



The Benefit of the Protection of Underwater Cultural Heritage for Sustainable Growth, Tourism and Urban Development

Elaborated by the UNESCO Secretariat and the Scientific and Technical Advisory Body of the Convention on the Protection of the Underwater Cultural Heritage (2001)

EXECUTIVE SUMMARY

The present study aims to evaluate the potential of underwater cultural heritage for the economic development of a region or city. A selection of museums, with visitor numbers ranging from 40,000 to 1 million persons per year, have been used as case studies.¹ Similarly, dive tourism on underwater cultural heritage sites has also been assessed and evaluated.²

The document illustrates that:

- Fostering public access to underwater cultural heritage contributes to its increased appreciation and recreational value, as well as the public's understanding of its significance;
- Investment in infrastructure for the display and responsible visitation of submerged heritage increases the economic activity of the area in which it is located, fostering sustainable development;
- Responsible public access to underwater cultural heritage can help finance protection and research, and is a means of monitoring its security and state of preservation.

This study also aims to identify new **ways to provide public access to underwater cultural heritage** and new means of financing **underwater archaeological research**, while maintaining high standards of protection. Examples are:

- Reinforcing **access to *in situ* underwater sites** through the establishment of specific infrastructure improvements, such as metal cages, dive trails or glass bottom boat visits; the opening of archaeological work under water to tourists or controlled guardianship of sites in co-operation with selected dive centres;
- Increasing the establishment of **underwater heritage museums** (*in situ* or land-based);
- Enabling **virtual access** to sites.
- Increasing **media cooperation** to publish archaeological work;

¹Museums showing underwater cultural heritage are quite numerous. A relatively comprehensive list of such museums is provided at www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/museums-and-tourism/land-based-museums

²Geographical distribution has been sought, but not fully respected, as some regions have a longer tradition of underwater archaeology than others. This study is based on illustrative examples. It does not take into account all existing museums, dive sites or other publicly accessible underwater heritage.

CONTENTS

- Executive Summary 1
- Introduction 4
- Development potential of underwater heritage..... 5
 - Cultural, Educational and Recreational Benefits..... 5
 - Tourism 6
 - Urban Development..... 8
 - Protection and Preservation Guarantee 9
- Case Studies 11
 - Museums..... 11
 - China - Maritime Silk Road Museum..... 11
 - Canada/Spain - San Juan wreck..... 11
 - Germany - Haithabu 12
 - Danemark - Viking Ship Museum, Roskilde..... 13
 - Egypt - Alexandria Underwater Museum project 15
 - Sweden - Vasa Museum 16
 - Spain - National Museum of Underwater Archaeology ARQUA, Cartagena 17
 - Turkey - Bodrum Museum 18
 - United Kingdom - Mary Rose Museum 19
 - USA - Great Lake Maritime Museums 20
 - Dive Tourism 22
 - Australia – Yongala..... 23
 - Chuuk Lagoon - Federated States of Micronesia 24
 - Egypt – Alexandria Eastern harbour..... 25
 - Grenada – Shipwreck Diving 25
 - Italy – Baia 27
 - Jamaica - Port Royal 28
 - United Kingdom - Scapa Flow, Scylla and Stirling Castle Wrecks 28
 - USA - Thunder Bay National Marine Sanctuary & Great Lakes Maritime Heritage Center, Michigan 30
 - USA - Florida Keys 31
- New ways of raising benefits 31
 - Reinforcing Access 32
 - Establishment of Dive Trails, Glass-Bottom Boat Visits..... 32
 - Metal cage protection and underwater display..... 32
 - Dive club guardianship of sites..... 33

| | |
|---|----|
| Replica Site Construction | 33 |
| Shared Archaeology | 34 |
| Heritage Dive Courses | 34 |
| Pre-Evaluation of cultural Development Needs..... | 35 |
| Media cooperation..... | 35 |
| Virtual Visit to Shipwreck Sites..... | 35 |

INTRODUCTION

Underwater cultural heritage holds vast potential for scientific research and education. Submerged prehistoric sites are of crucial importance for understanding the development of human civilisation.³ Similarly, shipwrecks provide vital information on past cultural exchanges, trade and mutual influences, while sunken cities, dwellings and religious sites reveal important data on local life, religious ceremonies and sacrifices.

In addition to its scientific significance, underwater cultural heritage also opens up numerous opportunities for recreation, cultural enrichment and sustainable development. It is an interesting and attractive form of heritage, highly appreciated by the public due to the stories it symbolises and thanks to the air of mystery which surrounds its underwater location.

Submerged heritage thus provides long-term opportunities for cultural and recreational tourism, and can contribute significantly to urban development. Public access to underwater archaeology, in the form of museums or dive trails, ensures the protection and preservation of the underwater cultural heritage concerned, while promising a lasting financial return.

Studies of some heritage sites on land⁴ have shown that for every USD spent at a heritage site itself, up to USD 12 may be spent on related activities around the site.⁵ This effect was particularly obvious in the sector of tourism (transport, accommodation, food, guides, souvenirs, etc.). Additionally, it stimulates local pride and instigates an increase in consideration for heritage.

³ For as much as 90% of human history, sea levels were significantly lower than they are today, as a result, many prehistoric landscapes are now submerged, and many traces of early human development may be found underwater.

⁴ An overview is provided for example for the EU in the document "The economy of culture in Europe" http://ec.europa.eu/culture/pdf/doc883_en.pdf. According to this in the EU the sector turned over more than EUR 654 billion in 2003, contributed to 2,6% of EU GDP, the overall growth of the sector's value added was 19,7% in 1999-2003 and in 2004 at least 5,8 million people worked in the sector, equivalent to 3,1% of total employed population in Europe.

⁵ A frequently cited study of the State of Virginia contrasted spending patterns of heritage visitors with tourists who did no heritage activities showing that heritage visitors stay longer, visit twice as many places, and spend 2 ½ times more than other visitors. Similar data is available from other countries. A local impact study of Biltmore in North Carolina showed that for every USD spent by a visitor at Biltmore, USD 12 was spent elsewhere, i.e. hotels, restaurants, gas stations, retail shops, etc. In Norway only 6-10% of the spending involved in visiting a cultural heritage site was spent at the site itself. The balance was spent in the community around the site. See Donovan D. Rypkema in "Cultural Heritage and Sustainable Economic and Social Development", European Cultural Heritage Forum, Brussels, Belgium, December 7, 2005 www.hs-intl.com/pubs/speeches2005_002.pdf

DEVELOPMENT POTENTIAL OF UNDERWATER HERITAGE

“A concerted effort to preserve our heritage is a vital link to our cultural, educational, aesthetic, inspirational, and economic legacies - all of the things that quite literally make us who we are.”

Steve Berry

Defined in the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage, ‘underwater cultural heritage’ encompasses all traces of human existence that lie or once lay under water for at least 100 years and have a cultural or historical character. This includes ancient shipwrecks, submerged temples and cities, sunken heritage in Cenotes,⁶ wells and lakes as well as fish traps and others sites. It includes artefacts *in situ* as well as recovered objects brought to land. It is estimated that three million ancient shipwreck sites lie under the world’s oceans, at least 150 sunken cities and ports in the Mediterranean, and some 20,000 prehistoric sites in the North Sea and the Baltic. Traces of human existence have been found under water from up to 300,000 years ago.

Notably spectacular sites, such as the lighthouse of Alexandria, Egypt, or the shipwreck field of Chuuk Lagoon, Micronesia, inspire the public imagination through the powerful historical messages they evoke. However, there is also public interest in this heritage, stemming from the ‘unusual’ aquatic environment, which has prompted an increase in interest in underwater heritage and in dive tourism. This trend is particularly important for Small Island Developing States.⁷

CULTURAL, EDUCATIONAL AND RECREATIONAL BENEFITS

The protection, research and public display of underwater cultural heritage can have an important cultural, recreational and educational impact on the community or region where it is found. It can shape cultural identity and foster interaction between societies and their past.

The current globalization and media output-disparity can lead to a distorted perception of the past and the importance and impact of certain historical events on today’s situation. This can for instance be due to the wider distribution of certain TV channels or programmes, the greater ease of use of certain languages or even changed writing styles such as the altered use of Latin, Cyrillic, or Arabic letters.

⁶ Sinkholes caused by the collapse of karst caves that have since filled with water, common in Latin America

⁷ As a growing form of marine tourism, scuba diving has seen annual increases of on average 12 to 14 % since the 1970s according to the world’s biggest dive certifier, the Professional Association of Diving Instructors (PADI), which alone had certified more than 22 million divers worldwide by 2013 (<http://www.padi.com/scuba-diving/about-padi/statistics/pdf>). The Egyptian Red Sea for example, has seen a steep increase in dive tourism, with ten times as many divers arriving now compared with the 1990s (Harriott, 2002; Garrod & Gossling, 2008). See: Dive Tourism and Local Communities: Active Participation or Passive Impacts? Case Studies from Malaysia, Bilge Daldeniz, Mark Hampton, Kent Business School Working Paper No. 245 June 2011

The development of heritage for tourism can help reinvigorate the cultural well-being of the residents of an area, providing a connection between societies and their past. It adds a tangible dimension to historic events and historic connections, allowing the history to come alive more vividly in one's imagination.

This is of special importance for submerged heritage, as it reiterates the strong historic connection between ancient civilisations and the sea. This symbiotic relationship has diminished over time due to the recession of the ocean, changes in the focus of trade, the establishment of new means of transport and so forth. Additionally heritage preserved under water can illustrate certain religious views, such as veneration at Hawaiian fishpond sites, and the influences other civilisations had in the development of a specific region.

TOURISM

The link between culture and tourism is inexorable, and the increased dedication of resources to the former is certainly linked to the improvement of the latter. This is evidenced among others by a recent study which showed that 37% of global tourism has a cultural motivation.⁸

Submerged sites are appealing cultural attractions, and although many sites are not accessible *in situ* to the public, a considerable number of them, if managed properly, could be made accessible to the average tourist without threatening preservation.



Reconstitution of the Vasa shipwreck © Swedish Maritime Museums

Many pieces of underwater cultural heritage have also been

made accessible in land-based museums. Forms of tourism that can be especially well developed, following a proper valorisation of underwater cultural heritage, are cultural, dive and cruise tourism.

'Dry-Footed' Access

Some countries with rich underwater heritage have decided to recover artefacts or whole wrecks and make them visible to the public⁹ in major museums, which now provide a lasting attraction for their region. Spectacular examples are the *Vasa* Museum in Sweden, the *Mary Rose*

⁸ Cultural Heritage as a socio-economic development factor, Archimedes, Euromed; the same study states that according to recent estimates, more than 8 million jobs are directly and indirectly sustained by the Cultural Heritage sector in Europe. www.comune.venezia.it

⁹ This can be understood as enhancement of the underwater cultural heritage, which is one of the reasons for which activities directed at this heritage can be authorized according the Rule 1 of the Annex to the 2001 Convention.

Museum in the UK, the Bodrum Museum in Turkey, the Roskilde Museum in Denmark, and the ARQUA Museum in Spain.

