underwater cultural heritage shall avoid the unnecessary disturbance of human remains or venerated sites.

Rule 6. Activities directed at underwater cultural heritage shall be strictly regulated to ensure proper recording of cultural, historical and archaeological information.

Rule 7. Public access to in situ underwater cultural heritage shall be promoted, except where such access is incompatible with protection and management.

Rule 8. International cooperation in the conduct of activities directed at underwater cultural heritage shall be encouraged in order to further the effective exchange or use of archaeologists and other relevant professionals.

II. Project design

Rule 9. Prior to any activity directed at underwater cultural heritage, a project design for the activity shall be developed and submitted to the competent authorities for authorization and appropriate peer review.

Rule 10. The project design shall include:

- (a) an evaluation of previous or preliminary studies;
- (b) the project statement and objectives;
- (c) the methodology to be used and the techniques to be employed;
- (d) the anticipated funding;
- (e) an expected timetable for completion of the project;
- (f) the composition of the team and the qualifications, responsibilities and experience of each team member;
- (g) plans for post-fieldwork analysis and other activities;
- (h) a conservation programme for artefacts and the site in close cooperation with the competent authorities;
- (i) a site management and maintenance policy for the whole duration of the project;
- (j) a documentation programme;
- (k) a safety policy;
- (l) an environmental policy;
- (m) arrangements for collaboration with museums and other institutions, in particular scientific institutions;
- (n) report preparation;
- (o) deposition of archives, including underwater cultural heritage removed; and
- (p) a programme for publication.

Rule 11. Activities directed at underwater cultural heritage shall be carried out in accordance with the project design approved by the competent authorities.

Rule 12. Where unexpected discoveries are made or circumstances change, the project design shall be reviewed and amended with the approval of the competent authorities.

Rule 13. In cases of urgency or chance discoveries, activities directed at the underwater cultural heritage, including conservation measures or activities for a period of short duration, in particular site stabilization, may be authorized in the absence of a project design in order to protect the underwater cultural heritage.

III. Preliminary work

Rule 14. The preliminary work referred to in Rule 10 (a) shall include an assessment that evaluates the significance and vulnerability of the underwater cultural heritage and the surrounding natural environment to damage by the proposed project, and the potential to obtain data that would meet the project objectives.

Rule 15. The assessment shall also include background studies of available historical and archaeological evidence, the archaeological and environmental characteristics of the site, and the consequences of any potential intrusion for the long-term stability of the underwater cultural heritage affected by the activities.

IV. Project objective, methodology and techniques

Rule 16. The methodology shall comply with the project objectives, and the techniques employed shall be as non-intrusive as possible.

V. Funding

Rule 17. Except in cases of emergency to protect underwater cultural heritage, an adequate funding base shall be assured in advance of any activity, sufficient to complete all stages of the project design, including conservation, documentation and curation of recovered artefacts, and report preparation and dissemination.

Rule 18. The project design shall demonstrate an ability, such as by securing a bond, to fund the project through to completion.

Rule 19. The project design shall include a contingency plan that will ensure conservation of underwater cultural heritage and supporting documentation in the event of any interruption of anticipated funding.

VI. Project duration – timetable

Rule 20. An adequate timetable shall be developed to assure in advance of any activity directed at underwater cultural heritage the completion of all stages of the project design, including conservation, documentation and curation of recovered underwater cultural heritage, as well as report preparation and dissemination.

Rule 21. The project design shall include a contingency plan that will ensure conservation of underwater cultural heritage and supporting documentation in the event of any interruption or termination of the project.

VII. Competence and qualifications

Rule 22. Activities directed at underwater cultural heritage shall only be undertaken under the

direction and control of, and in the regular presence of, a qualified underwater archaeologist with scientific competence appropriate to the project.

Rule 23. All persons on the project team shall be qualified and have demonstrated competence appropriate to their roles in the project.

VIII. Conservation and site management

Rule 24. The conservation programme shall provide for the treatment of the archaeological remains during the activities directed at underwater cultural heritage, during transit and in the long term. Conservation shall be carried out in accordance with current professional standards.

Rule 25. The site management programme shall provide for the protection and management in situ of underwater cultural heritage, in the course of and upon termination of fieldwork. The programme shall include public information, reasonable provision for site stabilization, monitoring, and protection against interference.

IX. Documentation

Rule 26. The documentation programme shall set out thorough documentation including a progress report of activities directed at underwater cultural heritage, in accordance with current professional standards of archaeological documentation.

Rule 27. Documentation shall include, at a minimum, a comprehensive record of the site, including the provenance of underwater cultural heritage moved or removed in the course of the activities directed at underwater cultural heritage, field notes, plans, drawings, sections, and photographs or recording in other media.

