



HAL
open science

Maritime Archaeology and Marine Conservation: The need for synergy in an uncertain future

Samantha D Farquhar, Maria J. Santos

► **To cite this version:**

Samantha D Farquhar, Maria J. Santos. Maritime Archaeology and Marine Conservation: The need for synergy in an uncertain future. Patrick Chaumette. Transforming the Ocean Law by Requirement of the Marine Environment Conservation - Le Droit de l'Océan transformé par l'exigence de conservation de l'environnement marin, Marcial Pons, 2019, 978-84-9123-635-1. halshs-02398392

HAL Id: halshs-02398392

<https://shs.hal.science/halshs-02398392>

Submitted on 7 Dec 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

CHAPTER 27

MARITIME ARCHAEOLOGY AND MARINE CONSERVATION: THE NEED FOR SYNERGY IN AN UNCERTAIN FUTURE

Samantha D. FARQUHAR

*College of the Environment
School of Marine and Environmental Affairs
University of Washington
Seattle, Washington USA*

Maria J. SANTOS

*Institute of Archaeology and Paleosciences
Faculty of Social Sciences and Humanities
New University of Lisbon
Lisbon, Portugal*

RÉSUMÉ: *Les défenseurs de la conservation de la mer s'inquiètent de la préservation et la compréhension même des ressources vivantes présentes dans nos mers, tandis que les archéologues marins s'inquiètent de la préservation et de la compréhension des éléments non-vivants. Malgré des motivations différentes, la conservation marine et l'archéologie marine luttent contre les mêmes menaces anthropiques, notamment le changement climatique, les activités de pêche et le développement offshore. Ces dernières années, la préservation des ressources marines et culturelles a été de plus en plus reconnue dans les engagements internationaux tels que les objectifs d'Aichi pour la biodiversité de 2010 et le programme de développement à l'horizon 2030 via la création de 17 objectifs de développement durable (ODD). Ces objectifs et cibles couvrent à la fois des problèmes sociaux et biologiques urgents, mais respecter ces engagements est devenu un défi. En ce qui concerne la conservation biologique, l'objectif 11 d'Aichi et l'objectif de dé-*

veloppement durable 14.5 préconisent la conservation de 10% de l'environnement marin et côtier d'ici 2020. Les parties ont également adopté l'ODD 11.4 qui vise à renforcer les efforts de protection du patrimoine mondial, culturel et naturel. Bien que les objectifs fondés sur des nombres, tels qu'Aichi 11 et SDG 14.5, soient plus populaires car ils sont plus faciles à suivre, les objectifs qualitatifs, tels que SDG 11.4, sont plus difficiles à mesurer. Nous soulignons comment la synergie peut être favorisée entre la conservation des ressources biologiques et culturelles tout en contribuant au respect des engagements internationaux des objectifs d'Aichi 11, ODD 14.5 et ODD 11.4 par le biais «d'autres mesures de conservation efficaces par zone» ou OECM. Les OECM constituent une innovation récente dans le domaine de la politique de conservation marine. Ils décrivent une zone dont la conservation biologique n'est pas le but principal, mais qui est propice à la biodiversité. Bien que la désignation OECM permette de reconnaître internationalement une zone protégée et d'être comptabilisée dans les objectifs de conservation globaux, elle est également susceptible de renforcer la reconnaissance d'un plus grand nombre de parties prenantes qui contribuent à la conservation biologique in situ et d'accroître la représentation et la connectivité écologiques qui manquent au sein des aires marines protégées (AMP) existantes. En prenant comme exemple les parcs archéologiques sous-marins du Portugal, nous montrons que les sites archéologiques maritimes ont le potentiel d'être désignés OECM et que les Parties devraient les prendre en compte au fur et à mesure que les OECM seront intégrés aux pratiques de conservation.