The decision to bring artefacts from their *in situ* locations to land-based museums is frequently due to the original site being difficult to access by divers, either because of its remoteness or depth. However, underwater archaeological objects were often also moved to land-based locations because the seabed was perceived as a place inaccessible to non-divers.

Nonetheless, today *in situ* access for the non-diving public has also been made possible thanks to glass-bottom boat visits over archaeological sites. This option is promising, as the average tourist feels inspired and curious by the idea of pirates, of oceans and the history of seafaring in general. A similar experience is provided by ship excursions that cross over underwater cultural heritage sites while the tourists view virtual presentations of the sites located on the seabed under their boat.¹⁰

Another recent development in the effective display of underwater cultural heritage is the creation of true underwater museums, or at least museum-aquarium settings, as seen in the Chinese Baiheliang and Maritime Silk Road (Nanhai No 1) museums.¹¹ Such museums show the underwater environment and the authentic site *in situ* or in a close to *in situ* situation.

Dive Tourism

While land-based museums require objects to be taken out of their context and into a museum, *in situ* access leaves finds in their original location on the seabed. This preserves the scientific integrity and authenticity of the site and reduces costs related to object display, storage and conservation. *In situ* access may in certain cases even generate a higher financial return than land-based access.

Scuba diving is increasing in popularity as a leisure activity, with the number of newly certified divers worldwide growing. However, the average age of divers is also going up, indicating a need to engage the younger generation more, for instance, by strengthening the access to cultural and not only natural sites. Moreover, it has been shown that divers visiting submerged sites spend more time in a region than tourists visiting artefacts displayed in 'dry-footed' museums and spend more.

Many *in situ* underwater sites are located close to the coast, making it relatively easy for dive clubs to organize visits to this submerged heritage. Even in the course of archaeological excavations, visits to underwater archaeological sites can be arranged through cooperation between dive centres and research institutions. In this manner the archaeologists who are

¹⁰ As for instance offered on a tourist ship line between Sestri Levante and Portofino in Italy.

¹¹ The Nanhai Museum is not an *in situ* presentation of a wreck, as the wreck was cut out of the silt of the seabed and brought to the Aquarium. However the underwater presentation seeks to give some of the authentic context back to the wreck.

present can ensure that the visitors adhere to the instructions and guidelines of the responsible authorities.

Worldwide, national authorities have endeavoured to create official dive trails in order to foster greater visibility and enjoyment of underwater cultural heritage, but also to increase dive tourism.¹² This is of special importance for States bordering the ocean, and in particular Small Island Developing States (SIDS), which can greatly enhance their tourist attractiveness through the extended valorisation and promotion of submerged archaeological sites. This trend is to be observed especially in many tourism-dependent states in and around the Caribbean, but also in Australia and in some European states.

In order to be attractive for dive tourism, the location of a dive trail or site is often crucial. Shallow warm water sites may for instance be more appealing to divers than remote or deep cold water sites. However, with proper valorisation even these 'difficult' sites can be transformed into attractive dive destinations, as demonstrated by the *Coronation* and *Scapa Flow* wreck sites in the UK.

URBAN DEVELOPMENT

Exceptional underwater heritage can, like land-based heritage, be a strong factor for urban development. The *Vasa*, *Mary Rose*, Bodrum and Roskilde Museums have, for instance, considerably changed the way Stockholm, Portsmouth, Bodrum and Roskilde look today.

When the construction of the Underwater Museum of Alexandria was proposed, it was met with international support and interest. Most importantly, it gained the backing of the Mayor of Alexandria, as the project could be a crucial component in the city's revival and in the rejuvenation of its waning tourism industry.¹³ Currently, only 2 to 10% of tourists coming to Alexandria are foreign visitors, and the city, despite its celebrated past, is often omitted from the usual tourist itineraries. The design of the underwater museum was suggested as part of a new urban planning approach envisaged for both the city and its northern coastal zone, in order to assure better safeguarding of cultural heritage and natural resources.¹⁴

¹² See a list provided by the Australian government here: www.environment.gov.au/heritage/shipwrecks/trails.html

¹³ After the Alexandria museum creation, direct benefits were expected to include the creation of employment to operate and maintain it (staff, curators, tellers, security guards, personnel of suppliers and maintenance). A project of this scale was also immediately recognized to generate indirect benefits, in terms of consumption through services, like restaurants, hotels, transport, construction, maintenance. Other expected indirect effects were that the investment in the museum would encourage investors to invest in the development of the neighbourhood, i.e. hotels, services, infrastructure, entertainment, cruises, guided tours, weekends organized to combine Alexandria, north east and west coasts to Alamein or to Port Said and the Suez Canal. Urban development and cultural heritage protection were recognized to go hand in hand and therefore, protection is worth the effort.

¹⁴ Underwater Archaeology Museum of Alexandria: An Integrated Sustainable Development Role, Naguib Amin, Proceeding of UNESCO Meeting, Chongqing, China, 2010; See also the study 'The Tourism Sector in Alexandria', Alexandria City Development Strategy, World Bank, April 2005; Alexandria City Development Strategy (CDS) & Alexandria Growth Pole Project, Mohamed Bassiouny, Secretary General, Alexandria Governorate, CDS Partnership Forum, March, 2006; Itinéraires d'Alexandrie, Propositions, September 2006

This example demonstrates the need to valorise submerged heritage and to actively foster access in order to achieve the best possible social and economic results. Despite the presence of truly exceptional sites in and around the Bay of Alexandria, the current beneficial return (without the museum) for the city is yet minimal. The average tourist is neither informed of the possibility to dive the sites, nor invited to do so. Almost no indication draws attention to the submerged sites on the land-part of the Pharos lighthouse site, the Quait Bey Fort. Unfortunately, the same can be said of many other exceptional underwater heritage sites worldwide that do not currently exploit their full potential as tourist attractions.

PROTECTION AND PRESERVATION GUARANTEE

Article 2, paragraph 10 of the 2001 Convention calls for the development of “responsible non-intrusive access” to underwater cultural heritage, and makes the States Parties managers of the adoption of “practicable measures to raise public awareness regarding the value and significance of underwater cultural heritage and the importance of protecting it” (Article 20).

Underwater cultural heritage is a legacy for humanity, and the public has a right to access and develop an appreciation for it. However, the UNESCO 2001 Convention is very clear in its message: No public access should be allowed if there is a risk of threatening the integrity and preservation of the underwater cultural heritage concerned.

Therefore, in order to avoid negatively impacting the underwater cultural heritage by making it accessible to the public, control mechanisms should be established and respected. This guarantees the protection and preservation of the heritage that is on display either in museums or *in situ*.

Unfortunately, it has so far been difficult to conclusively assess the impact leisure diving has on underwater cultural heritage. Most of the available literature concentrates on the impact of dive tourism on coral quality and growth, but not on cultural heritage preservation.¹⁵ Even so, some of the conclusions of existing studies also apply to cultural sites, and can therefore help highlight the possible negative impacts of public access.

For example, key dive sites can become congested when dive boats cluster in an area, as observed at shipwreck sites in Malaysia. Vessels transporting visitors to these sites can also damage the objects, as seen on the *Titanic* wreck. Likewise, souvenir hunting and pillaging can be unfortunate and undesirable consequences of public access. In a similar vein, a study on the

¹⁵ Multi-stakeholder Values on the Sustainability of Dive Tourism: Case studies of Sipadan and Perhentian Islands, Malaysia. Janet Haddock-Fraser, Mark Hampton, Kent Business School www.academia.edu/446390/Multi-stakeholder-values-on-the-sustainability-of-dive-tourism-Case-studies-of-Sipadan-and-Perhentian-islands-Malaysia as well as Dive Tourism and Local Communities: Active Participation or Passive Impacts? Case Studies From Malaysia. Bilge Daldeniz, Mark Hampton, Kent Business School Working Paper No. 245, June 2011 www.academia.edu/704256/Dive-tourism-and-local-communities-active-participation-or-passive-impacts-Case-studies-from-Malaysia

Sipadan and Perhentian islands in Malaysia concluded that tourists had a worrying lack of concern for the conservation of the locations they visited.¹⁶ On the same islands, poorly planned resort and tourism developments had also been responsible for damaging coral and obscuring a cultural heritage site. Further issues can for instance include sewage disposal problems, especially when toilets empty directly into the sea, as observed at Malaysia's dive sites and in Alexandria, Egypt.

Despite the limitations mentioned above, many of these issues can be avoided if the responsible authorities actively manage their underwater cultural heritage¹⁷. Furthermore the investment in the research and study of this underwater cultural heritage provides societies with an increased understanding of their own past, and of the socio-cultural environment that surrounds them.

At the same time, the more we know about heritage, the more meaning we will be giving to the physical remains that constitute it. In charging an archaeological site with a historical and cultural meaning, it may be appreciated differently by diverse parts of the society. Even though valorisation can differ geographically, culturally or temporally, it always reinforces the existing links between societies and their cultural heritage, and it helps preserve the sites in question.

¹⁶ Multi-stakeholder Values on the Sustainability of Dive Tourism: Case studies of Sipadan and Perhentian Islands, Malaysia. Janet Haddock-Fraser, Mark Hampton, Kent Business School

¹⁷ See for instance the campaign to create anchoring places at historic wrecks in Germany, started in 2015 supported by the CMAS.

CASE STUDIES

Some case studies of selected museums and underwater sites shall serve to evaluate and illustrate the benefit of submerged heritage to society from a cultural, educational and sustainable development stand point. The selection has been made focusing on facilities where data was available. It was sought to achieve an equal geographical distribution of the examples.

MUSEUMS

CHINA - MARITIME SILK ROAD MUSEUM

An example of advanced museum design and tourism development working in conjunction with scientific research is the Maritime Silk Road Museum in China. China planned to develop tourism on Hailing Island, which did not have much to attract visitors besides the beach. However, it lies close to an important ancient trade



The interior of the new Nanhai No 1 – Maritime Silk Road Museum, China © U. Guerin/ UNESCO

route, the Maritime Silk Road, and an ancient shipwreck was discovered close to Hailing Island. Searching for the best way to bring this cultural attraction to the community and its visitors, and to render the island more attractive, a world-first aquarium-museum was built: the ‘Maritime Silk Road Museum.’ The wreck, called *Nanhai No.1*, was recovered and brought to the aquarium still preserved in the surrounding silt. It is now being excavated, and will be shown as work-in-progress underwater to the visiting public. The desirability of the island for touristic activity has increased considerably with the cultural experience offered here and the local development which has been undertaken. The stretch of beach used for building the museum was, in any case, not suitable for swimming, and visitors mainly come now to this location from the surrounding beaches for the purpose of visiting the museum. In this way, the museum’s construction did not negatively impact other types of recreational land-use.¹⁸

CANADA/SPAIN - SAN JUAN WRECK

The remains of the *San Juan*, a Basque galleon with three full decks and three masts that sank in Red Bay, Canada in 1565 with a cargo of 900 to 1,000 barrels of whale oil, was excavated by underwater archaeologists from Parks



¹⁸ There is no statistical data on the visitor numbers, but as the shipwreck is not yet entirely revealed, any data would be provisional.

