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**Wood Resources, Shipbuilding and Social Environment: The Historical context of the ForSEAdiscovery Project.**

Dr. Ana Crespo Solana  
(ITN Coordinator ForSEAdiscovery)

Instituto de Historia  
Consejo Superior de Investigaciones Científicas (CSIC)  
CCHS calle Albasanz, 26-28, 28037 Madrid, Spain  
[ana.crespo@cchs.csic.es](mailto:ana.crespo@cchs.csic.es)  
+34 916022329

### **Abstract**

*ForSEAdiscovery* (Marie Curie Actions PITN-2013-GA-607545) is an interdisciplinary project encompassing History, Archaeology and Dendrochronology with a dual objective: to collect information on naval construction and the use of timber in shipbuilding; and to complement this research with the analysis of the archaeological evidence collected from Iberian shipwrecks, timber and other artefacts. In this paper I will focus on the general objectives of the ForSEAdiscovery Project highlighting on some of the key historical aspects of the project whilst placing them within the context of this wider multi-disciplinary project. Historical studies have been looking into so-called “Environmental History” only for the last few decades. However, one of the most relevant aspects of the first global age has not attracted the attention of the environmental historians, the evolution of the maritime empires. The ForSEAdiscovery Project focuses on the relationship between deforestation and the evolution of

shipbuilding techniques in the two first maritime empires, Portugal and Spain during the Early Modern Ages.

### **History and theory about Iberian shipbuilding: new perspectives**

During the early modern ages (16<sup>th</sup> to 18<sup>th</sup> centuries) wood was the first and most important natural resource to build and arm navies for the expansion and conquest of new territories. International political lobbies of merchant networks became involved in business operations involving timber production and trade in the world-wide financial networks built around the first “Maritime Empires”, Portugal and Spain. Besides, wood has been a constant feature in economic life because it made possible, directly or indirectly, the processes of accumulation throughout world history. Wood has provided the means for the social and economic transformations seen, especially in maritime societies, and it has been a resource utilized in wars, industrial development and population control. Those areas hierarchically located where these resources were handled and traded had a great advantage over the rest. In Spain a comparison can be drawn between Andalusia and the Basque-Cantabrian region, as stated in 1575 by Juan Escalante de Mendoza, when concluding that “*it is verifiable that the best ships used to be built in the yards in Bilbao, its province-Vizcaya and the neighbouring area*”.<sup>1</sup>

Historiography has neglected the study of the influence that the commercial, maritime, and colonial European expansion had in the use of forest resources. Up to date, a few relevant works exist that relate expansion and deforestation (Chew, 2001; Grove, 1996; Parker, 2010), but their coverage of the Early Modern Period focuses on the 18<sup>th</sup> century, leaving references to 16<sup>th</sup> and 17<sup>th</sup> century brief and shallow. Unedited written sources are still available in certain geographical areas which may shed light on these relationships. An historical, sociological and anthropological analysis of these sources could provide us with new insights about how the *ecological world* has affected social and economic evolution, and vice-versa. These relationships were based on the extraction and exploitation of resources so that society’s hierarchical networks could be maintained. Social systems have always depended on Nature for reproduction. Nature could have restricted this reproductive ability. Social systems have always needed to produce a surplus of resources based on the levels of consumption dictated by the hierarchical distribution. Interplay can be seen between the limits in Nature, social and political dynamics, and economic relationships. Resource availability limits and restricts a society’s ability to expand, and they have to be found elsewhere when they cannot be found in the

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<sup>1</sup> Juan Escalante de Mendoza (1575), *Itinerario de navegación de los mares y tierras occidentales*, quoted in Gervasio de Artiñano y de Galdácano (1914), *La Arquitectura naval española (en madera). Bosquejo de sus condiciones y rasgos de su evolución*, Madrid, p. 272.

homeland. To that purpose, the necessary mechanisms will need to be put in place so that control, trade and monopoly will reward handsomely the social groups involved. This behavioural dynamic has been, and actually is, a steady part in the context of human cooperation and the formation of social networks (Crespo Solana & Alonso García, 2012).