Mots-clés: *archéologie maritime; conservation marine; synergie; d'autres mesures de conservation efficaces par zone.*

ABSTRACT: *Marine conservationists are concerned with preserving and understanding living resources found within our seas whereas marine archaeologists are concerned with preserving and understanding the non-living. Despite having different motivations, marine conservation and marine archaeology are fighting against the same anthropological threats, including climate change, fishing activities, and offshore development. In recent years, the safeguarding of marine and cultural resources has been increasingly recognized through international commitments such as the 2010 Aichi Biodiversity Targets and the 2030 Development Agenda via the creation of 17 Sustainable Development Goals (SDGs). These goals and targets cover both pressing social and biological issues, but meeting these commitments has since been a challenge. In regards to biological conservation, both Aichi Target 11 and SDG 14.5 call for the conservation of 10% of the marine and coastal environment by 2020. Parties also agreed to SDG 11.4, which aims to strengthen efforts to protect the world's cultural and natural heritage. While number-based goals, such as Aichi 11 and SDG 14.5, have been more popular given they are easier to track, qualitative goals, such as SDG 11.4, have been harder to measure. We highlight how synergy can be promoted between the conservation of both biological and cultural resources while contributing towards international commitments Aichi Target 11, SDG 14.5, and SDG 11.4 through «other effective area-based conservation measures» or OECMs. OECMs are a recent innovation in the marine conservation policy realm. They describe an area whose primary purpose is not biological conservation, but by consequence, biodiversity is benefiting. While OECM designation would allow an area to be internationally*

recognized as protected and counted towards the global conservation goals, more importantly, the OECM designation has the potential to increase the recognition of more stakeholders that contribute toward in-situ biological conservation and increase ecological representation and connectivity that is lacking among existing marine protected areas (MPAs). Using Underwater Archaeological Parks (UAPs) of Portugal as an example, we show that maritime archaeological sites have the potential to be designated as OECMs and Parties should consider them as OECMs become mainstreamed in conservation practices.

Keywords: maritime archeology; marine conservation; synergy; other effective area-based conservation measures.

1. INTRODUCTION

Maritime archaeology, as defined by Domingues (2012), is «all forms of relationships between the archaeological work and the maritime environment». Meanwhile, marine conservation is defined as «the science of protecting, recovering, and sustainably using the living sea» (Norse and Crowder, 2005). Marine conservationists are concerned with preserving and understanding living resources found within our seas whereas maritime archaeologists are concerned with preserving and understanding the non-living or cultural resources. While a marine conservationist might see an old shipwreck as an invasive, ancient form of marine debris, a maritime archaeologist sees it as an opportunity to learn how humanity interacted with the sea long ago. However, despite the different motivations, these disciplines are endangered by the same anthropological threats. Both are affected by activities such as seabed mining, offshore oil drilling, fishing, cable and pipe laying, offshore dumping, and other marine developments (Halpern *et al.*, 2007; Evans *et al.*, 2009; Flatman, 2009; Brennan *et al.*, 2013; Krumholz and Brennan, 2015). Furthermore, both marine conservation and maritime archaeology are increasingly affected by climate change related events such as severe weather events, ocean acidification, sea-level rise, and even invasive species (Halpern *et al.*, 2007; Murphy *et al.*, 2009; Westley *et al.*, 2011; Erlandson, 2012; Appelqvist *et al.*, 2015).

Recent international commitments have aimed to mitigate such threats and aid biological and cultural conservation efforts. This includes the 2010 Aichi Biodiversity Targets and the 2030 Sustainable Development Goals. We highlight these commitments and show how they can be streamlined using a recent innovation in conservation policy: other effective area-based conservation measures.

2. EXISTING FRAMEWORKS

Maritime archaeology and marine conservation grew internationally in the late twentieth century and became respected fields of study (Norse and Crowder, 2005; Bass, 2012). During this time, international treaties began recognizing their

importance and the need to conserve cultural and biological resources. For example, in the 1982 UN Convention on the Law of the Sea (UNCLOS III), Article 149 states that «all objects of an archaeological or historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole». Similarly, Article 192 states that «all states are obliged to ensure the protection and preservation of the marine environment in each territorial zone of the sea». However, UNCLOS III articles lacked specificity and problems persisted in both disciplines. Ultimately, Parties did not know what «preserving and protecting» the marine environment meant or how cultural resources were supposed to be managed to «benefit mankind». Later, other international agreements further defined what cultural and biological conservation was. The 1992 Convention on Biological Diversity (CBD) established the first international guidance for the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from genetic resources. It also established biennial Meetings of the Conference of the Parties (COP). Similarly, the Convention on the Protection of Underwater Cultural Heritage (CPUCH) was signed in 2001 and came into effect in 2009. The CPUCH laid out 36 Rules concerning activities directed at underwater cultural heritage. Ultimately, CPUCH helped resolve issues in regard to law of salvage and finds; the exclusion of a «first come, first served» approach for the heritage found on the continental shelf; and the strengthening of regional cooperation that was lacking from UNCLOS III (Scovazzi, 2010). It also ensures that underwater archaeological sites consider the marine environment. For example, Rule 29 of the CPUCH UNESCO Manual states, «an environmental policy shall be prepared that is adequate to ensure that the seabed and marine life are not unduly disturbed» (Maarleveld *et al.*, 2016).

