

The Oranjemund shipwreck, Namibia. The excavation of sub-Saharan Africa's oldest discovered wreck*

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Abstract

On 1 April 2008, parts of an historic shipwreck were unearthed during diamond-mining operations near Oranjemund, Namibia. Initial investigations undertaken during that same month indicated that it was, most probably, the remnants of an outward-bound Portuguese ship that foundered during the second quarter of the sixteenth century. The Oranjemund shipwreck is the oldest wreck ever found in sub-Saharan Africa and received world-wide attention in the media. After an initial survey was undertaken and a representative sample of artifacts and ecofacts recovered, the site was reburied. Following this, the Namibian Government stepped in and took control of the project. A Second Phase investigation was undertaken under supervision of the author during September and October 2008, resulting in full-scale excavation of the site. This article describes aspects of archaeological fieldwork.

Introduction

On 1 April 2008, Namdeb employee Tate Kapaandu Shatika located archaeological material in the high security diamond mining area close to Oranjemund, in the Karas region of southern Namibia.¹ The finds date back to the sixteenth century and form part of the material culture from a shipwreck. The original ship was in all likelihood a merchant vessel or *nao* of Portuguese origin, which foundered after 1525.² The vessel

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¹ Namdeb (Namibia-De Beers) is owned jointly by the Namibian Government and the De Beers diamond mining company. Bruno E.J.S. Werz, *The Oranjemund Shipwreck Project. Phase 2 Excavation Report*, unpubl. report, Cape Town, November 2008: 5, 9.

² *Nao* is the Spanish and Portuguese word for a ship during the 13th to 16th centuries. The term does not refer to any particular vessel type. See: Peter Kemp, (ed.), *The Oxford Companion to Ships and the Sea*,

was on the outward-bound voyage, from Europe to Asia, when it most probably struck a submerged rock close to shore. Provisional dating and identification of the nationality of the vessel was based on artifacts recovered from the site in April 2008, including coins. This has been substantiated since through historical research, which indicated that the wreckage is probably that from the *Bom Jesus*, under the command of Francisco de Noronha, that went missing in the vicinity of the Cape of Good Hope in 1533.³



Figure 1: Watercolour of the early seventeenth century Portuguese *nao* 'Acabada'. Although dating to some 80 years after the foundering of the Oranjemund ship, the drawing provides a good impression of the outer hull of merchant vessels of the period. (Manuel Fernandez, *Livro de traças de carpintaria*. S.l. 1616. Facsimile copy produced by the Academia de Marinha, Lisbon 1995: fo. 71).

This discovery is of tremendous importance. Based on the available literature, it can be concluded that the wreck represents the oldest European vessel to be discovered in sub-Saharan Africa to date. Because the ship was operational during the decades following the Portuguese discovery of the sea route to Asia, proper excavation and study of its remains can provide much detailed information on a variety of issues. The finds and related excavation data will contribute to a better understanding of the earlier periods of European navigation along African shores. They will also provide more information on such aspects as sixteenth century European ship construction, international contacts, inter-continental commerce and trade, as well as technological advancement. This data should contribute to a more complete historical picture of the period during which the ship was operational.

London et al., Granada Publishing, 1979: 572. Provisional identification and dating was undertaken by the author in April-May 2008. The kind assistance of Ms Natalie Jaffe and Mr. Robert Mitchell of City Coins, Cape Town, and Mr. Christopher Webb, of Dix Noonan Webb, London, in identifying coins from the shipwreck is hereby acknowledged with many thanks.

³ This identification was undertaken by Dr Paulo Monteiro, Portugal. Correspondence P. Monteiro – B. Werz, 20-4-2009.

The project also plays an important educational role on various levels. The research data obtained is of great academic interest, but can also contribute to school curricula, as well as to public education. The project offers an opportunity to train students in particular fields, such as shipwreck excavation and conservation of finds from the marine environment. A suitable display of the material, in the form of a site museum and traveling exhibitions, will greatly contribute to its educational role. In addition, this may generate revenue that can be used for ongoing research, conservation and future Namibian maritime archaeological projects.⁴

In addition, the project serves an important political role, in that it emphasizes and illustrates the benefits of international cooperation and support. It has enhanced Namibia's position in the world. Furthermore, the discovery of the shipwreck has drawn international attention to the importance of the fragile and non-renewable underwater cultural heritage that is of global importance. The wreck and its contents represent both a cultural 'treasure' unique to the African continent, as well as a most important example of world heritage.⁵

The site

The area where the wreck was found is known as U60, which forms part of Mining Area 1 (MA1) which is situated within the 'Sperrgebiet' or Forbidden Zone. The geographical coordinates of the archaeological site are: 28°28'29" 849S and 16°15'11" 181E (WGS84).⁶ The site is located at a distance of some 18 km north of the Personnel Control Centre (PCC) at the entrance of the mine in Oranjemund, and about 3 km south of the accommodation facilities and workshops at Uubvlei. The shipwreck was originally deposited on the sea bed. In recent years, this area was temporarily reclaimed from the sea and protected by a massive sand wall. The distance from the previous shoreline was approximately 30 m and the depth in between 7 and 8 m below mean sea level. The bedrock in the area consists of meta-sediments of the neo-Protozoic Gariiep Supergroup.⁷

⁴ For a discussion of the potential of Namibia's maritime archaeological heritage see: Bruno E.J.S. Werz, "A suggested blueprint for the development of maritime archaeological research in Namibia", *Journal of Namibian Studies*, 2, 2007: 103-121.

⁵ The various roles that the shipwreck plays have been discussed during a number of presentations. See: Bruno E.J.S. Werz, *The Oranjemund shipwreck*, Powerpoint presentation, Southern African Institute of Maritime Archaeology, Cape Town, September 2008; idem, *The U60 shipwreck*, Powerpoint presentation, Southern African Institute of Maritime Archaeology, Cape Town, August 2008; idem, *Recent developments in southern African Maritime Archaeology*, lecture presented to the Cape Natural History Club, Cape Town, 30 July 2009; idem, *Ship in the desert. The Namibian treasure wreck*, lectures presented to Duikvereniging de Peddemoeek, Weert, 19 September 2009 and the Society of Antiquaries of London, London, 1 October 2009.

⁶ Exact coordinates provided by Mr. Anthony Goosen, Chief Surveyor, Namdeb Survey Section.

⁷ Werz, *Phase 2 Excavation Report*: 15-16.