The study of the social and economic theory about the relation between forestry resources and the competition among maritime empires must be made within this perspective on network cooperation and competition for organizing political and economic behaviour around forest resources and in the so-called Environmental History. The utilisation of forestry resources to fuel the expansionist dynamics of societies, states and empires, have always been undertaken within and between the trade and territorial linkages of the societies, civilizations and empires (Chew, 2001: 4).

So far we have seen few studies in which naval construction and deforestation are regarded as related, and the emergence of a policy of protection of the resources needed to fuel the naval and economic activities of the empires. Besides, shipbuilding and all ancillary activities it generated in the peripheral maritime areas is a constant paradigm in the narrative of Global History. No ships mean no navies, and no forest mean no ships. Besides, alongside the ongoing warfare in the early modern era, a wide network of commercial and financial interests was built around the powers of the empires in order to monopolize the routes and businesses through which forestry resources were being channelled and capital was being used to fund the building of the *armadas*. The network of timber trade and its relation with naval policies in the Hispanic Monarchy have been partially and secondarily analyzed in the broad spectrum of Spanish Modern Age. Historical analyses of European expansion and Atlantic trade have traditionally been approached from economic, social, or political viewpoints, leaving a notorious gap with regards to the technology and the raw materials that enabled and sustained them. Early modern Historiography has focused on the study of merchant networks and international maritime routes between the 16th to 19th centuries, has shown the most important factors in the evolution and consolidation of the so-called Atlantic World. It is a line of research which is still being reviewed and new contributions have also been made from a socio-economic, political and institutional point of view, especially in the British Atlantic World (Armitage & Braddick, 2009). Further recent studies on history and globalization depart from the economic aspect and enter cultural and anthropological fields in order to explain the emergence of cultural systems at regional level. Studies on Atlantic System in the Early Modern Age were intent on finding answers to more complex questions as the perspective of possibilities broadened of the comparative histories on societies that have, or had, the Atlantic as the centre of their exchanges not only at economic, but also at ideological, human and cultural levels. Specialists on Iberian, British, Dutch or French expansion have highlighted the fundamental role of the Atlantic exchanges in the regional integration of Europe, America,

Africa (due to the traffic of black slaves) and Asia. Top specialists are approaching the topic from the perspective of constructive criticism and based on well-known studies on European expansion between the 16th and 18th centuries. This is a key period to understanding some of the current consequences of this expansion process. There may still be an outstanding subject related to the role played by Spain from an expansive trans- and circum- Atlantic History point of view: analysing the influence of the Spanish commercial systems in how the other empires' spaces were articulated from a perspective that is broad and comparative and takes into account the cross influences (Crespo Solana, 2014b: 71-83). One of the most important chapters to read when trying to understand the complexity of the connections at both socio-institutional and economic levels makes reference to the role played by trade communities in the economic transformations (Mauro, 1993; Mukherjee, 2011). Furthermore, studies about colonial trade with America have evolved from the traditional macro-economic works (Chaunu, 1955-1960; García-Baquero, 1976) or analyses of European trading companies in the colonial world or the Spanish trade with America (Emmer, Petre-Grenouilleau & Roitman, 2006).

Specialists have recently studied in depth the connections between environmental change and other major topics of early modern history such as population growth, commercialization or imperialism. Some authors have pointed at the relevant role wood trade had in the economic growth of 16<sup>th</sup> and 17<sup>th</sup> century European empires (Vries & Der Woude, 1995; Perlin, 1989). During the Early Modern Ages, empires organized and expanded, at least in part, through speculation and exploitation of key natural resources. The growth of the Spanish Empires required the building of ocean going ships (Aranda y Antón, 1990). However, historiography has barely deepened into specific analyses about the relationships between deforestation processes and the use of resources for shipbuilding. Kenneth Pomeranz states that Environmental History is “*an urgent intellectual project*”; although he barely looks into natural resources and their relation with political, economic and social history of the maritime empires (Pomeranz, 2009: 3). Besides, it is important to see what the social theoreticians say about the clash among History, Culture and Nature. Chew stated that the correlation between Culture and Nature has been looked at in the context of competition and rivalry among empires when it came to seizing resources which were usually channelled centripetally from the periphery to the centres of power. The studies of social and economic changes in the *long durée* have almost always focused on the human factors. William McNeil, for example, highlights the review of this perspective in Global History by studying network impact on World History (Mc Neill, 1990: 21-22). Most of the studies developed recently have focused in that perspective including mines (Crespo Solana, 2010a; 2010b: 181-213; and 2014a).