Canada. It is the oldest shipwreck ever found in Canadian waters and is a sunken relic that symbolizes the early spread of European civilization and commerce to the New World.

Now, a team of Spanish maritime heritage experts undertake build a seaworthy replica of the 450-year-old vessel. This has, among other things, led to the Basque city of San Sebastian, the original home of the vessel, being chosen to be Europe's Capital of Culture in 2016. This much desired nomination greatly enhances the tourism visibility and cultural investment in the city, and will hopefully greatly improve its urban development.

The replica galleon is to be built in the coming years, and is expected to travel between European cities from 2019 onwards. Afterwards, it will set sail for Labrador and other East Coast destinations. It is hoped that this endeavour will help to spread awareness of the deep historical connection between Canada and Spain and of the importance of underwater cultural heritage.¹⁹

The wreck's characteristic structure serves now also as part of the **logo of the UNESCO 2001 Convention** on the Protection of the Underwater Cultural Heritage. The original galleon and its surrounding Red Bay have also been inscribed in the UNESCO World Heritage List. Due to the decline of the fishing industry, the Red Bay population currently lives largely off tourism income generated by tourists visiting the Red Bay installations and wreck.

GERMANY - HAITHABU

Haithabu (Hedeby) was an important trading settlement in the Danish-northern German borderland during the Viking Age. It flourished from the 8th to the 11th centuries.



After lengthy excavations of the site and the recovery of shipwrecks from the water, a museum was created and opened in 1985. More importantly, an ambitious archaeological reconstruction program was initiated in 2005 on the original site. Based on the results of this archaeological research, exact copies of some of the Viking houses were built. In the complex, the visitors can now view underwater archaeological finds in the form of Viking shipwrecks.

The German region of Schleswig-Holstein has invested EUR 2.3 million in support for the new concept museum built in 2009-2010. The contribution of the museum to local and regional tourism is multifaceted, but can be

¹⁹ Canada's oldest shipwreck to be resurrected in replica of 16th-century Basque galleon, Randy Boswell, Postmedia News www.canada.com/Canada+oldest+shipwreck+resurrected+replica+16th+century+Basque+galleon/7981207/story.html

considered as significant through the enrichment of the region by the cultural and recreational experiences offered.

Although many of the tourists visiting this area stayed at beach locations, many frequented the cultural offers of the region, like that of the Haithabu museum, which is located close to the small city of Schleswig. According to a survey by the Haithabu museum, most visitors to the museum came from the surrounding region, with 38.5% of visitors coming from the immediate surroundings and 91.4% coming from Germany.²⁰ Visitors from foreign countries amounted to 8.6%²¹.

It should be noted that when visitors came to the museum, they spent a considerable portion of their day there. Since the opening in 1985, the Haithabu site has counted approximately 4.5 million visits. In 2011 alone, there were a total of 146,000 visits. This museum thrives on the local Viking history, so this attraction leads the way for other museums in the German county of Schleswig-Holstein.

DANEMARK - VIKING SHIP MUSEUM, ROSKILDE

The Danish Roskilde Museum focuses on ancient and medieval ships, seafaring and boatbuilding. It displays five Viking ships discovered at Skuldelev. It also houses copies of a trading vessel and a warship. The boatbuilding tradition and culture of the Viking age are illustrated through working boat builders and exhibitions displayed at the museum. Craftsmen work in an archaeological workshop, where finds from all over Denmark are measured and recorded, and maritime archaeology is conducted.



In 2011, there was a decrease in visitor numbers in accordance with the general decrease of tourism due to the economic crisis, although there were still an impressive 115,129 visitors²² (70,623 adults and 44,506 children under 18)²³ for a town of only 48,000 inhabitants. The following numbers were provided:²⁴

Income from ticket sale: USD 1,069,455.31

Costs in subsidies for the museum: The Viking Ship Museum received approx. USD 2.4 million in government grants in 2011, while Roskilde municipality

²⁰ Survey of the Schloss Gottdorf Haithabu museum undertaken in 2011

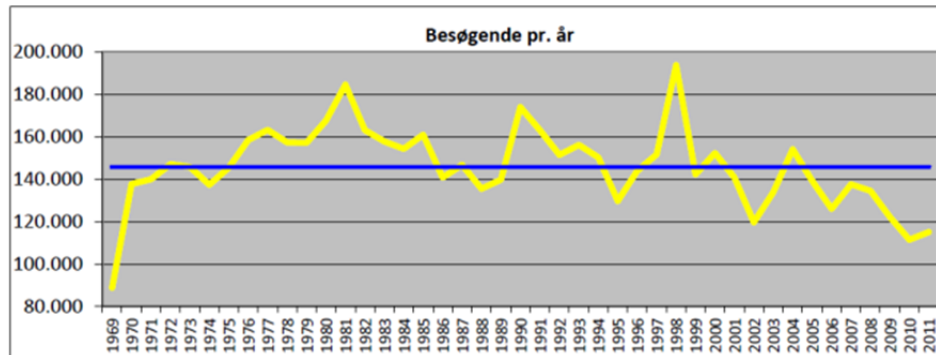
²¹ In 2002 a total of 176,198 hotel beds were available in Schleswig-Holstein, which were used in the same year by 2,968,406 visitors for 15,429,614 nights. 278,786 guests came from abroad, which represents 8.6% of the overnight guests.

²² Another well-visited and comparable, even if smaller, underwater cultural heritage museum in Denmark, the Strandingsmuseum St. Georg, attracts 40.000 visitors per year.

²³ Similar variations have been observed in other museums, like for instance in Portsmouth for the Mary Rose museum. It appears that temporary exhibitions, special events, openings and anniversaries are crucial for keeping the initial visitor numbers after a museum opening also for a long time.

²⁴ Provided by the Viking Ship Museum, Roskilde in 2012.

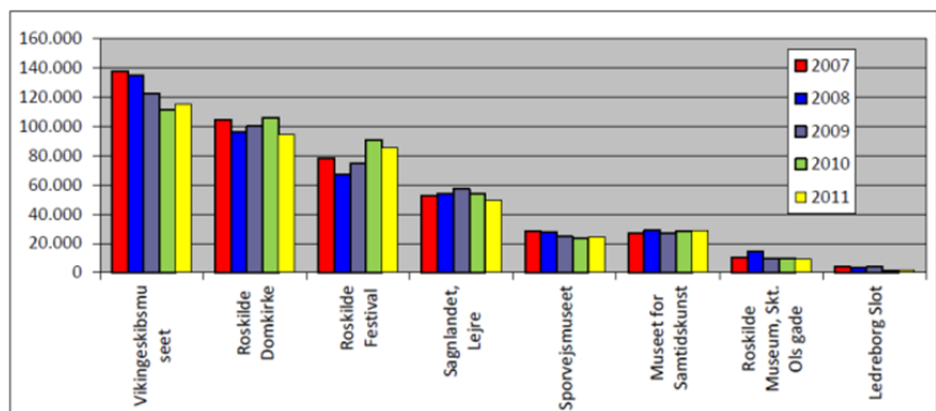
provided a grant of approx. USD 1.5 million. From the State, a total grant of approx. USD 850,000 was made in 2011, and the permanent government grants in 2011 totalled 36% of the museum's operating budget. It should be noted that each donation has reduced in comparison with previous years.



Graph showing visitor totals since the museum opened.

Purpose and stay of visitors in Roskilde: 39% of the Viking Ship Museum's visitors come to Roskilde solely to visit the museum and spend an average of 2-3 hours in the museum whereas 19% also visited Roskilde Cathedral, and 42% visited the town of Roskilde during their stay.

Visitor's expenditure in local economy during their stay: approx. USD 3.7 million



Visitors' total of Roskilde attractions 2007-2011.

The Viking Ship Museum has historical significance and is also central to the marketing of Roskilde as an active and attractive cultural destination. Its importance for tourism revenue in Roskilde and the Zealand region is illustrated by calculations²⁵ based on museum visit registrations and audience studies, which show that:

- 69.5% of visitors came from abroad
- 30.5% of visitors came from Denmark, of which 4.2% from Roskilde
- 44,900 people visited per year the area because of the Viking Ship Museum

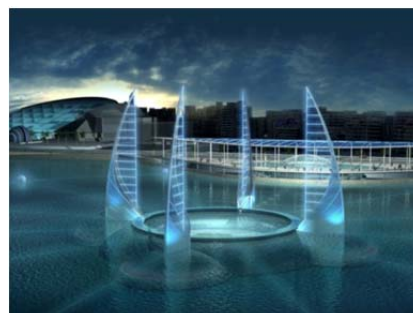
²⁵ made by ABS-analysis (Attractions' The Meaning of Society developed in cooperation ODA (Experience Development in Danish attractions)

- 21,875 people visited the area because of the Viking Ship Museum, but also for other attractions /locations in the area.
- 48,354 people visited the area or live in the area and visit the Viking Ship Museum
- 69% of the visitors were day visitors and 8% are overnight tourists.²⁶

As an overall remark the Viking Ship Museum has benefitted the society in 2011 with tourism revenue of approx. USD 5.8 million with revenue of USD 3.7 million to the local area.²⁷ Its cultural benefit, which is difficult to quantify, is of even more profound significance.

EGYPT - ALEXANDRIA UNDERWATER MUSEUM PROJECT

Some 40 years of intense archaeological research in the Eastern Harbour Bay of Alexandria and in the Bay of Abukir have revealed the existence of significant submerged ancient sites, including the 'Portus Magnus' from the Ptolemaic period, remains of the lighthouse of Alexandria, three sunken cities and ancient shipwrecks including the flagship of Napoleon's fleet. Moreover, thousands of other equally important objects have been discovered and identified.



While no museum has yet been built, an international exhibition entitled 'Egypt's Sunken Treasures' was held in a number of countries and was dedicated to the discoveries of Alexandria. It was an immense success, demonstrating the vast international interest in these extraordinary findings.²⁸ After Berlin, Paris, Bonn and Madrid, this exhibition went to Turin and then Yokohama in Japan. It was seen by almost 3 million visitors,²⁹ making it one of the most noted exhibitions in recent years. The income generated was considerable, and a portion was allocated to contribute to a planned underwater museum in Alexandria (USD 1.6 million).

Despite the exhibition's success, the city of Alexandria itself has yet to profit from this attention. A study from 2006 shows³⁰ that Alexandria's capacity for

²⁶ The data used have been processed in an adapted version of the officially recognized calculation models TØBBE and LINE. The calculations for 2011 are adjusted for the actual number of visitors to 115,129.

²⁷ The museum's own turnover, employment and derivative taxes and fees are not included in the figures

²⁸ The exhibition "Egypt's Sunken Treasures" presented objects exclusively from the underwater excavations of the Institut Européen d'Archéologie Sous-Marine (IEASM), conducted since 1992 in Alexandria and Abukir Bay by Franck Goddio in co-operation with the Supreme Council of Antiquities in Egypt. Around 500 artefacts were on view, most of them never before shown in public. Among the impressive finds were 5 metres high statues of a king and queen, as well as statues of sphinxes, offerings and liturgical objects, stelas, jewellery and coins, ceramics and items from everyday life of ancient Egypt.