Figure 2: Overview of the site towards the east. The picture was taken from the top of the sand wall that protected the area from the sea. The wreck site is in the centre. In the foreground, two pumps that kept the water out. The bus in the background provided shelter and office space. (Bruno Werz)

The wreck site, the area in which both structural remains and associated artifacts were found, covered a surface area of approximately 18 x 16 m. The longitudinal axis was orientated approximately 12° – 192° (NNE – SSW) and the latitudinal axis 106° – 286° (ESE – WNW) True North.⁸ The site contained remnants of the original ship. In all probability we are talking about part of the lower hull, from about mid-ships towards the stern section (from S to N). No remains of the keel were found. Three distinct areas in the eastern section of the site contained structural remains. These were marked from north to south: Structure 1 (St 1), Structure 2 (St 2) and Structure 3 (St 3). To the south of St 3 was an area containing some deposits and named 'Southern Deposits', while the western section of the site was indicated as 'Debris Field' or 'Spillage Area'.⁹

The wreck remains were deposited adjacent to a natural obstruction in the form of a rocky seabed outcrop, to the east, which most probably represents the rock against which the vessel foundered. To the north of the rocky outcrop and to the north and northeast of the wreck remains was an area that revealed a concentration of roughly and irregularly cast metal ingots, probably tin or lead. A number of these ingots had been deposited in deep erosion pockets in the sea bed; the remainder covering the surface. Most of the ingots were removed in April 2008. Deposited among the metal

⁸ Magnetic compass readings by Bruno Werz; Mr. Anthony Goosen, Chief Surveyor, Namdeb Survey Section, pers. communication, 21 April 2008.

⁹ Werz, *Phase 2 Excavation Report*: 17-20.



Figure 3: Aerial view of part of the site towards the southeast. The picture was taken on 6 October 2008, towards the end of the excavations. At this stage, most material had been removed. The hull fragments were left *in situ* to allow for a final laser scan survey. Left, bottom is St.1; in the centre St.2; and top, St.3. The structural remains are flanked by the rocky seabed outcrop, to the left, against which the vessel probably foundered. (Bruno Werz)

ingots was a large-calibre bronze cannon, a muzzle-loader, that has been heavily abraded by seabed sand deposits. It was situated in an approximate east-west direction, with the cascabel pointing east and the mouth west. This area also revealed a bronze cannon of a smaller caliber, possibly a culverin or saker, whereas immediately to the west of and touching the structural remains of St 1 was a fragment of the barrel of another small bronze gun.¹⁰

The areas to the north, west and south of the structural remains revealed a number of ferrous concretions, cemented to the bedrock and containing an array of pewter, small bar-shaped tin ingots and other artifacts. Partly on top of St 3 and immediately south of the structural remains was a substantial concentration of copper ingots. Some stray metal ingots were also deposited at various places on site. The depositional pattern of these larger metal ingots especially, both tin or lead and copper, supported the surmised direction in which the keel was originally deposited on the seabed as NNE-SSW.¹¹

¹⁰ *Ibid.*: 21 f.

¹¹ *Ibid.*: 23.

Previous work

During preceding years, cultural material was found at various locations in the mine. It is highly likely that this can be attributed to the historic shipwreck that was discovered there in April 2008. At various stages, elephant tusks were recovered that only recently could be classified as being part of the cargo of the vessel. Some of these tusks were located up to 11 km north of the wreck site, being scoured out and transported by the northerly Benguela current. In other instances, Namdeb employees reported seeing substantial wood fragments and debris that may well have belonged to the wreck originally. The area where these finds were made is situated approximately 5 to 6 km north of the site.¹² In October 2007, Namdeb employee Andrew Darné found a substantial piece of worked wood that he correctly identified as belonging to an old sailing vessel. He reported this find, took some photographs and secured the object.¹³ The artifact was later identified by the author as part of the standing rigging of the ship.

Further material was uncovered on 1 April 2008 by Tate Kapaandu Shatika during the course of mining operations. This material was also observed by a team of geologists, who reported seeing half-round spheres and three items that were described as copper tubes or pipes. The objects were later identified as copper ingots and cannon barrels. Some photographs were taken and the site provisionally protected against further mining activities. Namdeb then contacted its contract archaeologist, Dr Dieter Noli, who in turn contacted the author for advice.¹⁴

On 9 April 2008, Dr Noli was issued with a Namibian National Heritage Council permit to examine the site further. He was instructed by Namdeb to complete his investigation by 25 April as, after that date, the site would be inundated again. From the onset, the author provided extensive telephonic advice on a daily basis. This advice related to provisional identification of the nationality of the wreck (Portuguese), the approximate time period during which it was deposited on the seabed (after 1525), suggestions on how to document the project, as well as aspects of storage and initial treatment of finds. As his input was deemed essential, the Namibian authorities and Namdeb brought the author to Oranjemund. He arrived on 20 April and took charge of documentation, surveying and artifact storage, with the invaluable assistance of Namdeb personnel, while the permit holder continued with the excavation. After a representative sample of materials had been secured and sufficient data acquired and recorded, the site was

¹² Various Namdeb security officials pers. communication; Messrs. Terrence Holland and Karl-Heinz Ulbricht, pers. communication 19 October 2008.

¹³ Mr. Andrew Darné, pers. communication 15 October 2008 and 18 October 2008.

¹⁴ Dieter Noli and Bruno E.J.S. Werz, *Preliminary report on the U60 shipwreck, Oranjemund, Namibia*, unpubl. report, Oranjemund, Cape Town 14 May 2008: 1; Dr D. Noli, pers. communication 4 April 2008; Dr R. Burrell, pers. communication 20 April 2008; Robert Burrell et al, *Account of Namdeb Mineral Resource Department's role in the discovery of the Oranjemund shipwreck*, unpubl. account, Oranjemund, 28 October 2008.

reburied on the author's insistence, conforming to international guidelines and best practice in (maritime) archaeology.¹⁵



Figure 4: A Spanish *excellente* from the reign of King Ferdinand (1452-1516) and Queen Isabella (1451-1504). This was one over 2000 Portuguese, Spanish, Venetian and even Hungarian gold coins that were excavated from the wreck. The coins allowed for the identification of the shipwreck. (Anthony Goosen)