X. Safety

Rule 28. A safety policy shall be prepared that is adequate to ensure the safety and health of the project team and third parties and that is in conformity with any applicable statutory and professional requirements.

XI. Environment

Rule 29. An environmental policy shall be prepared that is adequate to ensure that the seabed and marine life are not unduly disturbed.

XII. Reporting

Rule 30. Interim and final reports shall be made available according to the timetable set out in the project design, and deposited in relevant public records.

Rule 31. Reports shall include:

- (a) an account of the objectives;
- (b) an account of the methods and techniques employed;
- (c) an account of the results achieved;
- (d) basic graphic and photographic documentation on all phases of the activity;
- (e) recommendations concerning conservation and curation of the site and of any underwater cultural heritage removed; and
- (f) recommendations for future activities.

XIII. Curation of project archives

Rule 32. Arrangements for curation of the project archives shall be agreed to before any activity commences, and shall be set out in the project design.

Rule 33. The project archives, including any underwater cultural heritage removed and a copy of all supporting documentation shall, as far as possible, be kept together and intact as a collection in a manner that is available for professional and public access as well as for the curation of the archives. This should be done as rapidly as possible and in any case not later than ten years from the completion of the project, in so far as may be compatible with conservation of the underwater cultural heritage.

Rule 34. The project archives shall be managed according to international professional standards, and subject to the authorization of the competent authorities.

XIV. Dissemination

Rule 35. Projects shall provide for public education and popular presentation of the project results where appropriate.

Rule 36. A final synthesis of a project shall be:

- (a) made public as soon as possible, having regard to the complexity of the project and the confidential or sensitive nature of the information; and
- (b) deposited in relevant public records.

Annex 5 -Team and biographical note

Scientific Head of mission

- Michel L'Hour (STAB) (France)

Members of the mission

- Auron Tare (STAB) (Albania)
- Lila Reboul (France)
- Frederic Osada (France)
- Jon Sharfman (South Africa)
- Jean-Christophe Peyre (Madagascar)
- Frédéric Lucas (Madagascar)

UNESCO Secretariat

- Mohamed Djelid, Director, UNESCO Nairobi Office
- Ulrike Guerin, Secretariat 2001 Convention on the Protection of the Underwater Cultural Heritage, UNESCO Paris
- Irene Ranaivozanany, UNESCO Nairobi Office, Antenna Antananarivo

Statutory oversight

- Augustus Ajibola, Chairperson, UNESCO Scientific and Technical Advisory Body

Members of the Advisory Body

- Augustus Babajide Ajibola, Chairperson (Nigeria), Ministry of Culture of Nigeria, Deputy Director.
- Ovidio Juan Ortega Pereyra (Cuba), Vice-chairperson, head of the Archaeological Department of the Direction of Underwater Studies of Maritime Services.
- Michel L'Hour, Rapporteur (France), Director of the Underwater Archaeology Research Department (DRASSM) of the Ministry of Culture of France.
- Auron Tare (Albania), Executive Director of the Albanian Center of Marine Research
- Xavier Nieto Prieto (Spain), Professor University of Cadiz
- Dolores Elkin (Argentina) National Research Council and National Institute of Anthropology, Professor at the University of Buenos Aires
- María Elena Barba Meinecke (Mexico), head of Underwater Archaeology in the Yucatan Peninsula, Underwater Archaeology Vicedirectorate, INAH.
- Seyed Hossein Sadat Meidani (Islamic Republic of Iran), diplomat and legal expert in the Iranian Ministry of Foreign Affairs.
- Constantin Chera (Romania), National History and Archaeology Museum Constanta, Head of the Department of Archaeology.
- Ouafa Ben Slimane (Tunisia), underwater archaeologist at the Institut National du Patrimoine in Tunis.
- Jasen Mesic (Croatia), State Secretary in the Ministry of Culture of the Republic of Croatia.
- Vladas Zulkus (Lithuania), Rector of Klaipėda University.

Assisting and consulted specialists

John de Bry, Center For Historical Archaeology, USA

Séraphin Herifandmezanjo Sum Meunrg, Madagascar

Jean-Bernard Memet, A-Corros, France

Frédéric Guibal, dendrochronologist, Institut Méditerranéen de Biodiversité et d'Ecologie marine et continentale, France

Jean-Christophe Peyre, IDDS, Madagascar

Corey Malcolm, Director of Archaeology, Mel Fisher Maritime Heritage Society

Frederic Lucas, professional diver

Zhao Bing, specialist in Chinese porcelain

Martjin Manders, Head of the Maritime Programme, Rijksdienst voor het Cultureel Erfgoed (State Service for Cultural Heritage), Netherlands

Jerzy Gawronski, City Archaeologist of Amsterdam, Underwater Archaeologist, Netherlands

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Thanks to Ms Emeline Raharimanana and General Alphonse Dieudonné for their dedication to the preservation of the underwater cultural heritage of Madagascar and to Jacquit Vanghou for his devotion to the conservation of artefacts, stored in difficult conditions and with little financing.

