

## The In Situ Protection of a Dutch Colonial Vessel in Sri Lankan Waters

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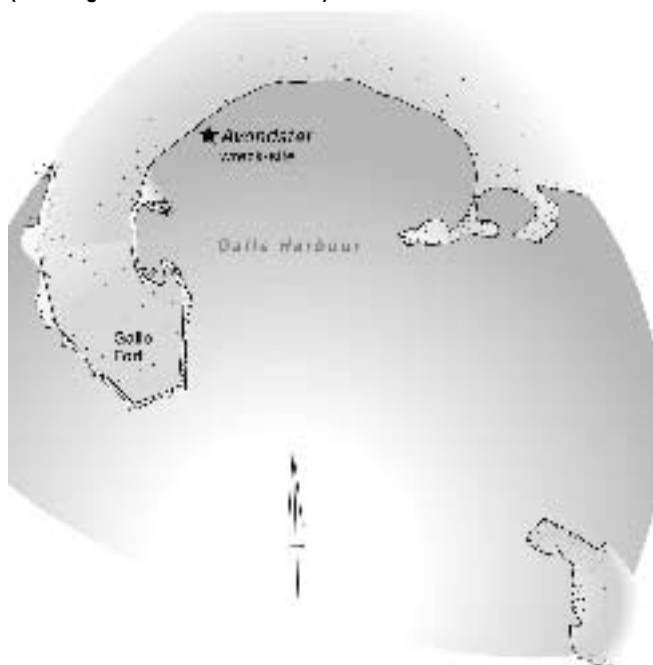
*The Netherlands*

On the 2nd of July 1659, during a calm night, a Dutch Eastindiamen (VOC), called the *Avondster*, ran ashore in Galle Harbour in the south of Sri Lanka and wrecked. The ship had been loading a cargo of areca nuts (Areca Catechu) for India. These are the seeds of a palm tree and an ingredient of sirih, a kind of chew (Figure 1).

By observing the remains of the ship, this is what probably happened: the stern of the *Avondster* hit the sandy seabed and ran ashore on a gradually sloping sandy coast near the Dutch Fort of Galle. Due to the constant pressure of the waves, the sternpost broke off from the rest of the ship. The waves were also responsible for the breaking of the portside under the bilge and the starboard side just above the first deck. Fine fluvial sediment of the river that deposited its water and waste into the bay and coarser marine sand covered the entire wreck. It must have been covered with fine sand and silt very soon after wrecking, which left it in an anaerobic condition for many centuries. In comparison to most other wrecks in tropical waters, the conservation conditions were extremely good for a long time, protecting a large part of the *Avondster's* wooden structure (Figure 2).

A few decades ago, a road and stone barrier were built only 50 metres away from the site. Since then the environment has been very unstable. In the early 1990s, the wreck was discovered during a survey project of Galle Harbour. The

**Figure 1: Location of the *Avondster* wreck in Galle Harbour (Drawing M. Manders/M.Kosian)**



Galle Harbour project started in 1993 and lasted three years. It was a co-operation between the Department of Archaeology (Sri Lanka), the Central Cultural Fund (Sri Lanka), the Post Graduate Institute of Archaeology (Sri Lanka) and the Western Australian Maritime Museum (Australia).

The *Avondster* excavation project was a follow up of this project and is a joint venture of the Mutual Heritage Centre of the Central Cultural Fund (Sri Lanka), the University of Amsterdam (the Netherlands), The Amsterdam Historical Museum (the Netherlands) and the Western Australian Maritime Museum (Australia). At the start of the *Avondster* project, the decision was made to safeguard the valuable archaeological information of the wreck site by excavation. Many objects will be preserved *ex situ*, but the idea is to leave the wreck itself *in situ*. Information about the ship construction will be gathered underwater. The finds are being conserved in a laboratory near the site especially created for the *Avondster* project.

Throughout the years we have seen the *Avondster's* wooden construction being destroyed by wood-eating organisms, erosion, as well as human activities such as fishing and diving. Not only the ship, but also objects that belong to the inventory, cargo and the persons on board are deteriorating and moved all over the wreck site by swell, currents, waves, and breakers. This means loss of archaeological information. The turbulent sea at the site possibly also makes the water oxygen-rich from time to time. This, together with the large amount of organic waste found on the site and dumped in the water, make the area extremely favourable for organisms attacking organic archaeological material.

The excavation of the *Avondster* wreck started in 2001 but probably will go on for many years to come. Considering the speed of degradation on the site, the decision was made to physically protect the site in order not to lose much information prior to this excavation. A method of physical protection needed to be designed that would protect the wreck and its contents against:

1. Natural erosion and scouring caused by sea and weather
2. Objects being moved all over the site
3. Wood-eating organisms
4. Looting
5. Fishing activities
6. Chemical degradation, including the corrosion of metal objects (if possible)

Also taken into consideration was the need for the method to be inexpensive, the materials easy to buy in Sri Lanka, the protection easy to install and easy to remove so that the excavation in trenches could continue.