Michael Williams, in his book “Deforesting the world” considers the long-term implications of the European discovery of the New World and colonial expansions as well as

developments within Europe itself. However Williams did not mention shipbuilding as a cause of deforestation (Williams, 2006: 317). He describes the varied ways in which over 222 million trees disappeared from the tropical world, particularly in southern and south-eastern Asia from 1750 to 1920. To make this argument, he analyzes the impact of indigenous uses of forests, including shifting and permanent agriculture, grazing, and burning, as well as capitalist penetration and colonial consolidation that led to the use of tick forests, railways, plantation, and commercial farming.

With the exception of Fernand Braudel (1982: 289, 350 and 570), who describes the processes of production and timber trade as one of the most important chapters of the integration of the northern regions of Europe in European consumption chains, hardly anybody has directly discussed the timber issue, except Chase-Dun and Hall (1997); or Barbier in his *Scarcity and Frontier* (2010). Although Wallerstein never mentioned timber, these studies appear to be in line with his theories (1974), as he stated that the greatest transformations taking place after 1492 happened as resources were being transferred from the periphery to the centre. It is competition for access to those resources that give power, control over trade and accumulation of capital. It is possible to say that timber has made possible, directly or indirectly, the processes of accumulation in world history. Therefore, the use and exploitation of forest resources over the modern period is comparable to the use of oil since the Industrial Revolution.

### **Objectives of the ForSEAdiscovery project**

The ForSEAdiscovery Project is being developed within this historical context. AS an interdisciplinary project, its theoretical framework is located within the context of questions related to 'natural' resources and how they are used. Environmental framework in Humanities *"is always about human interaction with the natural world or, to put it in another way, it studies the interaction between culture and nature. The principal goal of environmental history is to deepen our understanding of how humans has been affected by the natural environment in the past and also how they have affected that environment and with what results. This is called the bilateral approach of environmental history"*.<sup>2</sup>

The study of shipbuilding processes and the provenance of timber lead us to reflect on the paradigm of the utilization of natural resources in History. This is the main reason for an interdisciplinary research project. The general objectives of ForSEAdiscovery have been outlined in recent papers and publications (Crespo Solana & Nayling, 2015, forthcoming). This

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<sup>2</sup> See: by K.J.W. Oosthoek; ([http://www.eh-resources.org/environmental\\_history.html](http://www.eh-resources.org/environmental_history.html), accessed 1 May 2015).

project tries to relate the history of naval construction and the progress of the Atlantic maritime trade with deforestation and the value of timber resources, and to find out if all this had an impact on the shipbuilding between the 16<sup>th</sup> to the 18<sup>th</sup> centuries. Over four years, ForSEAdiscovery is going to sail across the vast, unexplored ocean of the yet-to-be-done research, where the project team will look for information about the social, economic and politico-administrative framework in which the collection, sale, distribution and utilisation of the forest resources for shipbuilding were carried out in the Iberian empires-Portugal and Spain, during the centuries of the First Global Age.<sup>3</sup> This is all about expanding our knowledge of the purveyance of timber used in shipbuilding in the Iberian empires between the 16th and the 18th centuries, analysing the merchant networks behind this trade, getting to know the policies on naval construction in the period and their impact on the distribution channels of the forest resources.