Ultimately, it was these treaties and agreements, among others, that set the stage for the development of international commitments that emerged in the first half of the twenty-first century.

3. EMERGING INTERNATIONAL TARGETS AND GOALS

The first «global goals» were established during the United Nations (UN) Millennium Summit in 2000. This included eight goals that later become known as the Millennium Development Goals (MDGs). Of the eight, only one goal focused on biological conservation, which was Target 7.B: «Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss». However, concern grew as studies showed that biodiversity was in decline on a global scale and was essential for human well-being [Millennium Ecosystem Assessment (MEA) 2005]. In response to this trend, the Conference of the Parties to the CBD echoed Target 7.B of the MDGs by creating the «2010 Biodiversity Target». This aimed to, «achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth».

The CBD later made global objectives for biodiversity conservation more defined in 2010 during the tenth meeting of the Conference of the Parties in Nagoya, Japan. It was here that the Convention on Biological Diversity Parties revised and updated the Strategic Plan for Biodiversity to include 20 biodiversity targets, collectively referred to as the Aichi Targets (decision x/2) (CBD 2010). One of the most specific goals created was Aichi Target 11 which stated:

«By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes».

This was the first time a defined number was agreed upon for biodiversity by the global community. As parties strived to reach this biodiversity goal, protected areas—both marine and terrestrial—became the tool of choice for doing so. In the marine realm, marine protected area (MPAs) coverage rose from 2.5% in 2010 to 6.4% in 2017 (UNEP-WCMC and IUCN, 2018).

However, by comparison, no global goals had been established for cultural conservation in the same manner at the time. There was a need to establish clear objectives, not only for biodiversity but also for other essential fields that are essential for the future of our planet and people.

On 25 September 2015, the 193 countries of the UN General Assembly adopted the 2030 Development Agenda titled «Transforming our world: the 2030 Agenda for Sustainable Development». The 2030 Agenda outlines 17 Sustainable Development Goals (SDGs) which range from eradicating hunger to mitigating climate change to reducing inequalities. In regard to cultural conservation, SDG 11.4 aims to strengthen efforts to protect and safeguard the world's cultural and natural heritage. Meanwhile, SDG 14.5 reiterated Aichi Target 11 as it called for the, «(conservation) of at least 10% of coastal and marine areas, consistent with national and international law and based on best available scientific information». While number-based goals, such as Aichi 11 and SDG 14.5, have been more popular given they are easier to track, qualitative goals, such as SDG 11.4, have been harder to measure. However, there is emerging research that focuses on reaching these commitments, their interdependence, and their co-benefits (Singh *et al.*, 2018; Bowen, 2017). Biodiversity mainstreaming has especially been recognized to support other developmental objectives (Redford *et al.*, 2015).

Thus, we show a novel way to promote synergy between the conservation of biological resources and the conservation of cultural resources and how they can be streamlined to contribute to international commitments Aichi Target 11, SDG 14.5, and SDG 11.4.

4. PROMOTING SYNERGY THROUGH OECMS

One innovative suggestion to promote synergy between maritime archaeology and marine conservation is through the petitioning of maritime archaeological sites or underwater cultural heritage as protected areas (PAs) and recorded to the World Database on Protected Areas—the official tracker of progress towards biological conservation goals. It should be noted that there are many maritime archaeological sites that are already considered a PA and present in the WDPA, but only if that archaeological or cultural area is part of an existing MPA. The majority, however, are excluded due to the strict rules about what a protected area is. Presently, the WDPA only accepts protected areas that meet the International Union for Conservation of Nature (IUCN) definition of a protected area:

«A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values» (Dudley, 2008).

Because this definition implies that the primary objective of the area must be biological conservation, other areas, like archaeological sites where the primary objective is cultural conservation, could not be counted. However, recent developments within marine conservation are changing this. Within the last decade, a new term has arisen: other effective area-based conservation measures or OECMs. OECMs describe an area whose primary objective is not in-situ conservation of biodiversity, but biodiversity is a strong co-benefit.