The Second Phase fieldwork

As the Namibian Government soon realized the tremendous international significance of the shipwreck, the Ministry of Youth, National Service, Sport & Culture became involved, under the leadership of Permanent Secretary Dr P.T. Shipoh. The Ministry is now in charge of the project and wishes it to be completed according to the best possible international standards. To prepare this, a meeting was held in Oranjemund on 21-22 August 2008. The meeting was attended by representatives of various Namibian government ministries and departments, Namdeb, the African World Heritage Fund, representatives of the Oranjemund community, as well as diplomats and scientists from Portugal, Spain, the USA and South Africa. During the meeting it was indicated that the shipwreck had become an issue of national importance and international experts expressed their willingness to cooperate in future research. It was also agreed unanimously to appoint the author as the Principal Investigator for the Second Phase excavation of the shipwreck. In addition, he was appointed as the manager of all further

¹⁵ Martin Dean et al., (eds.), *Archaeology Underwater. The NAS Guide to Principles and Practice*, s.l., Nautical Archaeology Society, Archetype Publications, 1992: 216-222; Jeremy Green, *Maritime Archaeology. A Technical Handbook*, London et al, Academic Press, 1990: 171; Keith Muckelroy, *Maritime Archaeology*, Cambridge, Cambridge University Press, 1978: 52-57, 165-169; Noli and Werz, *Preliminary report*: 1-5; Bruno E.J.S. Werz and Dieter Noli, *The U60 shipwreck, Oranjemund, Namibia. Provisional proposal for future research and management*, unpubl. proposal, Southern African Institute of Maritime Archaeology, Cape Town, June 2008: 4.

scientific research related to the project. The administrative Project Leader is Dr Webber Ndoro, Director of the Africa World Heritage Fund.¹⁶

The general consensus that was reached during the stakeholders meeting was that the structural remains and the wreck site needed to be excavated completely. In-situ preservation was not considered an option, due to the importance of the find and the costs for adequate reburial and additional protective measures. Excavation was to be followed by detailed surveys, recovery of all the material related to the wreck, conservation of all the artifacts, as well as full documentation and exhaustive studies of all the material and related scientific data. The end goal is to have the shipwreck and all the finds preserved, documented, published and displayed in a special museum. This will serve as a lasting monument and a cultural, educational, as well as a financial asset for the Government and the people of Namibia.¹⁷

Objectives and brief

The objectives of the Phase II excavation were described as follows:

- Documentation, excavation and removal of the wreck remains;
- Documentation, excavation and removal of associated materials, including ferrous concretions on the site;
- Transportation and temporary storage of the wreck remains, associated materials and concretions.¹⁸

There was an urgency to undertake further excavation for the following reasons. The sand wall that provided temporary protection of the site from the sea was not being maintained for a period of several weeks. This period fell between the end of the First Phase excavation and September 2008, when the Second Phase Excavation started. Although Namdeb continued to pump water out of the area during this period, the circumstances on site were not favourable. It would only have been a matter of time before the sea would reclaim the site and inundate the shipwreck again. It was not possible to predict exactly when this would happen.

As the winter season ran from April to September, rough sea conditions were the norm. Added to this was the fact that a period of spring tides was experienced in August-September, which further contributed to the erosion of the sea wall. For these reasons, the immediate focus had to be on excavating and recording the structural remains *in situ*, followed by removal and temporary re-deposition on higher ground. A secondary

¹⁶ Bruno E.J.S. Werz, *Phase II Excavation of the Oranjemund shipwreck. A proposal for the Namibian Government*, unpubl. proposal, Southern African Institute of Maritime Archaeology, Cape Town, 26 August 2008: 1-2.

¹⁷ Werz, *Phase II Excavation*: 1; idem, *The Oranjemund shipwreck*, Powerpoint presentation; idem, *The U60 shipwreck*, Powerpoint presentation.

¹⁸ Bruno E.J.S. Werz, *National Heritage Council Permit Application*, unpubl. permit application, Cape Town, 1 September 2008.

objective was to document and remove associated materials, including the concretions. The Second Phase excavation was therefore divided into different stages. Due to the urgency of the matter, initial work focused on the wreck remains. Parallel to this, the most important concretions were documented and removed and further excavation undertaken; mainly in the northwestern and southern sections of the site.¹⁹

Excavation

The nature of the excavation was dictated by the objectives of the project, the time frame that was available, the number and experience of project participants, as well as the available infrastructure. The time factor was most important and dictated the pace of excavations. As the Second Phase started on Monday 8 September 2008 and had to be completed by Friday 10 October, there were only 33 days to carry out an excavation that under normal circumstances would have taken many months to complete. In essence, the project was thus a rescue excavation. Another constraining factor was provided by the diverse background of the participants, who ranged from inexperienced lay persons, students with limited excavation experience, to qualified archaeologists. As a consequence of this, part of the time had to be spent on fieldwork teaching, bearing in mind the sensitivity of the site and the project as a whole from an international perspective.²⁰

As the area had been reburied on 24-26 April 2008, the first objective of the Second Phase excavation was to establish the exact position of the wreck remains and the thickness of the overburden, which consisted of a layer of sand covered with cobbles and boulders. At the onset of the work, conflicting information was received from various Namdeb employees who visited the site. These ranged from references to the possibility that deposits had been removed in the interim period, to statements that additional deposits had been dumped for further protection. Due to the sensitivity of the site, it was therefore necessary to carefully probe first and establish the thickness of the overburden, before machinery could be brought in to remove the upper layers of deposits.

Probing took place in two locations: along the western perimeter of the site and along the western perimeter of the area containing wreck remains. The western area of the site was subdivided into 3 x 3 m rope grids, marked A1 to A3, from north to south. The objective was to establish the site boundary and the thickness of deposits. Probing along the western perimeter of the area containing wreck remains was done by

¹⁹ Werz, *Phase 2 Excavation Report*: 12-14.