The aims of the project are concentrated into three major lines of research: to create an inventory based on archival information of the sources of oak and pine used for shipbuilding in the Iberian Peninsula; to collate historical and archaeological information regarding construction features of specific Iberian ships; to investigate how the supply of timber and its dynamic trade network were organized and to synthesize results through the development of a Historical GIS based model combining information from the different disciplines involved in the project. One of the major bases of this investigation is the comparison between the historical information and the archaeological data gathered from already located and studied Iberian shipwrecks. Iberian Forestry has evolved through time according to the historical documentation currently available. Dendrochronological research, focused on living trees and historic buildings in areas known to have produced timber for Iberian shipbuilding during the Early Modern Age provides complementary evidence for these past forest practices and exploitation. Additionally, the construction of tree-ring chronologies for these areas or regions may provide reference chronologies for the dating and provenancing of timbers found archaeologically. The potential for additional scientific analyses including microscopic wood anatomy, geochemical signals and stable isotope will be explored. The triangle of this multi-disciplinary project is completed through archaeological investigation and timber sampling of suspected Iberian shipwrecks located in Iberia and beyond. The project team will conduct wood sampling and data collection from the ship timbers found on selected shipwreck sites that have already been located. This will cover the objective of testing and analysing the provenance of timber by means of chemical analyses and dating procedures, through comparison of ring-width patterns, and other anatomical, chemical and isotopic variables found in shipwreck assemblages with the data collected from Iberian regions of known timber production in the past. The methods and

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<sup>3</sup> More information in: <http://forseadiscovery.eu/>

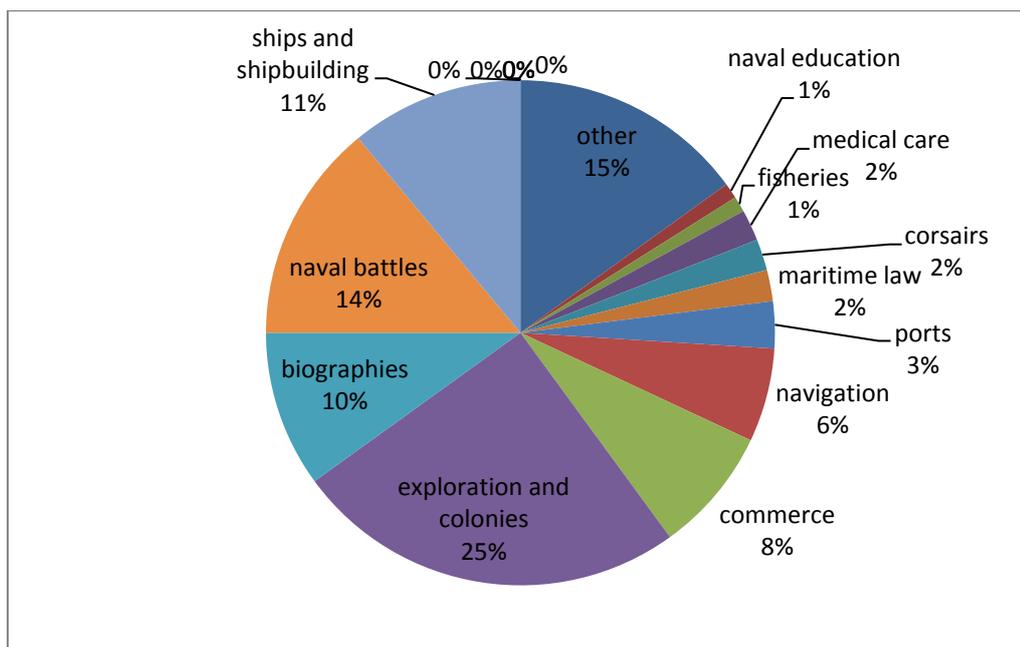
objectives of the project are reflected in the structure of the research project which is divided into three scientific work packages: historical wood supply and dynamic trade networks (history, GIS); nautical archaeology and shipbuilding (history and archaeology); and wood provenancing (dendrochronology, wood anatomy, chemistry). The international and collaborative project team endeavour to provide answers to questions related to the relationship between the Iberian forestry resources and the high demand for shipbuilding during the centuries of the European expansion. In doing so, there is a need to consider the role of timber trade – to what extent was the timber resource requirement of Iberian shipbuilding met by importation from Northern Europe, mainly from the Baltic and Scandinavian areas? How did those trade networks organise themselves around this timber trade? Was there a relation at all amongst the various monopolies of these networks? How were these timber resources arranged; or how were these administered and employed by the lobbies that operated around the governments of these empires? Again, these questions can best be addressed through multi-disciplinary approaches.