OECMs were originally described in 2010, at the tenth meeting of the Conference of the Parties in Nagoya, Japan in Aichi Target 11:

«By 2020, at least 17 percent of terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and *other effective area-based conservation measures*, and integrated into the wider landscapes and seascapes» (emphasis added).

However, there were no official guidelines to assess what OECMs were and what they were not (Bertzky *et al.*, 2012). Conceptually, OECMs were seen as valuable as they had the potential to illuminate and recognize more stakeholders that contribute toward in-situ conservation and contribute to better ecological representation and connectivity that was lacking with MPAs (Laffoley *et al.*, 2017). Yet, there were no established rules or guidance for designating OECMs thus, all focus turned towards MPA designation.

However, with 2020 nearing and only 7.45% of the biological conservation target reached, OECMs have been discussed at length in international arenas. At the 22nd Subsidiary Body on Scientific, Technical and Technological Advice (SB-STTA) Meeting of the CBD (July 7, 2018), an official definition was drafted for OECMs:

«Other effective area-based conservation measure» means «a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic, and other locally relevant values» (CBD, 2018).

In addition to this definition, a number of recommendations and criterion for OECMs were drafted. This included the recommendation for the WDPA to expand their database to include OECMs and encouraged parties and other governments to collect and submit this information (CBD/SBSTTA/REC/22/5). This definition, criterion, and recommendations were recently officially adopted by the CBD during the 14th Conference of Parties in November 2018 (CBD/COP/14/L.19).

Now there is a need to start using this new OECM framework. We show its applicability and implications to maritime archaeological sites. Some maritime archaeological sites have strong co-benefits of biodiversity due to an «artificial reef effect». An artificial reef can be described as a man-made structure which has been submerged in the natural environment usually with the purpose to promote marine life. Artificial reefs work by providing substrate for colonization for microorganisms or larvae, or by providing structure for fish habitat (Seaman and Sprague, 1991). They have shown to have greater densities and biomass, and provide higher catch rates, compared to surrounding soft bottom areas, and in several cases in relation to adjacent natural reefs (Ambrose and Anderson, 1990; Arena *et al.*, 2007). An increasingly number of studies show that maritime sites—notably shipwrecks—have high biodiversity (Mallefet *et al.*, 2008; Smith, 2010; Kumar *et al.*, 2015).

As a case example, we highlight the work of Garcia and Barreiros (2018) who studied the biodiversity of Underwater Archaeological Parks (UAP) in the Azores islands in Portugal. The Azores are a remote oceanic archipelago composed of nine islands which belongs to the Macaronesia biogeographical region and known for its rich biodiversity (Borges *et al.*, 2010). In 2005, the Regional Government of the Azores classified the Bay of Angra of Terceira Island as an UAP. The motivation of the designation was to protect the cultural sites in the bay from threats, such as construction, dredging, or fishing. The bay was an important port during the 16th-17th centuries, but due to its south-facing position, it caused many ships to sink while anchored. By consequence, the bay has at least 70 documented shipwrecks and more than 15 archeological sites. Now the UAP acts as a tourist attraction for divers and important historical site.

Garcia and Barreiros (2018) showed that there was significantly high biodiversity at Angra UAP compared to outside the UAP. Thus, Angra UAP proves to be an ideal model of both cultural and biological conservation as it meets the OECM definition and criterion. While, the total area of the Angra UAP is small, approximately 0.60 km², there are four other UAPs in Portugal. These, combined with the Angra UAP, could increase the number to 3.2 km². This number is small, but

given that the goal for global conserved area will continue to increase (many argue for 30% by 2030), OECMs will likely be a key player in reaching this goal while ensuring ecological representation, connectivity, and creating an accurate baseline of globally conserved areas (Laffoley *et al.*, 2017). Thus, maritime archeological-based OECMs have the potential to promote both the conservation of living and non-living cultural resources and contribute to international targets and goals. Parties should pay special attention to them as OECMs become mainstreamed in conservation practices.