²⁰ Ibid.: 24-25. In addition to fieldwork teaching, a series of lectures were presented during the evenings, while a reader was compiled. This reader offered an introduction to the field of maritime archaeology and this specific project. See: Bruno E.J.S. Werz and Dieter Noli, *The Oranjemund shipwreck project; a basic reader for students*, unpubl. reader, Oranjemund, September 2008.

excavating a narrow north-south trench that ran along the surmised position of the original keel line of the vessel.²¹

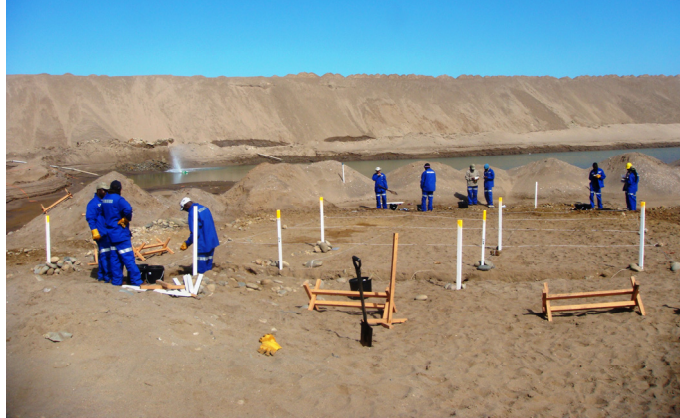


Figure 5: Overview of the site towards the west. In the foreground: excavation in the narrow trench to relocate the structural remains. Centre: students in the process of laying out grids. In the background the massive sand wall that kept the sea out. (Bruno Werz)

Probing revealed that a further layer of deposits had been added to the overburden that was originally deposited on site. The total thickness of these deposits could be estimated at approximately 850 mm immediately west of the area containing structural remains, from the surface to bedrock. The overburden on the wreckage itself was approximately 450 mm. The results of these first test excavations thus allowed for the proper planning of the removal of protective sediments. During week 2 of the excavation, from Monday 15 September to Sunday 21 September, a variety of technical problems had to be overcome. These ranged from electricity shorts, causing the water pumps to stop working, to recurrent problems with the mechanical excavator, as well as the absence of Transvac excavation machinery. As a result of this, the first part of the week was spent removing the overburden by hand. On Tuesday 16 September, much of the sterile deposits had been removed and it could be established that the depth to bedrock in places was only some 100 to 200mm. The next day, some finds were made and it was decided to continue excavation by hand. Concretions and some wood fragments were uncovered in the southern section, close to the location where a chest containing sword blades had been observed during the First Phase in April. In the north part of the trench that was excavated to establish the position of the wreck remains, some structural elements began to appear. The wood was kept wet and wrapped in protective plastic foil. A small team was then tasked to continue excavations in this

²¹ Werz, *Phase 2 Excavation Report*: 26 f.

location and between the area containing wreck remains and the rock against which the ship most probably foundered. The objective was to uncover the surface of the protective layer of ferrous oxide concretion that covered most of the structural remains, as observed in April. At the same time, the western parts of the wreck section that was later registered as St 1, and that had already been observed in April, were exposed.²²

On Thursday 18 September, the concretion covering the structural remains of what was later recorded as St 2 and St 3 was surveyed by means of a Differential Global Positioning System or DGPS. The perimeter of the concretion was recorded at intervals of approximately 100 mm. This was supplemented by a series of transverse readings, taken across the surface to record the topography of the concretion layer. The extremities of a few protruding wooden parts, possibly parts of the original hull, were also included in this survey as they were embedded in the concretion. Another survey that was undertaken that same day re-established the site boundaries, with an added margin of approximately 2 m, to ensure that the complete wreck site was covered. Excavation continued in the area referred to as 'Southern Deposits' and to the west of the structural remains; the 'Debris Field' or 'Spillage Area'. The objective was to remove as much of the overburden as possible, in order to expose the whole excavation surface. This continued during the following days.²³

Remaining overburden was removed from both the 'Spillage Area' and the 'Southern Deposits' in an east-west direction. On the exposed bedrock, three smaller wooden rigging blocks that had been left *in situ* previously were relocated immediately west of the wreck remains, as was an iron axe with wooden handle to the west of the centre of the site. In the northwest corner of the 'Spillage Area' various objects were found, including a fragment of a pewter plate, a shard of dark-brown earthenware, a stone cannon ball, an elephant tusk and several large concretions. With most of the overburden removed, it became clear that the most likely area to contain pronounced stratigraphy was in the 'Southern Deposits'. Although some stratigraphic evidence was expected in the sections containing structural remains (St 1 - St 3), and some small erosion holes and gullies in the bedrock, this specific area seemed most promising as a layer of *in situ* deposits containing copper ingots and other items was observed after the overburden had been removed. For that reason, the area was excavated meticulously over the next three days, but very little stratigraphic evidence could be observed.²⁴

During the course of the Second Phase excavation, the need to search for and record potential stratigraphies was duly acknowledged. Unfortunately, very few locations were found that showed a pronounced sequential building up of layers of sediments. The most comprehensive example of this was presented by marine deposits that were located underneath sections of the hull structure. These confirmed that the wreck had

²² Ibid.: 28.

²³ Ibid.: 29.

²⁴ Ibid.: 30.



Figure 6: A small wooden block that formed part of the running rigging of the ship (length approx. 290mm). The artefact was found immediately to the west of the wreck remains. When excavated, it was conglomerated onto the bedrock by ferrous oxides. The trowel point indicates north. (Bruno Werz)

been exposed to a high-energy marine environment. The wreck was obviously not buried immediately, but remained vulnerable to the destructive forces of the swell and currents for quite some time after deposition. Evidence of this had already been provided during April, when a fragment of a rubber tyre was found in deposits underneath St 2. During the Second Phase excavation, another fragment of modern rubber from a car tyre was excavated from deposits underneath St 3. In addition, part of a conveyor belt was recovered, trapped in concretion on top of St 3. Biological deterioration caused by marine borers (*Teredo navalis* and possibly gribble or *Limnoria*) was also observed. Evidence of this was provided by the faces of the rib fragments as well as scattered wood fragments.²⁵

At some locations, layers containing cultural material were observed, interspersed with marine deposits. Most of these were located in the 'Southern Deposits' and underneath the structural remains. The information that was gained from these layers was limited, as it could be concluded that they were deposited simultaneously. The reason for their deposition was the wrecking of the ship, which represented a very specific moment in time. This was a once off event, which was not obscured by 'reoccupation' or 'reuse' of the site, as is often the case on terrestrial sites.²⁶

By Wednesday 24 September, most of the overburden had been removed. One team now focused on the 'Southern Deposits'. This area, of approximately 5 x 6 m, was bound by St 3, to the north, the rock against which the ship probably foundered, to the east, and the water-filled lower lying area of U60, to the south. As was explained above, the

²⁵ Ibid.: 30 f.