²⁹ Source: www.franckgoddio.org/events/temporary-exhibitions/egypts-sunken-treasures.html

³⁰ Alexandria City Development Strategy (CDS) & Alexandria Growth Pole Project

accommodating visitors is relatively limited,³¹ but the expenditure of hotel clients in Alexandria was high (estimated at USD 44 million annually, including a contribution of USD 1.8 and USD 0.9 million in direct national and local tourism taxes), even if yet very few come from abroad. This total could be increased significantly if the length of the visitors stay was increased and if more cultural and recreational activities were introduced to also attract tourists. This would especially need to target foreign leisure visitors.

The proposal to build an underwater museum in Alexandria to accommodate the finds from Alexandria's harbour and in Abukir was greeted with much enthusiasm in the city, as it would provide the ideal reviving element to attract tourists who usually opt for visits to Giza and Sharm El Sheikh. It would also attract cruise and yachting tourism from the Mediterranean – as reiterated by an expert recommendation made at a UNESCO meeting in Alexandria in 2006.

The creation of the museum would lead to direct benefits in terms of employment (for instance in the construction industry) and upon completion, these benefits are expected to continue thanks to the jobs created for the operation and maintenance of the museum. A project of this scale is also expected to generate indirect benefits in terms of consumption through various services, with the restaurants, hotels, transport, construction, and maintenance necessary for a rich tourism environment to flourish. Additionally, an indirect effect is the investment from other organisations and businesses in the development of the neighbourhood of the museum through the development of hotels, services, infrastructure, entertainment, cruises, guided tours and weekends organized to combine Alexandria, north east and west coasts to Alamein or to Port Said and the Suez Canal.

Until now, circumstances have not permitted the undertaking of such a project in Alexandria, but maybe this will be possible in future.

SWEDEN - VASA MUSEUM

The Swedish *Vasa* Museum presents the *Vasa*, a warship which was, at the time of launching, heralded as the most powerful boat ever built, but ironically sank in 1628, shortly after being launched. The exceptionally well preserved shipwreck was



³¹ Hotel accommodation capacity of Alexandria is of 3,400 rooms, which is relatively low for such an important city, is insufficient for the number of visitors which would arrive, should an attraction be developed. Only 5 stars hotels had a good room occupancy rate of above 70%, and only 2-10% of foreign tourists to Egypt visited also Alexandria. In 2004, hotel arrivals totalled only 389,233 and bed-nights totalled 675,494. Both domestic and international hotel clients had only a very short average length of stay of 1.7 days and 70% of the hotel bookings were for business.

recovered from the bottom of Stockholm harbour in 1961, and is now exhibited in the *Vasa* museum. The museum is exemplary for the discipline at large, and the ship's recovery has had an important influence on the development of underwater archaeology in general. Furthermore, its conservation has greatly benefitted the study of conserving waterlogged finds. The *Vasa* shipwreck museum in Sweden is visited by 1 million visitors a year and, as such, it is the most visited museum of the country. The ship has been visited by over 30 million people since the vessel's recovery in 1961.

Typically, these tourists spend an additional day in Stockholm, spending an average of EUR 200 per day on hotels, meals and other expenses. This amounts to the attractive sum of EUR 200 million (USD 260 million) of increased spending in the city of Stockholm per year, excluding the museum entry fees.³²

A survey from 2009 shows that the museum attracts visitors of all ages, with the average visitor being 41 years of age. 20% of visitors lived in Sweden and 80% came from abroad. The majority of international visitors came from Germany or the United States (13% each), while a further 6% of survey participants came from Spain. Russian tourists constituted a rapidly growing demographic, with the percentage of Russian visitors having increased from 3 to 7.5% in under a year.³³

SPAIN - NATIONAL MUSEUM OF UNDERWATER ARCHAEOLOGY ARQUA, CARTAGENA

The National Museum of Underwater Archaeology of Spain, ARQUA, is the institution responsible for raising public awareness of the underwater cultural heritage of Spain, promoting its conservation, and thus enhancing its appreciation and enjoyment.³⁴

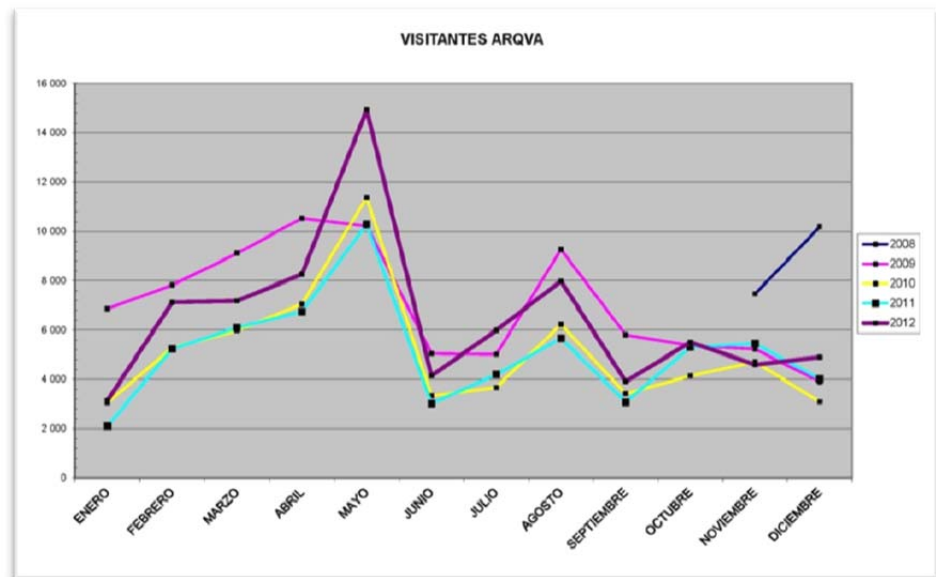
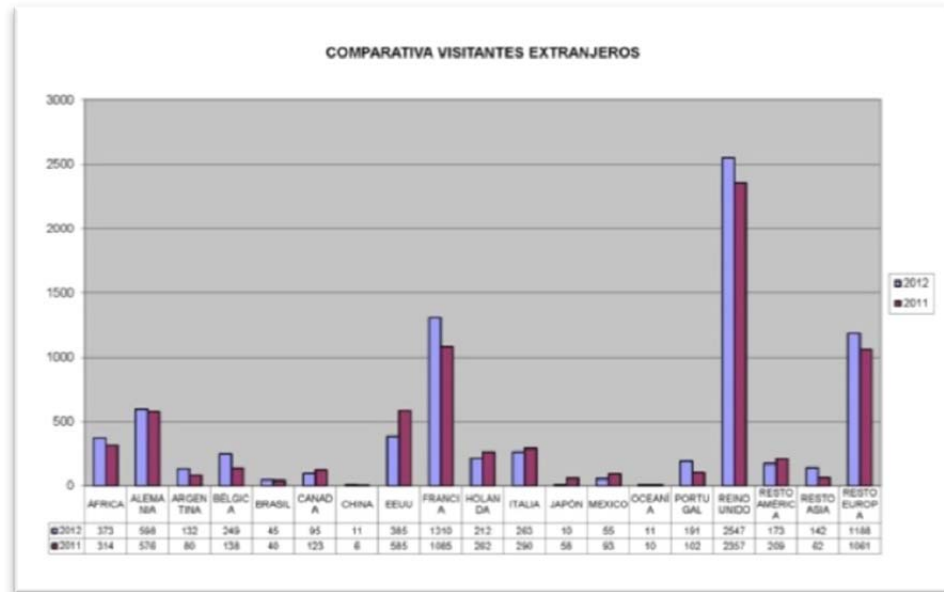


ARQUA's permanent exhibition features the timbers of a seventh-century BC Phoenician shipwreck, the *Mazaron I*, which was discovered near Cartagena. The complete renovation of Cartagena's city centre and its port area in 2008 included the construction of the museum and the restoration of the nearby Roman amphitheatre. Four years later, tourism in the city has increased by 10%, with increasing numbers of cruises contributing to the success.

³² These expenditure numbers do not consider the material effort made in exchange for them (hotel building, hotel staff, restaurant services etc.). These have not been considered as also hotel and restaurant staff employment and material acquisition have been considered beneficial for the city of Stockholm.

³³ The statistics are based on surveys conducted during visits in 2009. Every 70th visitor answered questions during a five day period, with a total of 514 respondents. www.vasamuseet.se/en/Press/Vasa-in-brief/Who-visits-Vasa

³⁴ See <http://en.museoarqua.mcu.es/museo/mision/index.html>



TURKEY - BODRUM MUSEUM

The *Bodrum museum* in Turkey is a striking example of how the protection of underwater cultural heritage contributes to urban development. When excavations of the Uluburun wreck started in 1959, Bodrum had approximately 5,000 inhabitants. Through the valorisation of the wreck in the Bodrum castle tourism has increased. The castle is now the second most visited museum in Turkey, and has won numerous awards with its display of finds from underwater excavations along the Turkish coast.



Although the museum continues to offer countless benefits, it should be noted that a large part of today's visitors are attracted by the town's beach and party attractions rather than by the cultural sites that initiated the tourism build-up. The museum Director Yazar Yildiz estimated that, in 2012 only 10-15%, of the tourists to Bodrum visited the museum.

In 2011, the Bodrum Museum had the following results:

- Number of museum visitors: 292,648
- Ticket income: approx. USD 1 million
- Duration of museum visits: 1 to 3 hours per day

UNITED KINGDOM - MARY ROSE MUSEUM

The *Mary Rose* Museum in Portsmouth displays the 16th century Tudor navy warship *Mary Rose*, as well as the historical context of the period in which it was used. Built in 1509-1510, the *Mary Rose* was the



| Income & Expenditure | Total 2010 | Total 2009 |
|--|-------------------|-------------------|
| | £ | £ |
| Income Resources | | |
| Visitor related | 73,787 | 83,137 |
| Commercial Trading Income | 1,035,277 | 1,143,874 |
| Grants receivable | 4,097,391 | 2,801,497 |
| Donations | 2,911,304 | 3,030,865 |
| Donated Gifts | 41,007 | 68,635 |
| Invested Income | 40,137 | 38,874 |
| Miscellaneous | 2,970 | 2,575 |
| Total Incoming Resources | 8,201,873 | 7,169,457 |
| Charitable Activities Expenditure | | |
| Commercial Trading | 928,429 | 1,004,872 |
| Learning | 185,355 | 166,072 |
| Conservation | 1,155,771 | 1,021,253 |
| Collections | 118,759 | 114,742 |
| Publications | 44,271 | 49,442 |
| Museum Build & Design | 259,374 | 272,705 |
| | 2,691,959 | 2,629,086 |
| Other expenditure | | |
| Fundraising and public relations | 296,425 | 258,538 |
| Governance Costs | 47,754 | 49,224 |
| Demolish Viewing Platform | 54,602 | 0 |
| | 398,781 | 307,762 |
| Total Resources Expended | 3,090,740 | 2,936,848 |
| Net incoming/(outgoing) resources | 5,111,133 | 4,232,609 |
| Total funds brought forward | 13,608,823 | 9,376,214 |
| Total funds carried forwards | 18,719,956 | 13,608,823 |

NOTE -

1. A major Fundraising Drive commenced in 2007 in order to raise £14 million towards the total cost of a new museum of £35 million. The results have raised £11.2 million, net of fundraising costs, of which £3.9 million has been pledged to be paid over the next 5 years.