5. REFERENCES

- APPELQVIST, C.; HAVENHAND, J. N., and TOTH, G. B. (2015), «Distribution and Abundance of Teredinid Recruits along the Swedish Coast - Are Shipworms Invading the Baltic Sea?», *Journal of the Marine Biological Association of the United Kingdom*, 95(4), 783790, <https://doi.org/10.1017/S0025315414001830>.
- ARENA, P. T.; JORDAN, L. K. B., and SPIELER, R. E. (2007), «Fish Assemblages on Sunk-en Vessels and Natural Reefs in Southeast Florida, USA», *Hydrobiologia* 580 (1), 157171, <https://doi.org/10.1007/s10750-006-0456-x>.
- BASS, G. F. (2012), «The Development of Maritime Archaeology», in FORD, B.; HAMILTON, D. L., and CATSAMBIS, A. (eds.), *The Oxford Handbook of Maritime Archaeology* (vol. 1), Oxford University Press, <https://doi.org/10.1093/oxford-hb/9780195375176.013.0000>.
- BORGES, P. A. V.; COSTA, A.; CUNHA, R.; GABRIEL, R.; GONÇALVES, V.; MARTINS, A., and VIEIRA, V. (2010), *Listagem dos organismos terrestres e marinhos dos Açores - A List of the terrestrial and marine biota from the Azores*. *Biologia* (April 2016), 429, <https://doi.org/10.15468/hyvwxi>.
- BOWEN, K. J.; CRADOCK-HENRY, N. A.; KOCH, F.; PATTERSON, J.; HÄYHÄ, T.; VOGT, J., and BARBI, F. (2017), «Implementing the «Sustainable Development Goals»: Towards Addressing Three Key Governance Challenges-Collective Action, Trade-offs, and Accountability», *Current Opinion in Environmental Sustainability*, 26-27, 90-96, <https://doi.org/10.1016/j.cosust.2017.05.002>.
- BRENNAN, M. L.; DAVIS, D.; ROMAN, C.; BUYNEVICH, I.; CATSAMBIS, A.; KOFÄHL, M., and DUMAN, M. (2013), «Ocean dynamics and anthropogenic impacts along the southern Black Sea shelf examined through the preservation of pre-modern shipwrecks», *Continental Shelf Research*, 53, 89101, <https://doi.org/10.1016/J.CSR.2012.12.010>.
- CBD (2010), *Decision X/2: Strategic Plan for Biodiversity 2011-2020*, Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting.
- (2018), *Protected areas and other effective area-based conservation measures*, UNEP/CBD/SBSTTA/22/6.
- DOMINGUES, F. C. (2012), «Maritime History and Maritime Archaeology», in FORD, B.; HAMILTON, D. L., and CATSAMBIS, A. (eds.), *The Oxford Handbook of Maritime Archaeology* (vol. 1), Oxford, Oxford University Press, <https://doi.org/10.1093/oxford-hb/9780195375176.013.0039>.
- DUDLEY, N. (ed.) (2008), *Guidelines for Applying Protected Area Management Categories*, Gland, IUCN.