We decided to test a method that was already in use in the Netherlands: covering a site with polypropylene nets. These nets promote sand deposit that will cover the site and leave

Figure 2: The exposed site of the *Avondster*. After so many centuries, much of its wood is still preserved (R. Muthucumarana)

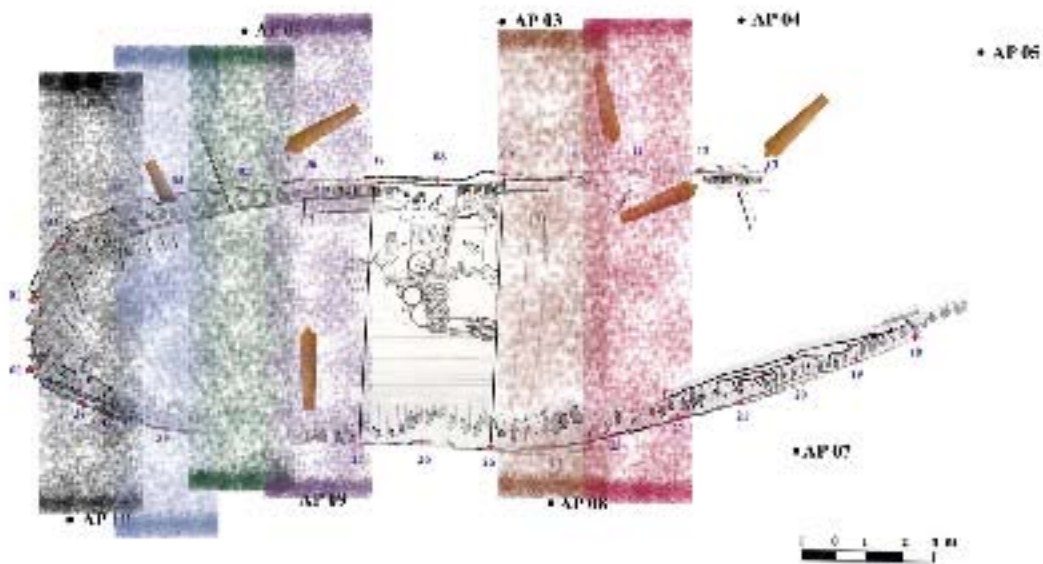


Figure 3: Schematic impression on where the polypropylene nets have been placed on the *Avondster* wreck (R. Muthucumarana)

Figure 4: Sand is penetrating the little holes in the net, covering the wrecksite with a protective sediment layer (R. Muthucumarana)



it protected in an anaerobic environment. These tests were executed in February 2003, and because the results were very promising, an effort was made to cover the whole site in November that same year. The non-woven polypropylene net is fabricated in Sri Lanka and is normally used for filtering water and for shrimp fishing. In December 2003, the whole bow section was covered with five nets that were 4 meters wide and 25 meters long. They are placed squared on the wreck site covering the hull and the area where parts of the broken-off starboard side are possibly still lying under the sand. The strips of netting are weighted at both ends with sandbags. On the site, the nets extend 4 metres out of the portside of the wreck and 8 metres and more from the starboard side because here more parts of the wreck and objects are expected to be found (Figure 3).

The results of the protection are even more promising than the first test. Within one week after installation, the whole bow side was covered again with sand. This means that in places there was sediment buildup of more than 1 metre. Finally, the whole site has to be protected in order to be effective. For this protection, fourteen nets with a width of 4 metres and a length of 25 metres are needed. The total material cost of this physical protection of the *Avondster* wreck (about 500 square metres) is approximately € 2,000. The complete covering of the site has not been executed yet (Figure 4).

After the protective nets have been installed on the site, this *in situ* protection has to be maintained. Because of the shallowness of the site, it is obvious that monsoons might have an enormous effect on the environmental conditions at the *Avondster*. For this project, a monitoring scheme was developed, with visual observations on a regular basis.

On the 26th of December 2004, a Tsunami hit Galle Harbour with incredible force. It was thought that it would have affected the conditions on the site. Eyewitnesses state that just before the big wave entered the Galle Harbour, the wreck itself became exposed. Surprisingly, monitoring in April 2005, three months after the Tsunami, revealed that hardly any damage was done to the wreck site and its protection. The covered bow site was still covered with a thick layer of sand. Even in these conditions the protection seems to be effective.

## Conclusions and Consideration

The Bay of Galle has tidal influences but most of the sediment is moved over the seabed by high swell and surge caused by the stone barrier near the site. This caused heavy erosion and abrasion of the *Avondster* site for many years, exposing it to further natural, biological and human deterioration. The protective measurements with polypropylene nets that were executed in 2003 have the opposite effect. Sand that is transported over the wreck site falls down the holes of the net and settles due to the fact that there is hardly any water movement under the net. It creates an anaerobic environment comparable to the conditions in which the wreck has been

protected for a few centuries. At the bow where this protection was executed, it worked extremely well. It stopped abrasion and attack by woodborers; probably the most significant causes of degradation at the *Avondster* site.

To protect the wreck site effectively prior to excavation, the whole construction has to be again covered with sand. The site will then be a sloping mound of sand and nets within a few months. Within a few years it will be an artificial mound that will prove to be very difficult for looters to enter. However, with the proper equipment, like water dredges or airlifts, the protection is easy to remove. The wreck can then be easily excavated in parts, while the rest of the site is still protected.

Regular, ongoing monitoring of the site is important. At a shallow site like the *Avondster*, high swells and bad weather conditions, which are abundant during the monsoon season, form a potential threat. However, it is also important to keep in mind that some degradation will occur, whatever measures we take. However, we can slow down or stop a number of processes responsible for the deterioration of different materials. If the excavation of the *Avondster* continues, the contents of the wreck will be preserved *ex situ* without these negative influences. Although some deterioration of the wreck will continue slowly (e.g. bacterial decay), it will be well protected *in situ* for many years to come.

## Further Reading

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