2. The accounts have been compiled in accordance with the latest SORP

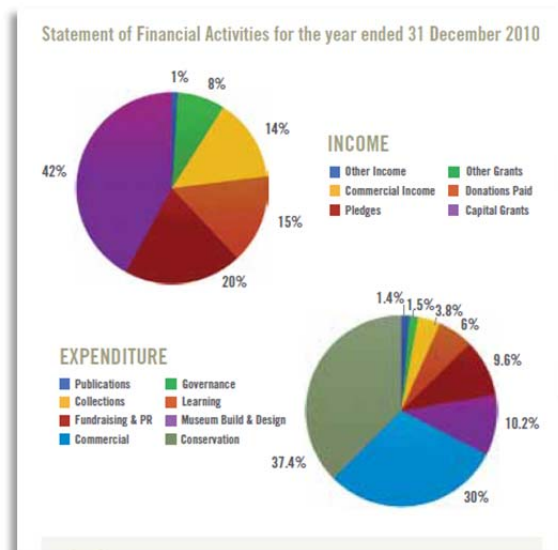
3. The grants received are significantly higher from the Heritage Lottery Fund, as we have now commissioned building the new museum.

main vessel in King Henry VIII's fleet, before sinking in 1545 during a battle against the French. Discovered in 1971, the wreck was studied and recovered in 1982, and is now displayed in a museum at the harbour of Portsmouth, UK. Initially, the wreck was exhibited in a temporary conservation hall, but a new museum was subsequently built and opened in 2013.

Although the collection of the *Mary Rose* Trust has been recognised as a collection of national importance, the *Mary Rose* Museum is not a national museum, and it therefore relies on income from visitors, grants, donations and sponsorship to carry out its work. The finalisation of the conservation of the hull and the building of a permanent museum was made possible by a USD 31

million grant from the UK's Heritage Lottery Fund. The Mary Rose Trust is financing the remaining cost of approx. USD 23 million through donations and grants from companies, charities, individuals and the general public.

By March 2011, over GBP 12 million had been raised and the foundation stone for the new museum was laid on 18 March 2011. The formal opening took place in May 2013.



USA - GREAT LAKE MARITIME MUSEUMS

There are seven well-regarded underwater cultural heritage museums in the US Great Lakes region, Vermont and Lake Champlain. All of them are well visited and appreciated by their surrounding community. They include:

- Door County Maritime Museum
- Great Lakes Shipwreck Museum
- Lake Champlain Maritime Museum
- Lake Superior Maritime Visitors Centre
- Marquette Maritime Museum
- Michigan Maritime Museum
- Museum Ship Valley Camp
- Wisconsin Maritime Museum³⁵

The annual attendance of these museums averages 91,978 visitors per museum. The Lake Superior Visitor Centre alone attracts more than 400,000 visitors each year. The museum budgets range from USD 110,000 to USD 2 million, depending on the size of the facility, its exhibits, programming, staff size and operating hours.

Their revenue sources include donations, grants, contracts for specific projects and programs, membership dues and earned income, including admissions, program fees, museum store sales and endowment distributions. Government sponsored facilities such as the Lake Superior Maritime Visitor Centre receive virtually all of their funding from the government, while other museums receive very little public support – earned revenues at these

³⁵ Information from Study on the Market Potential of the Thunder Bay Maritime Center, ConsultEcon, Inc/Office of Thomas J. Martin Economic Research and Management Consultants, Prepared for National Marine Sanctuary Foundation, May 2003

museums range from as little as 5% to close to 90% of the total working budget.

Comparison of Operating Characteristics of Selected Maritime Museum:



| Museum | Paid Employees | Budget | Family Membership | Members |
|--|----------------|-------------|-------------------|---------|
| Door County Maritime Museum | 5F/6P | \$600,000 | \$45 | 1,000 |
| The Great Lakes Shipwreck Museum | 8F/32P | \$2,000,000 | \$34 | 1,500 |
| Lake Champlain Maritime Museum | 14F/29P | \$1,700,000 | \$50 | 1,250 |
| Lake Superior Maritime Visitors Center | 4F/2P | \$450,000 | \$40 | 500 |
| Marquette Maritime Museum | 1F/5P | \$110,000 | \$40 | 190 |
| Michigan Maritime Museum | 4F/10P | \$490,000 | \$40 | 400 |
| Museum Ship Valley Camp | 1F/9P | NA | \$50 | 1,400 |
| Wisconsin Maritime Museum | 12F/23P | \$750,000 | \$45 | 750 |
| Average | | \$871,429 | \$43 | 874 |

Comparison of Market Characteristics of Selected Maritime Museums

| Museum | Location | Adult Price | Seasonal | Metro/County Pop. | Annual Attendance |
|--|------------------------------------|-------------|----------|-------------------|-------------------|
| Door County Maritime Museum | Sturgeon Bay, WI ^{1/} | \$6.50 | No | 28,300 | 64,450 |
| The Great Lakes Shipwreck Museum | Paradise, MI ^{2/} | \$8.50 | Yes | 39,200 | 87,000 |
| Lake Champlain Maritime Museum | Vergennes, VT ^{3/} | \$10.00 | Yes | 36,600 | 24,856 |
| Lake Superior Maritime Visitors Center | Duluth, MN ^{4/} | Free | No | 243,600 | 410,000 |
| Marquette Maritime Museum | Marquette, MI ^{5/} | \$3.00 | Yes | 64,000 | 12,000 |
| Michigan Maritime Museum | South Haven, MI ^{6/} | \$2.50 | No | 454,900 | 30,000 |
| Museum Ship Valley Camp | Sault Ste. Marie, MI ^{7/} | \$8.00 | Yes | 39,200 | 42,000 |
| Wisconsin Maritime Museum | Manitowoc, WI ^{8/} | \$7.00 | No | 82,700 | 65,520 |
| Average | | \$5.69 | | 123,563 | 91,978 |
| Average (not including LSMVC) | | \$6.50 | | | 46,547 |

1/ Door County
2/ Chippewa County
3/ Addison County
4/ Duluth-Superior Metro Area
5/ Marquette County
6/ Kalamazoo-Battle Creek Metro Area
7/ Chippewa County
8/ Manitowoc County

There appears to be a strong market for these maritime museums, and the tourism income they have generated for the surrounding regions is considerable. All these museums have sustained their operations for many years thanks to their exceptional calibre of exhibits and programs, strong business practices, and the interest and support from residents and visitors. In 1995, there were an estimated 34.5 million domestic travellers in Michigan, USA. The situation in the states of Wisconsin and Minnesota is

similar. In 2000, Michigan's travel and tourism industry generated USD 12.8 billion in direct revenues, thereby supporting 173,000 employees, with a collective USD 3.8 billion in payroll. This industry generated over USD 800 million in tax receipts to State and local governments. Approximately 79% of visitors travel for leisure, while the remainder travel for business purposes. The region of the Center, North-eastern Michigan, is an overnight visitor market. Approximately 90% of visitors stay overnight, with the remainder making day trips.³⁶

DIVE TOURISM

Underwater cultural heritage sites are often popular among divers. A list of top ten dive attractions published in 2006 on the UK based website Scuba travel³⁷ placed the *Yongala* shipwreck site as the number 1 dive site worldwide. It was followed by the *Thistlegorm* wreck in the Red Sea and the *Liberty* wreck in Bali, which was placed number 9 on the list. The Bikini Atoll (Marshall Island), Scapa Flow (UK) and Chuuk Lagoon (FSM)³⁸ sites are also referred to in other publications due to their significance.

Statistics from PADI (the Professional Association of Diving Instructors) show that 80% of qualified open water divers have a college education, and can be counted as members of the higher income groups with the means to spend more money on their travels than the average tourist. However, in the same respect, it is important to note that although the demographic of divers is among the more financially stable, they are also aging, with a slightly decreasing popularity among younger generations. This may be due to the financial implications of diving. It may however also be due to the current focus on coral reefs and fish populations. An increase in the accessibility of underwater cultural sites would certainly help attract more young people to this field thanks to their cultural, and not purely environmental, appeal.

It is difficult to measure the success and contribution that underwater and maritime heritage has made to the local economy; when divers are invited to access sites through charter boats, personal boats, or shore entry, counting their numbers may not be possible.³⁹ Some underwater preserves, such as those in Vermont and New York, USA are strictly controlled, and visitors are

³⁶ Information from Study on the Market Potential of the Thunder Bay Maritime Center, Consult Econ, Inc/Office of Thomas J. Martin Economic Research and Management Consultants, Prepared for National Marine Sanctuary Foundation, May 2003

³⁷ www.scubatravel.com

³⁸ See for example the CNN World's 50 best dive sites under or the list of the Dive Site Directory listing Bikini Atoll, Truk Lagoon, Scapa Flow, the wreck sites in the Red Sea, and wreck diving in Malta

³⁹ Surveys and questionnaires, distributed through participating dive shops or via the Internet, are useful to count visitors whenever they make the effort to complete and submit them. It has been proposed that models could be instituted, in which diving to shipwreck sites will only be permitted through certain charter boat businesses or dive shops that agree to participate in preserving and monitoring the site and possibly pay also a fee. This, however, will not always account for divers who use private vessels or who enter the water from shore if the site is nearby.

required to register before diving on the sites. Guided tours are also the only means to see Curaçao's *SS Mediator* preserve. In such cases, visitors can be counted. Such measures are, however, only possible in locations with relatively light visitor traffic. Similar regulations would be difficult in locations such as Florida, the top sport diving destination in the USA, or in the Caribbean, with a high volume of diving and snorkelling visitors.⁴⁰

Similarly, when looking at the numbers of tourists coming to a country it is difficult to assess the extent to which diving was the motive for their trip.

Some illustrative and impressive examples of the importance of underwater cultural heritage for sustainable tourism development, but also for the cultural and recreational value of a region, are presented below.

AUSTRALIA – YONGALA

The passenger ship *SS Yongala* sank off Cape Bowling Green, Queensland, Australia on 23 March 1911. Today, it is a major tourist attraction for the scuba diving industry in Townsville, Australia. The wreck lies within the Central Section of the Great Barrier Reef Marine Park. This, combined with its own beauty, makes it a popular dive spot. It features an extensive array of marine life and at 110 metres long, it is one of the largest, most intact historic shipwrecks, and unsurprisingly, one of the top ten dive sites recognised worldwide.