- ERLANDSON, J. M. (2012), «As the World Warms: Rising Seas, Soastal Archaeology, and the Erosion of Maritime History», *Journal of Coastal Conservation*, 16(2), 137142, <https://doi.org/10.1007/s11852-010-0104-5>.
- EVANS, A. M.; FIRTH, A., and STANFORTH, M. (2009), «Old and New Threats to Submerged Cultural Landscapes: Fishing, Farming and Energy Development», *Conservation and Management of Archaeological Sites*, 11(1), 4353, <https://doi.org/10.1179/135050309X12508566208407>.
- FLATMAN, J. (2009), «Conserving Marine Cultural Heritage: Threats, Risks and Future Priorities», *Conservation and Management of Archaeological Sites*, 11(1), 58, <https://doi.org/10.1179/135050309X12508566208245>.
- GARCIA, A. C., and BARREIROS, J. P. (2018), «Are Underwater Archaeological Parks Good for Fishes? Symbiotic Relation Between Cultural Heritage Preservation and Marine Conservation in the Azores», *Regional Studies in Marine Science*, 21, 5766, <https://doi.org/10.1016/j.rsma.2017.10.003>.
- HALPERN, B. S.; SELKOE, K. A.; MICHELI, F., and KAPPEL, C. V. (2007), «Evaluating and Ranking the Vulnerability of Global Marine Ecosystems to Anthropogenic Threats», *Conservation Biology*, 21(5), 13011315, <https://doi.org/10.1111/j.1523-1739.2007.00752.x>.
- KRUMHOLZ, J. S., and BRENNAN, M. L. (2015), «Fishing for Common Ground: Investigations of the Impact of Trawling on Ancient Shipwreck Sites Uncovers a Potential for Management Synergy», *Marine Policy*, 61, 127133, <https://doi.org/10.1016/j.marpol.2015.07.009>.
- KUMAR, J. S. Y.; GEETHA, S.; RAGHUNATHAN, C., and VENKATARAMAN, K. (2015), «An Assessment of Faunal Diversity and its Conservation in Shipwrecks in Indian Seas», *Marine Faunal Diversity in India*, Academic Press, 441452, <https://doi.org/http://dx.doi.org/10.1016/B978-0-12-801948-1.00025-2>.
- LAFFOLEY, D.; DUDLEY, N.; JONAS, H.; MACKINNON, D.; MACKINNON, K.; HOCKINGS, M., and WOODLEY, S. (2017), «An introduction to “other effective area-based conservation measures” under Aichi Target 11 of the Convention on Biological Diversity: Origin, interpretation and emerging ocean issues», *Aquatic Conservation: Marine and Freshwater Ecosystems*, 27, 130137, <https://doi.org/10.1002/aqc.2783>.
- MAARLEVELD, T. J.; GUÉRIN, U., and EGGER, B. (2016), *Manual for Activities directed at Underwater Cultural Heritage, Guidelines to the Annex of the UNESCO 2001 Convention*. Retrieved from www.unesco.org/en/underwater-cultural-heritage.
- MALLEFET, J.; ZINTZEN, V.; VANDEN BERGHE, E.; DEMAERSSCHALCK, V.; STEYAERT, M.; DEGRAER, S., and CATTRIJSSE, A. (2008), *Belgian Shipwrecks: Hotspots for Marine Biodiversity (BEWREMABI). Scientific Support Plan for a Sustainable Development Policy*. Retrieved from <http://www.vliz.be/en/imis?refid=58010>.
- MILLENNIUM ECOSYSTEM ASSESSMENT (2005), *Ecosystems and Human Well-Being: Synthesis*, Island Press.
- MURPHY, P.; THACKRAY, D., and WILSON, E. (2009), «Coastal Heritage and Climate Change in England: Assessing Threats and Priorities», *Conservation and Management of Archaeological Sites*, 11(1), 915, <https://doi.org/10.1179/135050309X12508566208281>.
- REDFORD, K. H.; HUNTLEY, B. J.; ROE, D.; HAMMOND, T.; ZIMSKY, M.; LOVEJOY, T. E., and COWLING, R. M. (2015), «Mainstreaming Biodiversity: Conservation for the Twenty-First Century», *Frontiers in Ecology and Evolution*, 3, 137, <https://doi.org/10.3389/fevo.2015.00137>.

- SCOVAZZI, T. (2010), «The Entry into Force of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage», *Aegean Review of the Law of the Sea and Maritime Law*, 1(1), 1936, <https://doi.org/10.1007/s12180-009-0001-7>.
- SEAMAN, W., and SPRAGUE, L. M. (eds.) (1991), *Artificial habitats for marine and freshwater fisheries*, Academic Press.
- SINGH, G. G.; CISNEROS-MONTEMAYOR, A. M.; SWARTZ, W.; CHEUNG, W.; GUY, J. A.; KENNY, T.-A., and OTA, Y. (2018), «A rapid assessment of co-benefits and trade-offs among Sustainable Development Goals», *Marine Policy*, 93, 223231, <https://doi.org/10.1016/J.MARPOL.2017.05.030>.
- SMITH, D. M. (2010). *The ecology of shipwrecks: an assessment of biodiversity* (University of Hawaii at Manoa) (December 2010). Retrieved from <https://scholarspace.manoa.hawaii.edu/hand>.
- UNEP-WCMC and IUCN (2018), Marine Protected Planet (On-line) (December, 2018), Cambridge, UK: UNEP-WCMC and IUCN. Available at www.protectedplanet.net, Convention on the Law of the Sea, Dec. 10, 1982, 1833 UNTS 397.
- WESTLEY, K.; BELL, T.; RENOUF, M. A. P., and TARASOV, L. (2011), «Impact Assessment of Current and Future Sea-Level Change on Coastal Archaeological Resources-Illustrated Examples From Northern Newfoundland», *The Journal of Island and Coastal Archaeology*, 6(3), 351374, <https://doi.org/10.1080/15564894.2010.520076>.