²⁶ Ibid.: 31.

main goal of work in this section was to observe potential relevant stratigraphy. To that purpose, stratigraphic excavation was attempted. This technique was soon aborted, due to the lack of relevant layering and the presence of copper ingots and large stones which made excavation according to this method virtually impossible. From then on, it was decided to continue excavating in spits. Another team focused on the wreck structure (St 1) and started removing the overlying concretion by means of a hammer and chisel. When the concretion was partly removed, light ceiling planking that originally covered the ribs or futtocks on the interior surface of the hull was observed.²⁷ On Thursday 25 September, the site was cleaned in preparation for a laser scan survey. At the same time, a series of datum or control points for the survey was established on the site surface.²⁸

During the night of 27 to 28 September, the site was inundated as a result of failing pumps. Only the highest point on site, the easternmost section containing the structural parts, was left above water. The full team was therefore involved in excavating the wreck remains. The main task was to chisel away the covering concretion layers. It soon turned out that the concretion was too hard to remove manually, which necessitated the use of pneumatic hammers. In the following days work on the concretions continued. The area containing structural remains had now been formally subdivided in St 1, St 2 and St 3 and these various parts were recorded as such. Due to its size, St 3 was further subdivided into a northern section, St 3, concr. N, and a southern section, St 3, concr. S. This subdivision was demarcated by a square structural timber that divided the concretion layer which partly covered it. The timber, St 3 24, was orientated east-west. The size of the concretion layer was substantial and had previously been surveyed, on Thursday 18 September. As the experiences from the previous few days had shown, the concretion was too big and too hard to remove manually. It was therefore decided to subdivide St 3, concr. S. into blocks, each measuring roughly 500 x 500 mm. The different blocks, marked E1-E2, F2, G1-G2 and H1-H2, were separated by means of slits, cut with an angle grinder. The exact positions of the various corner points were subsequently established with DGPS and Total Station theodolite. Following this, the different blocks were removed by means of an electric jack hammer. This proved the best way to excavate the concretion. After the surface had been broken up, further excavation followed as much as was possible by hand and using handheld tools. Nevertheless, as concretions were ubiquitous in St 3, concr. S, the jack hammer had to be used constantly. Excavation of this section revealed a deposit of up to approximately 1 m thick. This consisted of a solid concreted layer, containing a mixture of animal bone and some personal items, such as a lice comb, in the upper layers. Underneath, but also present in the higher levels, were copper ingots and wood fragments of structural parts

²⁷ Francesco Alves and Miguel Aleluia, *Oranjemund shipwreck Phase II field notes*, unpubl. field notes, Oranjemund, September-October 2008.

²⁸ Werz, *Phase 2 Excavation Report*: 32-34.

of the ship. The lower levels revealed thin ceiling planking, similar to the planking that had already been observed in St 1. Underneath this were some sections of the hull.²⁹



Figure 7: A wooden lice comb, as excavated from the upper layers of St.3, concr. S. Combs like these were personal items of those on board and formed a basic hygienic necessity. (Bruno Werz)

The position of the various materials indicated that this part of the hull was deposited on the sea bed and weighed down by part of the cargo of copper ingots. During the process of sinking, the structure broke up and partly collapsed. Overlaying structural parts were deposited on the cargo and material from a higher level, including provisions represented by the animal bone and personal items, such as the lice comb, filtered down.³⁰

On Monday 6 October, the large concretion that covered St 3, concr. N. was lifted and transported in a complete state to the artifact repository. This was possible, as this concretion was not attached to the deposits that were covered by it, as opposed to St 3, concr. S. By this time, the latter section had been broken up, excavated and for the larger part removed from site. After removal of the covering layer, excavation proceeded in section St 3, concr. N. The deposits here were not as solidly concreted as in the adjacent southern section. Artifacts, including several copper ingots were often separated by thin deposits of marine sand, which facilitated excavation. In addition, the area revealed some coins and a bronze candle stick.³¹

By Wednesday 8 October, all the structural parts had been excavated, surveyed and recorded. The individual timbers were now removed piece by piece. The frames and

²⁹ Ibid: 29, 35 f.

³⁰ Ibid.: 37 f.

³¹ Ibid.: 39 f.

planks that made up St 1 had already been taken off the site during the preceding days. All structural remains were stored in a water basin near Uubvlei that had been prepared especially for this purpose. Most other areas had also been excavated totally by this time, with the exception of some concretions on the bedrock. These were subsequently surveyed and removed. On Friday 10 October, it could be concluded that the objectives of the Second Phase excavation had been realized successfully and that there would be no reason to continue. The wreck remains had all been excavated, accurately surveyed, removed and securely stored. Furthermore, more than 95 percent of the other material culture from the wreck had been excavated, surveyed, accessioned and removed. There was therefore no valid reason to continue with the excavation. This last excavation day was used to remove the last fragments from site and the Second Phase archaeological excavation came to an end.³²

Survey

Already during the First Phase excavation in April 2008, the author requested support from Namdeb's Survey Section under Mr. Anthony Goosen to record the site accurately. This resulted in a geodesic survey of the excavation area, whereby use was made of a laser scanner and a Differential Global Positioning System or DGPS. This was supplemented at the time by video footage and photography.³³ Even though the Survey Section was given short notice, a laser scan survey of the site was executed during this period. This served to save as much spatial data as was possible under the circumstances. The objective was to record the site topography and, wherever possible, the positions of cultural material that had not yet been removed by Dr Noli and his team. For this survey, the laser scanner was positioned at five separate perimeter control points. The scanner point interval distance was set at a spacing of 40 mm at a distance of 25 m. Deep gullies that could not be scanned, especially in the northern section of the site, were manually surveyed using DGPS. The combined survey data made the production of a contour plan possible. This showed larger artifacts, such as cannons and the copper ingot field. The surface detail was however not sufficient to identify minor artifacts. In order to improve the plan, a meeting was organized by Mr. Goosen that included the laser training officer of Optron Geomatics (Pty) Ltd, Mr. Sean Dane. During this meeting, the available data were perused. Additional photographic records were provided and these were used, in conjunction with the survey results, to improve on the site model. Mr. Dane subsequently amended the model.³⁴

³² Ibid.: 41-43; Oranjemund Shipwreck Project, *Oranjemund shipwreck project: minutes of a meeting*, unpubl. document, Oranjemund, 13 October 2008; Bruno E.J.S. Werz, *Letter addressed to the Assistant General Manager Production, Namdeb*, unpubl. letter, Oranjemund, 13 October 2008.