A warm thanks also to Jean-Christophe Peyre, Madagascar, for his patronage and logistics facilitation of the STAB mission, and without whom it would not have taken place, as well as for his continuous dedication to the preservation of the underwater cultural heritage of Madagascar.

Our warm appreciation finally also to John de Bry for providing the UNESCO STAB team with photographs of artefacts taken between 2000 and 2015 and for guiding it to the sites in Sainte-Marie.

Biographical Notes



Michel L'Hour is general curator for underwater archaeology and member of the French Marine Academy. He has been the Director of the Department of Underwater Archaeological Research (DRASSM) of the Ministry of Culture of France since 2006. He joined DASSM in 1982, where he was responsible for the western coasts of France, overseas territories and international relations. He has directed numerous major underwater archaeological excavations both in France and abroad and specializes in the history of maritime trade from the late Middle Ages to the dawn of the modern era. L'Hour is regularly sought as an expert by many international organizations such as UNESCO, and is the author of numerous articles and books on the subject. He has also curated major exhibitions such as the Sea for Memory from 2005 to 2009, and The Mystery of Lapérouse, in the National Maritime Museum in 2008. From 2013/14 Chairperson of the Advisory Body, he currently serves as Rapporteur.



Auron Tare is the Executive Director of the Albanian Center of Marine Research, which is responsible for underwater archaeology in Albania. The project is funded and supported by RPM Nautical Foundation 501© and the Institute of Nautical Archaeology. He is one of the founders of Butrint National Park, a UNESCO World Heritage Site and the first Director of the World Heritage Site of Butrint. He has worked for many years in mobilizing interest and support among international organizations and institutions (e.g., UNESCO, the World Bank, Ramsar Convention, Butrint Foundation, the Oak Foundation, Mifflin Trust) to protect and preserve this unique historical site. He was elected member of UNESCO Scientific and Technical Advisory Body in April 2015.



Jean Christophe Peyre is Director of International Deep Sea Survey based in Seychelles. Furthermore he has founded several societies in the same field such as REPTTEL (1986), IBIS (1992), SERCA (1993), FLOR IBIS (2000) in Madagascar, RTL (1994) in Louisiana and SD2R (1995) in France. He has taken part and directed numerous major underwater archaeological excavations both in Madagascar and abroad. Moreover he has directed several films and documentaries concerning underwater archaeology such as *Les Dents de le Terre*.



Jonathan Sharfman was manager of the Maritime and Underwater Cultural Heritage Unit at the South African Heritage Resources Agency from 2005 to 2013 where he was responsible for the management of UCH in South Africa. In 2013 he established the African Centre for Heritage Activities (ACHA), a heritage NGO that undertakes African development and capacity building programmes, excavations, heritage and archaeological impact assessments and acts as a centre for heritage research. He has worked on projects in South Africa, Mozambique, Tanzania, Madagascar and the United States. He is an

associate of UNESCO accredited NGO, CIE – Centre for International Heritage Activities and has worked with the Smithsonian Institute, George Washington university, the US National Parks Service and Iziko Museums.



Lila Reboul, specialist in preventive conservation of maritime cultural artefacts, is since 2010 responsible for preventive conservation and collections management at the Department of Underwater Archaeological Research (DRASSM) of the Ministry of Culture of France. Professional diver, she participates in underwater archaeological excavations and follows fate of the artefacts from their recovery in situ to their presentation in the various institutions. She works since 2013 also for the Momarch Master of the University of Aix-Marseille. She was responsible for preventive conservation at the excavations of the Natière off Saint-Malo, directed by Michel L'Hour and Elisabeth Veyrat from 2004 to 2008.



Frederic Osada is a photograph and film specialist specially trained for working on underwater sites. He is leading the firm Images Explorations located in Southern France. He has on numerous occasions participated in underwater archaeological explorations and filmed underwater archaeologists at work. During the Madagascar STAB mission Frederic Osada ensured that all sites, artefacts and actions were documented in photography and film.



Frédéric Lucas was Director of the “Salary Water Sports Centre” (2006-2013) and of the “Ifaty Water Sports Centre” (1998 -2006) in Madagascar. He is an expert on sea-land logistics, archaeological diving and visual inspections. Lucas participated in numerous scientific missions especially in Madagascar. He was involved in the discovery of the wreck *Surprise* in 2007.



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