### **Classical theories about Spanish shipbuilding**

Historical studies have provided us with some theories about shipbuilding in the Hispanic Monarchy, including the age of the Iberian Union between the two crowns of Portugal and Spain (1580-1640). But, what does History say about it? And, what kind of innovative perspective could be offer by an interdisciplinary project? History of shipbuilding in Spain has developed around specific topics around dockyards stories and naval policies with rare mention of the use of timber and how did timber supply influenced development of naval construction.

Carla Rahn Philips, made an analysis of the frequency of topics on Spanish Naval History. She gave the following data over a total number of publications of 1,328, many of which dealt with more than one topic. This chart represents only the most frequent themes:

**Chart: Spanish Naval and Maritime History: Frequency of topics<sup>4</sup>**



Theories about shipbuilding in early modern Spain said that shipbuilding evolved from the 16<sup>th</sup> century reaching its peak in the 18<sup>th</sup>. In the eighteenth century new policies were implemented for the construction of shipyards and arsenals and the new maritime departments were organized within which all timber supplies for the navy were arranged. New shipyards and arsenals were completed in Cadiz-La Carraca in 1717 (see Figures 1 and 4). Currently the "Caños de la Carraca" have important deposits of wood that make "La Carraca" in an interesting intertidal archaeological site. What is more, *los Caños* have numerous ships buried in mud, although some of them have been taken, as the case of a frigate of the Eighteenth century (see Figures 2 and 3).

Other dockyards were settled in La Graña and Ferrol in Galicia in 1726; and Cartagena in 1728 (Casado Soto, 1996: 235-252). In the second half of the seventeenth century shipyards were built in Gibraltar with the cooperation of the British merchants' in Cádiz (Serrano Mangas, 1982: 437-448). Also relevant is the creation of shipyards in colonial America, where it seems that many vessels used in the Indies were built. There were important shipyards in Havana, in the eighteenth century, but I must also highlight the important naval industry developed in Guayaquil (Laviana Cuetos, 1984: 74-91; Clayton, 1978; Serrano Álvarez, 2008).

<sup>4</sup> Source: Carla Rahn Philips (1994), "Spanish Naval History", John B. Hattendorf, ed. UBI SUMUS? The State of Naval and Maritime History, Naval War College, Historical Monograph Series, n° 11, Diane Pub. Co. ([https://archive.org/stream/ubisumusstateofn00hatt/ubisumusstateofn00hatt\\_djvu.txt](https://archive.org/stream/ubisumusstateofn00hatt/ubisumusstateofn00hatt_djvu.txt), accessed on May 2015).