While the shipwreck has raised the awareness of wreck sites as cultural heritage sites and tourist attractions, the site is impacted by the heavy visitor traffic. Because of this, access to the site is through permit only. These permits can be obtained on application to the Museum of Tropical Queensland, and access conditions apply. Additionally, the Maritime Museum of Townsville has an extensive display of *Yongala* memorabilia.

The importance of the wreck for local tourism is considerable, with more than 10,000 divers visiting the wreck every year. While their number is smaller than that of museum visitors for the museums presented in this study, the amount spent for a diving excursion is considerably higher than that spent for museum visits, and the stay of the divers in the town is also longer. Divers' contributions to local tourism are thus proportionally higher.

Divers book diving excursions ranging from one to several days, with one-day tours costing approx. USD 224⁴¹. Assuming each of the 10,000 divers stays just one day, this amounts to USD 2.24 million in tourism revenue per year,

⁴⁰ Preserves, Parks, and Trails: Strategy and Response in Maritime Archaeology, Della Scott-Ireton, USA

⁴¹ See for instance www.yongaladive.com.au/about-us and www.divethereef.com/DiveTrips/-55781637.asp.

just for booking tours. In addition to this, money is, of course, spent on hotels and restaurants in Townsville.

Tourism in Townsville and Queensland, Australia, is an important source of income. In 2010-11, tourism accounted for 124,000 jobs, and indirectly contributed to another 96,000 jobs, thereby constituting a total of 9.5% of employment in the state of Queensland.⁴²

In 2012, tourism exports amounted to AUD 3.8 billion (approx. USD 3.9 billion) for Queensland. Tourism is the state's second largest export, (second only to coal) and a major part of that tourism is dive tourism.⁴³

In 2012, domestic overnight visitors spent USD 14.3 billion whereas domestic day visitors spent USD 4.2 billion and international visitors spent USD 3.9 billion; totalling USD 22.5 billion – nearly USD 62 million per day.⁴⁴

CHUUK LAGOON - FEDERATED STATES OF MICRONESIA

Chuuk Lagoon, formerly known as Truk Lagoon, is a sheltered body of water in the central Pacific. It belongs to the Federated States of Micronesia, and consists of a protective reef enclosing a natural harbour. During World War II, the lagoon was Japan's main base in the South Pacific. The US war operation 'Hailstone' sank twelve Japanese warships, thirty-two merchant ships and 249 aircraft in the lagoon in 1944. The resulting wreck-remains are now world-renowned as a scuba diving paradise. The PADI *Encyclopedia of Recreational Diving* lists the lagoon is one of four 'Meccas' for wreck diving. Although Chuuk Lagoon contains a number of spectacular wrecks, the *Fujikawa Maru* is often singled out by diving magazines and travel guides as one of the top 10 wreck dives in the world.⁴⁵

Today, diving visitors are the major source of income for Chuuk. In 2006, some 5,000 tourists visited Chuuk out of 13,300 that visited the Federated State of Micronesia.⁴⁶ This number could be much higher, bringing with it an increase in revenue, but currently, there is still



⁴² This is substantially more than the mining sector (55,500 direct jobs) or even agriculture, forestry and fishing (77,900 direct jobs). Cafes, restaurants and takeaway food services had the largest share of tourism employment (26%), followed by retail trade (18%) and accommodation (14%).⁴² In 2010-11 direct and indirect tourism GSP was USD 17.5 billion (approx. USD 18 billion), or 6.6% of total Queensland GSP. Direct tourism income contributed USD 8.4 billion (USD 8.7 billion) directly to the Queensland economy, accounting for 3.1% of Queensland's GSP.⁴² The tourism sector is home to many small businesses, with 9 out of 10 tourism businesses employing less than 20 people. It is estimated that as of June 2011, Queensland had 55,700 tourism related businesses, representing 12.9% of all registered businesses in the state.⁴² Net taxes on tourism products arising from tourism consumption in Queensland were 795 million Australian Dollars (approx. USD 820 million) in federal, state and local government revenues and constituted 25.7% of total taxes on tourism products as a whole

⁴³ Tourism Research Australia - International Visitor Survey

⁴⁴ Tourism Research Australia - International and National Visitor Surveys

⁴⁵ See <http://wikitravel.org/en/Chuuk>

⁴⁶ 2006 FSM International Visitor Arrival Statistics report www.spc.int/prism/country/fm/stats/Publications/Quarterly/VAs16IVA_Oct05-Dec06.pdf

transport and tourist infrastructure to be improved.

On their website, one local dive centre candidly states *“Chuuk is admittedly an unsophisticated destination without a social structure that invites the visitor outside of their hotel for an evening of entertainment.”*⁴⁷ Similarly, the contributors of the online travel guide *Wikitravel* state that *“apart from scuba diving, there is not very much to do in Chuuk. There are no real beaches on Weno (although some of the outer islands which can be reached by boat do have beaches). None of the hotels on Chuuk even has a swimming pool. For non-diving spouses, a trip to Chuuk can be a dull and tiresome affair.”*⁴⁸

There are also issues of protection to be resolved, ranging from the simple preservation of the mainly metallic remains, to unexploded ordnance and fuel substances still present in some wrecks. One of the major attractions of the wrecks is their beautiful coral growth that could be endangered by fuel leaks of the wrecks themselves, similar to that encountered on the *Mississinewa* wreck.⁴⁹

EGYPT – ALEXANDRIA EASTERN HARBOUR

The remains of the lighthouse and the Ptolemaic palace previously mentioned can be visited by renting scuba diving gear from an Alexandria dive centre. However, divers must expect poor visibility due to the sewage of the city that is released, in part, into the harbour. There are little safety procedures and there is a poor explanation of the site.

What has the potential to be one of the most fascinating dive sites the world has to offer, given that the lighthouse was once counted as one of the Seven Wonders of the World, is thus only a very scarcely visited site. This example demonstrates how the absence of the necessary infrastructure for tourist access and necessary facilities, valorisation and site protection lead to the loss of a great tourist potential for a city.

GRENADA – SHIPWRECK DIVING

Grenada is 344 km², and has an estimated population of 110,000. The annual overall income of the country is about USD 1 billion. Grenada enjoys thriving dive tourism, especially utilising shipwrecks. Despite being the host of many dive-worthy sites, Grenada’s signature wreck is the *Bianca C*, a former Italian luxury liner.

⁴⁷ See

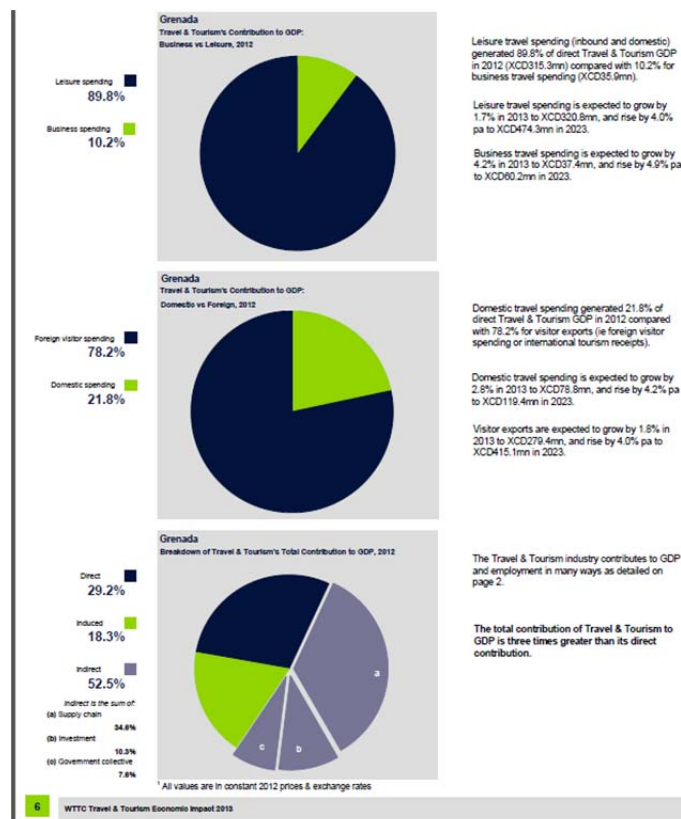
⁴⁸ See <http://wikitravel.org/en/Chuuk>

⁴⁹ The *Mississinewa* wreck leaked oil and cleaning was necessary in 2003. See for more on these issues in the UNESCO publication “Underwater Cultural heritage in Oceania” at <http://unesdoc.unesco.org/images/0018/001887/188770e.pdf>. See also the [Report of U.S. Navy survey dive expedition in August 2001](#) and the [Report of U.S. Navy oil recovery dives in February 2003](#).

Diving is of crucial importance for the country, as it is reliant on tourism to fuel its economy, and as most tourists come for the enjoyment of water related sports.

At present, tourism serves as the leading foreign currency earning sector.⁵⁰ Tourist arrivals numbered 114,000 in 2009.⁵¹ There were 1,758 hotel rooms with 3,844 beds available that same year. The average length of stay was seven nights. In 2005, the US Department of State estimated the daily cost of staying in Grenada at USD 261 from April through December. The rest of the year was estimated at USD 300 per day.⁵² Tourism expenditures in Grenada were last reported at 2.64% of total imports in 2010.⁵³

Diving on the underwater cultural heritage sites will account for a major part of the income. A 2-dive excursion is available at around USD 100 plus the equipment, which costs extra.⁵⁴ There are also promotional package deals which, for example, offer 20 dives for USD 940.



⁵⁰ Especially since the construction of an international airport in 1985. Since 1989, American Airlines nonstop service to Grenada has boosted tourism. <http://worldfacts.us/Grenada.htm>

⁵¹ According to a World Bank report, published in 2010.