³³ Anthony P. Goosen, *Note for the record*, unpubl. memorandum, Oranjemund, 21 October 2008; Noli and Werz, *Preliminary report*: 2-3; Appendix 6; Werz, *Phase 2 Excavation Report*: 46.

³⁴ Goosen, *Note*; Werz, *Phase 2 Excavation Report*: 46.



Figure 8: The first laser scan survey that was undertaken in April 2008. The scanner can be seen in the foreground. Centre: the author, Mr. Alcides Chipeio and Mr Anthony Goosen. To the far right, one of the Namdeb security camera's. (Dieter Noli)

The survey procedure that was applied for the Second Phase excavation was divided into the following aspects:

- use of Total Station theodolites: to record the exact positions in X-, Y-, and Z-coordinates of individual artifacts and features;
- use of DGPS: to record the exact positions of individual artifacts and features, as well as detailed aspects of topography on site; and
- use of the laser scanner: to record the site topography and the exact positions of larger features.

Before excavation started, a control point was established off site to calibrate the DGPS. A further fixed base station was established for the Total Station theodolite. These control points, which were tied in to the national grid system, were checked at regular intervals to guarantee the accuracy of measurements.

Throughout the Second Phase excavation, a Total Station theodolite to record the exact positions of individual artifacts and features was used. This instrument and a surveyor were permanently present on site, to record any artifact or feature that was uncovered. On some occasions, a DGPS was used for the same purpose. This instrument, however, was mainly applied when detailed aspects of the topography of the site or features contained therein, such as large concretions, needed to be recorded. A further application of the DGPS was to re-establish the site perimeter. The laser scanner was used to record the overall site topography before intrusive work started, during the course of the excavations, and once the project was completed. The combined data of the laser scan surveys allow for a reconstruction of the site at various stages of the

project. They can also assist in the production of cross-sections and even in the calculation of the quantity of material and deposits that were removed from site.³⁵

A brief chronological overview of survey activities includes the following. On Friday 5 September, the site perimeter and the section containing wreck remains were demarcated by means of wooden pegs. This assisted the archaeologists in the laying out of trial trenches. On Thursday 18 September, after part of the overburden had been removed, the exact site boundaries were re-established by DGPS on the basis of information acquired during April. A margin of approximately 2 m was added to the perimeter, to ensure that the complete wreck site was covered. That same day, the concretion that covered the structural remains of what was later recorded as St 2 and St 3 was also surveyed by means of DGPS. The edge of the concretion was recorded at intervals of approximately 100 mm. A series of transverse readings, taken across the surface to record the topography of the concretion layer, followed this. This concretion was subdivided on Monday 29 September 2008 due to its size. The corner points of the subsections were also recorded by DGPS and Total Station theodolite.³⁶

On Thursday 25 September, a series of datum or control points for the laser scan survey was established on the site surface. These consisted of steel spikes that were hammered into pre-drilled holes in the bedrock. The top of each spike was crowned with a small platform that served as a base for a sphere. These reflecting spheres represented the control points for the laser scan survey. A total of 14 control points were established and recorded as Perimeter Datum Point (PDP) 1 – PDP 14.³⁷

On Friday 26 September, a full laser scan survey of the excavation area was undertaken. To that purpose, the scanner was placed at three different positions around the site, with the scanning interval set at 5mm. At the same time, aerial photographs were taken at different heights from the gondola of a 60 ton crane. These served as an additional survey record and assisted in the interpretation of the site. The next day, additional laser scans were made from another three different positions. During this period, the overburden had been removed and excavation had just started. On Tuesday 7 October, towards the end of the excavation, another series of laser scans was undertaken. This focused on the structural remains, as the other areas, to the south and west, had already been scanned sufficiently on 26 and 27 September. At the time, the structural remains were exposed almost completely. Scanning was undertaken from three different positions or stations, with an accuracy of 2 mm at 5 m distance. The results of this survey, especially when combined with the results from previous laser scan surveys, resulted in an almost total saturation of the point clouds. Optimal coverage under the circumstances was achieved by scanning from different heights. As a result of this approach, the scanner was capable of recording points that could not have been

³⁵ Werz, *Phase 2 Excavation Report*: 47 f.

³⁶ *Ibid.*: 49.

³⁷ *Ibid.*: 50.

observed if it had only been positioned perpendicular or at an oblique angle from above. On 13 October, a final laser scan survey was undertaken. This scan was aimed at recording the bedrock which was now almost cleared of all cultural material. The only visible remains were some residues and stains of concretions. This scan completed the survey record.³⁸



Figure 9: The results of the combined laser scan surveys on the section of the site that contained structural remains. From top to bottom: St. 1, St. 2 and St. 3. The border on the right-hand side of the scan indicates the western perimeter of the seabed outcrop against which the ship struck. (Courtesy Namdeb Survey Section)

The various surveys that were undertaken during the Second Phase excavation served to provide an accurate record of the spatial positioning of artifacts and features. With this data secured the interpretation phase of the project, which will follow in due time, will be somewhat easier. A preliminary and basic example of this is a plan that combines the positions of various artifacts that were excavated and recorded individually during the period September-October.³⁹ The plan is only based on survey data pertaining to individual items. Although more material was recovered, some items were not surveyed in great detail as they formed part of concentrations. An example of this is the many copper ingots that were found underneath and immediately to the south of St 3. As was already discussed, all the ingots could be identified as being parts of the cargo and were stored in the lowest level of the hull, immediately on top of the ceiling planking.

³⁸ Ibid.: 50-55.

³⁹ Ibid.: 56.

Although the uppermost ingots were surveyed individually, those in the lower levels were not as it became evident that they all formed part of the same group of finds.