Before the establishment of American shipyards, the Galician ports on the Cantabrian seaboard had long enjoyed a prosperous relationship with Andalusian partners regarding wood trade for naval purposes as well as for making kegs and barrels. From Ribadeo and Viveiro wood was regularly shipped to Seville and Cadiz throughout the 17<sup>th</sup> century. Not all skippers were from Galicia as Portuguese merchants were also involved, especially until 1615. Later, ships from England, the United Provinces, Lübeck, Hamburg and Rotterdam, were involved in this trade (Zabala Uriarte, 2003: 127-184). Cantabrian ports and Galicia became the most important shipbuilding area of the 16<sup>th</sup> century, with the well-known dockyards of Guarnizo. The location of Guarnizo as particularly suitable for shipyard site appears to be closely linked to the figure of Christopher de Barros (*Superintendente de Fábricas, Montes y Plantíos*), Superintendent of Factories, Forestry and Plantations on the coast of Cantabria, whom Philip II in 1581 commissioned to build a series of nine galleons for the defense of the Indies. These Galleons have gone down in history as the first oceanic war galleons that have existed and that would take care of transportation and escorting treasure fleets of the “Carrera de las Indias” Cristóbal de Barros suggested to Phillip II that these ships should be built in “*esta canal que llaman de Solía y Guarnizo*”, justifying this option both in quantity and quality of timber in the area, the advantages of the Guarnizo channel for launching and “carenas” (careening, to refit the hull of a ship) of the galleons as well as the natural protection offered by this seaport against winds, storms and possible attacks by sea, being situated at the bottom of the well-fortified bay of Santander (Enríquez Fernández & Sesmero Cutanda, 2001; Rubio Serrano, 1991).

Since the middle Ages, merchants from Guipuzcoa, Alava and Vizcaya developed profitable trading activities with the North of Europe and their shipbuilding industry grew accordingly. From this area trade with other areas in the Cantabrian seaboard and beyond also flourished including Ribadeo, Llanes, San Vicente and other ports in the Santander province. Their trade networks reached the Galician ports and soon after Oporto and Lisbon in Portugal and an important route to Andalusia soon began from the Basque Provinces. Soon afterwards some important trade networks reached Barcelona, Genoa, Sicily and Sardinia. Basque fleets carried Castilian wool, wine and other produce to Flanders- Bruges and Antwerp- and the ports that changed hands from the English to the French, such as Bayonne, Bordeaux, La Rochelle, Harfleur and Rouen. The Hanseatic ports were reached soon afterwards. This trade was regulated by the Bilbao Municipal Ordinances.<sup>5</sup> A document describing how trade and navigation were made from these northern towns and cities stated: “*Given that the English as well as the Bretons, the Flemish and the French, and many other foreign persons are used to dealing in fabrics of all kinds as well as wheat, barley and pulses and other produce in this*

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<sup>5</sup> Bilbao Municipal Ordinances, 1477-1520. Medieval documental sources from the Basque Country in a 1996 edition.

town; and given that they all obtain gold, silver and minted currency from their dealings; it was ruled that all foreign merchants as well as the skippers and agents would only offload their merchandise upon registration of the goods declared, for which a license would be issued so they could resume their journey".<sup>6</sup> In the Santander area, specialised trade companies were created in specific areas, the *Hermandad de las cuatro Villas de la Costa de la Mar*, an administrative agency dealing with sea trade related matters for the four Castilian ports, San Vicente de la Barquera, Santander, Laredo and Castro Urdiales.<sup>7</sup> In 1514, the agency became the *Corregimiento de las Tres Villas de la Costa*, and in 1778 they were made to join the Province of Santander. Santander became a major port in the 18th century with a thriving merchant community as a result of new roads to the Castilian plateau being opened through the town of Reinosa in 1753. This new route was opened so the tax exemptions in place in the port of Bilbao could be bypassed by directing Castilian exports through Santander, mainly wool bound for the North of Europe. Later, when the wool market collapses, Santander trade changed to grain and flour exports to America. In 1765, Santander began importing colonial goods in 1765 and 1778. The *Consulado del Mar* was established in 1785.

Galician maritime commerce in the Early Modern Era did not deserve a global study with only a few studies. With regards to the Asturian market, we have some information about the interference in fiscal matters by the Conde-Duque which led to the disappearance of the trade in wine from Ribadavia (in Ourense, Galicia, the region of Ribeiro wine), which was redirected by land. Trade relations with Bilbao, especially iron exports and fishing from that Basque port, are discussed by M.A. Barkham (1991). As for trade with the Canary Islands, this dealt with by Lobo Cabrera by using documental sources from the islands, which can be crosschecked with notarial protocols from Galician archives (Lobo Cabrera, 1985: 345-374).