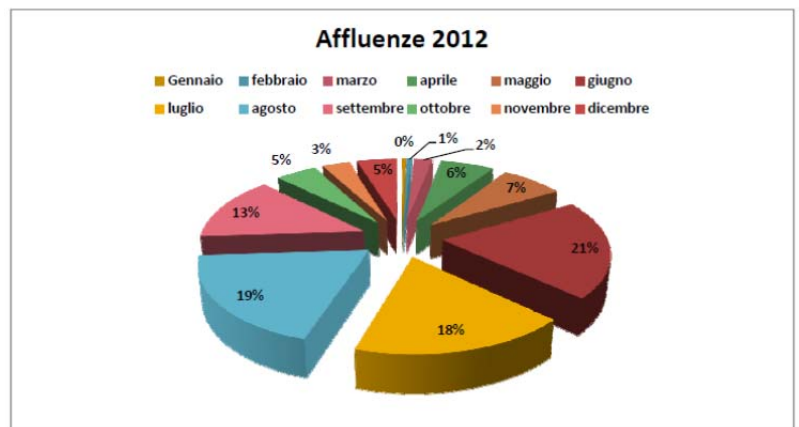
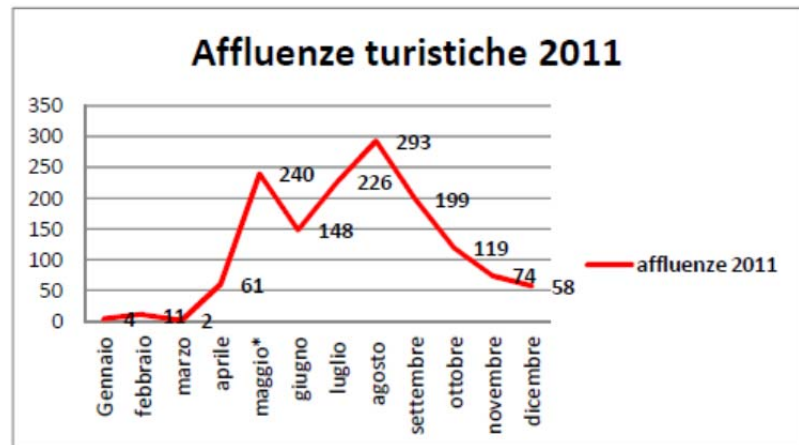
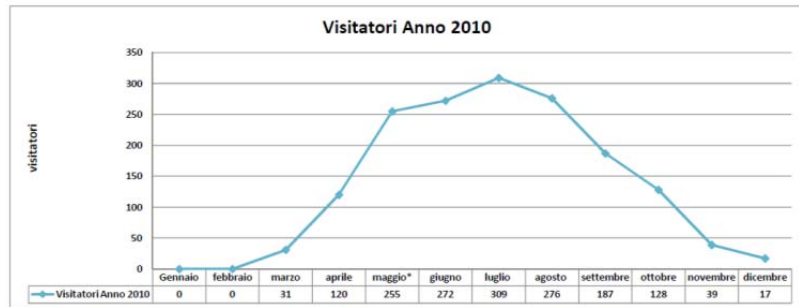
⁵² <http://www.encyclopedia.com/topic/Grenada.aspx>

⁵³ As a result there has been substantial foreign investment in the hotel and construction sector. Travel & Tourism generated 2,500 jobs directly in 2012 (5.9% of total employment) and this is forecast to grow by 1.9% in 2013 to 3,000 (6.0% of total employment). This includes employment by hotels, travel agents, airlines and other transportation services. It also includes, for example, the activities of the restaurant and leisure industries directly supported by tourists. According to the WTTC by 2023, Travel & Tourism will account for 3,000 jobs directly, an increase of 0.9% per annum over the next ten years.

⁵⁴ <http://www.divegrenada.com/diving.htm>; <http://www.scubatech-grenada.com/en/our-prices>

ITALY - BAIA

The ancient city of Baia was a popular seaside resort for rich families of the ancient Roman Empire. In fact, at the end of the Roman Republic, it was more important and fashionable than Pompeii or Herculaneum. However, due to volcanic activity and coastal subsidence, today most of Roman Baiae is submerged.



The surrounding site of Baia is already popular with tourists. The site is close to the major city of Naples, and the nearby city of Pozzuoli, which is also a cultural attraction.

In 2002, the Underwater Archaeological Park of Baia was established. It prohibited all navigational activity in its waters, and made efforts to protect

the marine area. An agreement was made between authorities and diving clubs in order to provide the means to allow public access to the magnificent site.

Over the last three years, the Underwater Archaeological Park of Baia has seen an increase in the number of visitors, with the high season being from April to October, coinciding with the summer months, which are most conducive comfortable access to the archaeological remains *in situ*.⁵⁵ The number of diving centres has also increased in the area, fostering the economic activity of this specific area. The full potential of Baia is however not yet used and the site still internationally little known. More could be done to preserve it and make it better appreciated and accessible.

JAMAICA - PORT ROYAL

Once known as the 'richest and wickedest city in the world,' Port Royal is home to the history and tales of a 17th century pirate haven. The most famous pirate who operated from Port Royal was Sir Henry Morgan, who plundered Spanish vessels travelling in the Caribbean. The city was initially prosperous, but a strong earthquake struck the area on 7 June 1692, sinking the ships in the harbour and killing many people. The earthquake moved much of the city into the sea⁵⁶ which has left a rich underwater heritage.

Most of the buildings at the port today are thus not the original buildings, but the remains of the latter are still preserved under water and have been archaeologically surveyed and excavated by the Texas-based INA.

The ruins are accessible, but the area is not made touristically attractive and difficultly accessible. A better valorisation of the site would bring a strong increase in benefit. Until now little has been done to achieve this. Its importance has been recognized by the Jamaican authorities that may propose it for World Heritage List inscription, but without an improvement in the management of the site, its significance for the city or the country remains little visible.

UNITED KINGDOM - SCAPA FLOW, SCYLLA AND STIRLING CASTLE WRECKS

The UK has some 270,000⁵⁷ recreational divers, with 70% of their activity focused on the British coast, rather than abroad. Their recreational diving is focused on the thousands of wrecks around the UK coastline, consisting mainly of wrecks left from the two World Wars. The remains of the German High Seas Fleet scuttled in Scapa Flow, Orkneys, from the end of World War I in June 1919 figures among the most popular sites. Over 15,000 dives were carried out on that fleet in 2006, with 1,640 scuba divers visiting three of

⁵⁵ Soprintendenza Speciale per I Beni Archeologici di Napoli e Pompei.

⁵⁶ [http://wikitravel.org/en/Kingston_\(Jamaica\)](http://wikitravel.org/en/Kingston_(Jamaica))

⁵⁷ According to information published in Charting Progress 2 (Department for Environment, Food and Rural Affairs [DEFRA] 2010)

Scotland's eight designated wrecks with a 'visitor licence' granted by Historic Scotland between 1994 and 2009.⁵⁸ In England, increasing numbers of visitor licenses were issued for protected sites, with the most popular being the *Coronation* wreck,⁵⁹ which attracted approximately 1,000 licensed visitors in its first year of operation. The lack of data, due to the fragmented nature of the sector and the reality that visits to offshore wreck sites are often free, make it, however, difficult to calculate the overall direct economic benefit of these public visits to the wreck sites.

An example where the financial contribution of diver tourism is measurable and has raised government awareness of the social and economic potential of shipwrecks is the *Scylla*. In 2004, the frigate became Europe's first 'artificial' wreck site as attraction for scuba divers. Following an initial investment of USD 2 million in the first operational year, it showed an overall return of USD 2.25 million: "... with an estimate of 35.46 full-time equivalent (FTE) jobs made up of supporting clubs, centres and charter boat operators as well as tourism related businesses...with 27.8 jobs (FTE) being created in the South-west region within which the *Scylla* is located with a net income of USD 1.85 million."⁶⁰

Alternatively, a site that has been left undeveloped, and thus unprofitable, is the *Stirling Castle* wreck in the UK, a ship which sank in 1703. After its discovery and survey, there were no major initiatives organized aimed at the site's long-term stabilisation and preservation. Although scuba divers can visit the shipwreck under license, the site is in an exposed offshore location, and diving is difficult. Per year, only a few hundred divers total visit this site. They do not influence the region's visitor figures much. Due to the fact that most of the public could not get into direct contact with the wreck, even the internet the story of the *Stirling Castle* has failed to motivate the public into more proactive stance. This endangers the future of this important underwater heritage site.⁶¹

⁵⁸ Scottish Government 2010 cited by Christopher j. Underwood in "Out of sight, out of mind, and at risk: the United Kingdom public's engagement with heritage."

⁵⁹ Coronation is a 90-gun second-rate ship, built in 1685 at Portsmouth (DCMS 2009).

⁶⁰ DEFRA: 2011 cited by Christopher j. Underwood in "Out of sight, out of mind, and at risk: the United Kingdom public's engagement with heritage."

⁶¹ Christopher J. Underwood, Out of sight, out of mind, and at risk: the United Kingdom public's engagement with heritage.

USA - THUNDER BAY NATIONAL MARINE SANCTUARY & GREAT LAKES MARITIME HERITAGE CENTER, MICHIGAN

Located in north-western Lake Huron, Thunder Bay is adjacent to a treacherous stretch of water within the Great Lakes system, which caused many ships to wreck in this location. The US Thunder Bay National Marine Sanctuary and Underwater Preserve (Thunder Bay NMS) was designated in the year 2000, and is a freshwater inland sanctuary belonging to the US National Marine Sanctuary System. It may protect as many as 200 historic shipwrecks, however today, only 100 have been located.⁶²



The range of depths of the shipwrecks appeals to a variety of diver skill levels, and also promises recreational opportunities for non-divers. The shallower wrecks can be viewed by snorkelers, kayakers, and boaters. The sanctuary partners with a local company to provide access to the shipwrecks through glass bottom boat tours, which charge USD 30 per ticket for adults and USD 10 for children.

In 2003, the NOAA National Marine Sanctuary Program provided USD 530,000 in funding to the Thunder Bay NMS. The State of Michigan provided USD 250,000. The offers of the Sanctuary and its partners do, however, greatly contribute to local tourism development. Tourism is an important source of income for the region.⁶³ The region, Alpena County, with its natural beauty and its abundant recreational opportunities and maritime history make it a popular destination for tourists. The MSU Tourism Resource Centre estimated that, in 1996, there were over 700,000 trips made in the county. These visitors were estimated to have an economic impact of over USD 38 million dollars. A further study indicates⁶⁴ that the average length of stay for leisure travellers was 2.05 days.

Furthermore, in a recent study⁶⁵ it was found that the counties surrounding Thunder Bay National Marine Sanctuary garner USD 100 million in sales associated with sanctuary activities, USD 39.1 million in personal income to residents, USD 59.1 million in value added and 1,704 jobs.⁶⁶

⁶² <http://thunderbay.noaa.gov/about/welcome.html>

⁶³ Information from Study on the Market Potential of the Thunder Bay Maritime Center, ConsultEcon, Inc/Office of Thomas J. Martin Economic Research and Management Consultants, Prepared for National Marine Sanctuary Foundation, May 2003

⁶⁴ D.K. Shifflet Travel Survey of the 12 county area

⁶⁵ Ehler, Rod and Jordan Parrillo. Northeast Michigan Integrated Assessment Final Report: Socioeconomic Assessment. NOAA and Michigan Sea Grant. 2009.

⁶⁶ An overall study on the entire US National Park System (also including parks not focusing on underwater cultural heritage) showed that the parks received 281 million recreation visits in 2010. Park visitors spent USD 12.13 billion in local gateway regions (within roughly 60 miles of the park). Visitors staying outside the park in motels, hotels, cabins and bed and breakfasts accounted for 56% of the total spending. Half of the spending was for lodging and meals, 19% for gas and local transportation, 10% for amusements, 8% for groceries, and 13% for other retail purchases. The contribution of this spending to the US national economy was 258,400 jobs, USD 9.8 billion in labor income, and USD 16.6 billion in value added. The direct effects of visitor spending were at the local level in gateway regions around national parks. Local economic impacts were estimated after excluding spending by visitors from the local area (9.8% of the total).