Most cultural material during the Second Phase excavation was located in the eastern section of the site. This comprised the remaining structural parts of the vessel, together with associated items, and some artifacts that formed part of the ship's equipment, cargo, provisions and a few personal items. The main reason for their survival seems to be ubiquitous presence of the copper ingots that covered and protected artifacts and finds against mechanical, chemical and biological deterioration agents. Other smaller concentrations of material were found in the northeastern section and in the 'Spillage Area', to the west. These mainly consisted of artifacts captured in smaller ferrous concretions that were spread over the site, such as pewter plates and jugs, galley wares, weaponry, some elephant tusks and personal items. The original location of these artifacts was above the hold of the vessel and separated by one or more decks. Their position, to the west of the lower levels of the ship, indicates that either the ship capsized to starboard after impact, or that the hull broke up in a westerly direction after being deposited on the sea bed. Future analyses of the survey results will undoubtedly provide more information in this regard.⁴⁰

Documentation

On 18 September, a start was made with the administration of artifacts and other finds. Initially, finds were recorded in a single spreadsheet document. Due to their quantity and the fact that finds were uncovered all over the site, the system was revised on 25 September. Recording was now based on the various locations where material was deposited. To that purpose, the site was subdivided into four areas or sections. These were recorded as: 'Concretions', 'Southern Deposits', 'Spillage Area', and 'Under Shipwreck'. Each area was allocated a separate spreadsheet, with columns containing specific information on the recorded items. This included the following:

- Date: the date when the object was recorded;
- OMS Number: (OMS=Oranjemund shipwreck) the specific number allocated to each find;
- Time: the time when the item was removed from its position on site;
- Content: a basic description of the item;
- Survey Reference (DPW): the number referring to the spatial or survey data pertaining to the item, as allocated by the surveyor;
- Location: the specific area from which the item was removed;
- Found By: the name of the excavator.⁴¹

⁴⁰ Ibid.: 56 f.

⁴¹ Ibid.: 29; Fouzy Kambombo and Onasmus Shiwedha, *Report on artifacts administration*, unpubl. report, Oranjemund October 2008.

Initially, the OMS or find numbers ranged from 1 to 44. Thereafter, the individual areas were allocated different batches of numbers. These consisted of:

- 'Concretions': 45 – 70;
- 'Southern Deposits': 71 – 90;
- 'Spillage Area': 91 – 110; and
- 'Under Shipwreck': 601 – 654.

In some cases, where the pre-allocated numbers did not suffice, new groups of numbers were allocated. This was the case with the 'Southern Deposits' and the 'Spillage Area' that both received second batches of numbers. The section 'Concretions' contained more artifacts than was originally expected. For that reason, four batches of numbers were allocated to this section during the course of the excavation. In this context, it should also be noted that all the finds from both the First Phase (April 2008) and Second Phase excavation (September – October 2008) later received individual accession numbers that were provided by the Namibian National Museum in Windhoek. All material was allocated individual accession numbers during the artifact audit that was undertaken by external experts in October – November 2008.⁴²

Aspects of the Second Phase excavation campaign were recorded in various ways. These included the following:

- 1 field notes;
- 2 reports;
- 3 general photographs;
- 4 technical photographs;
- 5 drawings and tracings;
- 6 computer records;
- 7 laser scans;
- 8 video and film footage.⁴³

1. At the onset of the Second Phase project, all people involved in the excavation were requested to keep notes of their activities and to record these in a notebook. The Principal Investigator kept a general diary, as he was more involved in project management. The records that were compiled provided information to reconstruct various activities that were undertaken.

2. Project participants that had been allocated specific responsibilities were requested to compile reports on their activities. As a result, reports were compiled on the excavation and recording of the structural remains, and on the finds registration.

3. An extensive general photographic record was compiled by project participants. This record forms part of the project archive. Another source of general photographic

⁴² Ibid.

⁴³ Werz, *Phase 2 Excavation Report*: 58.

material is presented by the pictures that were taken by members of the national and international press that visited the site on several occasions.

4. Technical photographs include general and detailed photographic records of the structural remains, as well as aerial photographs of the site. These are included in the general photographic record as described above.

5. Drawings and tracings of the structural remains were also produced. Most drawings are included in the field notes and the original tracings stored in the Namdeb Survey Section archive.

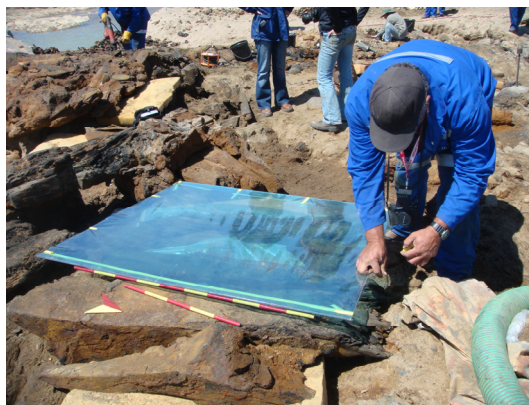


Figure 10: Portuguese fieldworker Miguel Aleluia in the process of tracing parts of the wooden structure of the ship's hull. The tracings that were produced represent an important part of the project documentation and will assist in later reconstructions. (Bruno Werz)

6. Computer records include the Finds Register. The Finds Register should be studied in conjunction with the record of Finds Coordinates, as compiled by the Namdeb Survey Section.

7. Other computer records consist of the laser scan surveys that were undertaken in April and September-October 2008, as well as the resulting contour plans that were produced by the Namdeb Survey Section.

8. Additional records consist of the video and film footage that was taken during the project. This includes footage taken by the Namibian Government, private individuals and different television teams. Another source of video footage is presented by the security camera footage that was taken by Namdeb during the course of the project.⁴⁴

The project documentation serves different purposes. In this context, it can be seen as a record of activities that were undertaken during the Second Phase excavation. The

⁴⁴ Ibid.: 58 f.

various files and records thus bear witness to these activities and represent an historical record or archive. This documentation will also assist in the interpretation stage of the project that will follow in due time. Interpretation depends on a variety of research questions that must be formulated first. In addition, further questions building on initial research results may follow during the course of time. In order to answer some of these, the project documentation will prove to be of immense value.⁴⁵

Data recorded in the project documentation was used to provide an impression of the material culture that was excavated, as well as some of the related contextual information. To this purpose, a basic analysis of information contained in the Finds Register and the list of Finds Coordinates was undertaken.⁴⁶ Although this analysis is preliminary and will need to be refined, it already provides some important information.

Initially, the Finds Register included material that was excavated from the whole site. During the period 18-24 September, a total of 43 entries were made, reflecting a diverse collection of items. At least 17 different categories of objects could be distinguished, ranging from bone, ceramics, wood, leather and textile to gold and silver coins, cannon balls and copper ingots. As this led to some confusion, the system was revised. From 25 September onwards, the site was subdivided into three and later, from 1 October onwards, into four different areas; the last area being 'Under Shipwreck'. These individual areas were allocated different batches of find numbers. The Finds Register indicates the number of entries for each area as:

- 'Concretions': 439 entries; recorded from 25-9 to 10-10-2008;
- 'Southern Deposits': 44 entries; recorded from 25-9 to 1-10-2008;
- 'Spillage Area': 38 entries; recorded from 29-9 to 10-10-2008; and
- 'Under Shipwreck': 392 entries; recorded from 1-10 to 10-10-2008.⁴⁷

This amounts to a recorded total of 956 entries. It should be noted, however, that not all find numbers indicate individual artifacts. A few refer to sediment and oxidation samples that were taken, whereas several other find numbers refer to groups of artifacts. If, for example, some lead sheeting was found in the same location as ceramic shards, this group was surveyed in as one point, collected together, allocated the same number and bagged as one unit. Another observation that can be made is that the entries are not always explicit, specifically where it concerns the column 'find description'. For example, the term 'wood' appears quite often, but it is not always clear if this refers to a small fragment of wood or a complete ship's timber. Also the location where some items were recovered is not always clear from the Finds Register. In particular the area that was named 'Concretions' was not always reported correctly by

⁴⁵ Ibid.: 59 f.

⁴⁶ Fouzy Kambombo and Onasmus Shiwedha, *Finds Register Oranjemund shipwreck September-October 2009*, unpubl. register, Oranjemund 2008; Namdeb Survey Section, *Finds Coordinates Oranjemund shipwreck September-October 2008*, unpubl. list, Oranjemund, 2008.

⁴⁷ Kambombo and Shiwedha, *Finds Register, Werz, Phase 2 Excavation Report*: 60.

some excavators or recorded consistently. Originally, the name was given to the eastern part of the site. This section was flanked to the south by the 'Southern Deposits' and to the west by the 'Spillage Area'. The section 'Concretions' was characterized by the presence of substantial ferrous concretions that covered the structural remains from the wreck. Once most of these deposits were removed, the area was renamed 'Under Shipwreck'. The circumstance that entries under 'Under Shipwreck' only started on 1 October may illustrate this. Nevertheless, confusion was caused, especially by the material that was excavated by one particular archaeologist. Although during the latter phase of the project this project participant did indeed focus on concretions, these were in fact situated in the area that had been named 'Spillage Area'. By referring to the location incorrectly as 'Concretions', confusion was caused. Nonetheless, this mistake has now been acknowledged and will be easy to rectify, especially when processing the survey data.⁴⁸

Although the Finds Register records many individual items, the corresponding list of Finds Coordinates does not always reflect this. Although some 500 entries were made in this list, the survey information does not always reflect every single item. An example is the group of copper ingots. The Finds Register indicates that 487 copper ingots were removed from site during the Second Phase excavation. This does not, however, include some additional ingots that may still be encapsulated in ferrous concretions that were removed and that have not yet been excavated at the artifact repository. Of the 487 ingots, the exact position of 79 was recorded, while the remaining 408 were grouped in 13 different concentrations. Although the positions of these concentrations were accurately established by Total Station theodolite readings, the exact location of each individual ingot contained in these concentrations was not. The reason for this was that many ingots were not directly accessible, as they were conglomerated together. In addition, possible information that could be gained from recording their specific location was regarded as limited. Recording the individual positions of all ingots also did not seem warranted due to the limited time factor.⁴⁹

The preliminary analysis of the Finds Register and list of Finds Coordinates also showed that most of the material that was excavated originated from the eastern part of the site. Some 439 entries were recorded for the 'Concretions' area and 392 for the 'Under Shipwreck' section, resulting in a total of 831 entries. This stands in stark contrast to the 'Southern Deposits' and 'Spillage Area' with a combined figure of 82 entries. Although these results will have to be adjusted slightly due to the confusion that was caused by incorrectly allocating the area name 'Concretions' to some artifacts that were actually removed from the 'Spillage Area', these results are nonetheless in accordance

⁴⁸ Werz, *Phase 2 Excavation Report*: 60 f.

⁴⁹ Kambombo and Shiwedha, *Finds Register*; Namdeb Survey Section, *Finds Coordinates*; Werz, *Phase 2 Excavation Report*: 61.

with the conclusions that can be drawn when observing the general pattern of artifact distribution.⁵⁰

Although the registration system for artifacts and finds that was applied in the field proved to be quite acceptable, further analysis and more refined recording is needed in future. To this purpose, it is necessary to compare the information in the Finds Register and the Finds Coordinates file with the Accession Register that was compiled during the artifact audit that was undertaken by external experts in October – November 2008. Besides comparing these three sets of information, it will also be important to have the respective artifacts and finds at hand. This will represent yet another control. At the same time, the respective artifact or find can be described and documented in more detail.⁵¹

Summary and conclusions

The Oranjemund shipwreck represents a heritage that is of global significance. Unfortunately, the site where the shipwreck was found in April 2008 was under immediate threat from natural factors and human interference. For this reason, an archaeological rescue excavation was undertaken in September-October of that same year to save as much information as was possible. This followed on a preliminary excavation that was executed shortly after discovery of the wreck.

The Second Phase project was commissioned by the Namibian Government. Its primary objectives were to excavate, to record and recover all structural remains of the wreck, as well as all associated artifacts and finds. The archaeological excavation successfully achieved these objectives. The project was completed within the projected time frame. All remaining parts of the ship structure, as well as more than 95 percent of its associated material culture were excavated according to acceptable professional standards. Recording of site information was undertaken in various ways. Besides that, many of the techniques that were applied and much of the data that was captured can meet best achievable international standards. In addition, an extensive inventory of finds was compiled, together with basic descriptions and a photographic record.

The international significance of the find and worldwide interest is reflected in the various backgrounds of stakeholders and project participants. Support for the project was received from Namibian, Portuguese, Spanish, Zimbabwean, Kenyan, South African, British and American quarters. The excavation was reported upon in the international media and more worldwide exposure can be expected in future. The next phase of the project will have to focus on the conservation and further documentation of the material that was excavated. Parallel to this task, future detailed research into a variety of aspects needs to be planned. This will have to involve scientists in different fields of

⁵⁰ Werz, *Phase 2 Excavation Report*. 61.

⁵¹ *Ibid.*

expertise. The end goal is to have the shipwreck preserved and displayed in a special museum, together with all the material that was excavated from the site. This must be accompanied by extensive research, publication and education on various levels.

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