The Great Lakes Maritime Heritage Center now complements the marine sanctuary. A study on its feasibility, executed in 2003, estimated its attendance potential at 58,300 visitors annually, which was exceeded by the actual visitor numbers of 70,000 annually. Operating expenses were estimated at approximately USD 1,056,000 annually. The admission to this center is free.⁶⁷ Funding comes mainly from government sources, the center has, however, also created a non-profit foundation. Grants, donations, and profits from the gift shop provide additional funds.

USA - FLORIDA KEYS

In 1987, Florida began to develop a state-wide system of underwater parks featuring shipwrecks and other historic sites. The shipwreck preserves have become popular attractions for skin and scuba diving visitors to witness a part of Florida's history first-hand. They contain not only interesting archaeological features, but also an abundance of marine life that make the parks living museums in the sea. Each site is interpreted by an underwater plaque; a brochure and laminated underwater guides are available from local dive shops. The parks are open to the public year round, free of charge. There are eleven parks at present, and several others under development.

The contribution to the regional economy was immense. Between 2007 and 2008, approximately 739,000 visitors and residents participated in 2.8 million days of diving in the Florida Keys. USD 54 million was spent on diving/snorkelling operations. Moreover, divers spent a total of USD 470 million in Monroe County, Florida Keys, supporting more than 7,500 jobs.⁶⁸ Overall, more than 33,000 jobs in the Florida Keys are supported by ocean recreation and tourism, accounting for 58% of the local economy and USD 2.3 billion in annual sales.

NEW WAYS OF RAISING BENEFITS

New approaches to improving the appreciation and visibility of underwater sites, as well as financing scientific underwater archaeological research are available. They can increase benefits to society and help to facilitate the sometimes scarce financing offered for underwater archaeological research.

Combining local impacts across all parks yields a total local impact including direct and secondary effects of 156,280 jobs, USD 4.68 billion in labor income, and USD 7.65 billion value added. The four local economic sectors most directly affected by non-local visitor spending are lodging, restaurants, retail trade, and amusements. Visitor spending supported 43,160 jobs in restaurants and bars, 32,000 jobs in lodging sectors, 23,000 jobs in retail and wholesale trade, and 18,560 jobs in amusements. The parks also impacted the local and national economies through the NPS payroll. In 2010 the US National Park Service employed 26,031 people with a total payroll of USD 1,709 million in wages, salaries, and payroll benefits. Including the induced effects of the spending of NPS wages and salaries in the local region, the total local economic impacts of park payrolls are USD 1.95 billion in labor income, USD 2.16 billion in value added, and 32,407 jobs (including NPS jobs). The impacts of the park payroll on the national economy are USD 2.41 billion in labor income, USD 2.96 billion in value added, and 41,700 jobs. Combining the impacts of non-local visitor spending and NPS payroll-related spending yields a total impact of 300,000 jobs nationally of which 189,000 are in the local regions around national parks.

⁶⁷ http://irlee.umich.edu/Publications/Docs/ThunderBayNMS_FinalReport.pdf

⁶⁸ <http://sanctuaries.noaa.gov/news/features/1211socio.html>

They can also be an economically convincing alternative to the commercial exploitation of ancient shipwrecks sites.

REINFORCING ACCESS

ESTABLISHMENT OF DIVE TRAILS, GLASS-BOTTOM BOAT VISITS

Dive-Trails are a much appreciated way of showing underwater cultural heritage to divers. Many of them have been created or are being created all over the world. They can give a new impetus to dive sport, improve the attraction of specific sites in comparison to others - which is an advantage over purely environment related attractions - and give a greater variety to the discipline. Dive tourism to visit cultural heritage can be as interesting to enrich the discipline as similar culture tourism on land-based sites.

Glass-bottom boat visits are moreover also a good way of increasing access. They have the advantage that the visitors can come dry footed, do not have to be divers and that the access and impact on sites is more controllable.

Cultural routes connecting underwater cultural heritage sites to coastal sites may furthermore be a very interesting option that could be attractive to divers, but also to cruise-tourism.

The reinforcement of access and the increase in access could, if correctly managed, also increase the heritage valorisation and protection.

METAL CAGE PROTECTION AND UNDERWATER DISPLAY

Several experiments have been made to enhance the controlled visitor accessibility of fragile sites. An especially notable option was to protect endangered shipwrecks by fixed protection cages.

In Croatia, metal cages have thus been installed over Roman wrecks. These cages are very large, and permit diving into them or to see through them, as long as algae are removed regularly. In these cases, access has been allowed to dive clubs under contract.



Cage protecting a Roman wreck © Frka, Ministry of Culture of Croatia

While this is an excellent initiative allowing viewing the wrecks, precautions apply. Metal cages can have some negative effects on the underwater cultural heritage and can, under certain circumstances, be a risk for the visiting divers if they are not properly maintained. They need to be cleaned, to be maintained, fixed and monitored. Also security precautions for the divers are needed.

The cooperation with dive-shops has allowed collecting funds for heritage preservation, which is very positive⁶⁹.

DIVE CLUB GUARDIANSHIP OF SITES

One possibility is to control site access and grant responsibility and guardianship of submerged archaeological sites to authorized dive clubs.

Here, permissions for exclusive access⁷⁰ to selected sites can be negotiated by the national authorities with controlled dive clubs. These pay for the permission to access the sites with their clients by collecting an entry fee, which benefits the national authority, and may permit, ideally, to invest in the research and protection of the underwater cultural heritage. The Clubs also guarantee, by contract, the control of the integrity of the site and monitor it regularly with a certified underwater archaeologist.

This system does not only help to finance underwater archaeology. It also permits more fragile sites to be opened up to the public without compromising their protection. Moreover, it engages the dive community more closely, encouraging divers to take care of 'their own' sites. Such a system is, at this moment for instance, applied in Croatia.

REPLICA SITE CONSTRUCTION

The creation of underwater displays of artefacts recovered from the sea and in relation to the maritime archaeology of certain areas can be a way to avoid over-storage in some museums.



Creation of an "artificial" ancient shipwreck with original amphorae for recreational divers, Marseille, France (Source: LePoint.fr).

The drawback of replica sites is, however, that they are not authentic sites. This argument might be felt stronger by the diving visitor than by the land-based museum visitor, who expects this situation to arise. A pro is that the underwater environment does again add its specific attraction to the artefacts. However, an authentic site is, of course, always more significant and preferable.

An example of a replica site is located in France: Around 250 amphorae recovered in the 1950s by Jacques Cousteau and his team of the Calypso,

⁶⁹ In Spain, the Phoenician shipwreck found off the coast of Mazarrón (Murcia), known as Mazarrón II, was likewise protected in situ through the establishment of a metal protection cage that was solidly, but tightly fixed over the hull remains. The Mazarrón I, another Phoenician wreck discovered in the Bay of Mazarrón has been excavated and is now on display in the ARQUA Museum in Cartagena. Unfortunately though, the protection by a tight cover does not allow the underwater display of the remains for the diving public and – while it may increase the much needed protection – it does diminish the social benefits of the site.

⁷⁰ The 2001 Convention does expressly encourage the public access to sites for observation, as long as this does not endanger protection.

were re-submerged in 2010 off the coast of Marseille, in a location with the appropriate conditions to allow access for divers of different levels.

This initiative, supported by the French Department of Underwater Archaeological Research (DRASSM) – which provided another 150 amphorae to complete the artificial site in a shipwreck shape - has attracted many divers and, due to its visibility and management by the diving centre, ensures that the amphorae are protected and supervised.

This place has now been there for five years, and to-date, none of the amphorae has disappeared. The visits are welcomed by divers like a land-based cultural visit.

A similar replica site has been constructed in the Dominican Republic where, ancient canons recovered from shipwrecks have been re-immersed close to hotel sites.

SHARED ARCHAEOLOGY

A promising way of financing and adding value to research work is the organization of charged and controlled public visits to archaeological sites in the process of being researched (as shown in the *Natière* shipwreck in Brittany, France). In some cases, it is also possible to involve divers as paying volunteers in the team that can watch, or even assist the archaeologists in their work, when the conditions of the site and the tasks given do not pose a threat to the integrity of the heritage.

Similarly, lectures and workshops can be a means of educating an interested audience and the local community, allowing interaction and a 'hands-on' experience of the archaeological remains which can create a strong connection between the society and its heritage, and add a sensational dimension to their participation.

In this context, practically applied experimental archaeology, encompassing replica constructions, the permission to handle these replicas for the public and demonstrations can create a stronger connection of the society to the heritage as well.

HERITAGE DIVE COURSES

Finally, an interesting and very attractive solution to bring the public into contact with underwater cultural heritage is to offer special heritage focused dive courses as part of 'normal' dive training offers by dive clubs or by specialized NGO, such as the Nautical Archaeology Society.

PRE-EVALUATION OF CULTURAL DEVELOPMENT NEEDS

A more indirect approach to managing alternative funding more effectively in order to finance underwater archaeological research and museum construction is the thorough evaluation of cultural development needs. Before deciding on which archaeological site should be excavated, a pre-evaluation of needs of regions can be undertaken from a scientific, but also a development point of view. Instead of researchers responding to chance finds, and museums being created out of a need to store material, it might be promising to evaluate if a museum would be needed for a region's cultural development. Limited research budgets can then be attributed in priority to one site instead of another, to achieve the highest possible social benefit. In the case of underwater cultural heritage sites at risk, priority should be given to ensuring maximum protection first, regardless of location.

This kind of evaluation is not without risk. Priority and consideration should always be given to site authenticity, integrity and protection, and any action should be complemented by the creation of an inventory of underwater archaeological sites that allows identification of every area's potential and of sites in danger of disappearing. A good example of cultural enhancement of a location by underwater heritage is the Nanhai No. 1 Museum in China described above.

MEDIA COOPERATION

Underwater cultural heritage, like any heritage, needs communication and public outreach to achieve optimal appreciation and protection. Stronger attention should therefore be paid to tour and exhibition opportunities, as well as films and publication in planning archaeological excavations.

This kind of communication outreach can also help in financing scientific work. Retail activities, as well as a gift sale with appropriate and varied merchandise, can be an important part of the visitor experience, and can also be an important revenue source. It can be a way of communicating the message of protection and value of the underwater cultural heritage, as well as telling its specific story.

VIRTUAL VISIT TO SUBMERGED SITES

While many underwater heritage sites can be visited *in situ* or in museums, many others cannot. This may be due to their fragility, their depth or their location. There remains, however, a possibility to present such sites to the public through virtual reconstructions. This can also be used to enhance the visibility of accessible sites, such as the project being undertaken now by Alexandria University, Egypt, for the lighthouse site in that city.

These virtual visits can be impressive in 3D versions, in 360 degree filming and other technical procedures.

Examples are the virtual access to the French *Lune* wreck provided by the DRASSM and Dassault Systems, and the Pavlopetri project at the University of Nottingham.

Further developments in this domain are under way and will certainly change the way the public looks at underwater cultural heritage shortly. A major issue is however still the provision of a high-level central platform holding a crucial number of these presentations and making them easily and convincingly accessible to the public.