In the 16th century almost all sea villages in Cantabria boasted a working shipyard although the most important were at Colindres and Guarnizo, in which the largest galleons at the time were built. As a result of Cristóbal de Barros being appointed by Philip II to revitalize naval construction in the Cantabrian yards, it was there where most of the royal *armadas* sent against England were built. The shipyard at Folgote, established in 1475, became a Royal

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<sup>6</sup> Ordenanzas de Bilbao 1477, p. 22: "*e porque los yngleses e bretones e flamencos e françeses e otros muchos extranjeros suelen tratar e tratan en esta dicha villa e traen muchas mercaderias es como paños e lienços e cannamazes e trigo e çebada e legunbre e otras diversas mercaderías, e los tales mercaderos extranjeros en retorno de sus mercaderías suelen llevar e llevan e sacan oro e plata e moneda amonedada...ordenaron que todos los mercaderes extranjeros e maestros de los nabios en que traxieren las tales mercaderias sean tenidos de manifestar e manifiesten las dichas tales mercaderias al tiempo de descargar e non sean tenidos de las descargar syn que sean manifestados antes que los descarguen al fiel e deputados de los mercaderes desta dicha villa...e den rason e quenta en que retorno lo sacan e la cantidad de las mercaderias...e aver liçençia del fiel e deputados non sean hozados de partir los tales mercaderos e maestros "* (translation by the author).

<sup>7</sup> Archivo General de Simancas (AGS), Registro General del Sello, 1495-I. s.f.

Shipyard in 1618. It was thought to be well protected from enemy attacks as it was located at the bottom of Santoña Bay. However, as a result of being placed under attack by the French in 1639, activity dwindled and was transferred to Guarnizo like other Cantabrian shipyards. Apparently Guarnizo was the yard in which *La Pinta* was built, as well as many other vessels among the largest at the time. As for naval construction, it is worth highlighting the conservationist policy applied by Philip II, reflected in his Royal Ordinances, and later copied by the English. Such policy ensured the sustainability of the forestry resources to be used in shipbuilding, the vast forests in Northern Spain. When this policy was later abandoned in the 18th century, a rapid degradation of the Cantabrian forests took place, almost to the point of total depletion. The importance of Cantabria was at its highest at the time with ports like Laredo and Santander being used as bases for the *Real Armada*. They were also the ports of departure chosen by many members of the aristocracy or even the royal family as they left Spain for a political marriage, a military posting or diplomatic placement overseas. A wealth of information is available in the *Registro General del Sello* as well other sections at Simancas (Martínez González, 2013: 1-26).

Also, for the *Gran Armada* of 1588, Santander contributed 13 galleons, 1,700 soldiers and 300 artillery pieces on behalf of Castile. The Flanders fleet used to depart from a Cantabrian port and it was taken as the model for the creation of the *Flota de la Carrera de Indias*. This latter fleet would later leave annually for America from the Andalusian ports. Early in the 16th century the navigation system used was “in convoy” or “in preserve” and remained in force from 1522 to 1561. Between 1561 and 1564 the new system of fleets was designed with large fleets of large ships with similar sail areas so their cruise speeds would be similar too. A number of reports and suggestions were submitted with ideas to establish an efficient system of fleets. Álvaro de Bazán (named *el viejo*) submitted four proposals between 1548 and 1549 with the aim of licensing the Indies Trade on a short lease with him as the first contractor. Three fleets would depart every year, escorted by a galleon and a *galeaza* - a large galley- provided by the contractor. Although the Crown yielded and signed the *Asiento* on February 14th, 1550, the contract was never implemented because of the fierce opposition by the *Consejo de Indias* and especially by the *Consulado Sevillano*. There are other very interesting cases to look into but the final model of fleets to Colonial América (later Fleet of New Spain and *Galeones de Tierra Firme*) was inspired by the Cantabrian fleets and created in 1556 by Pedro Menéndez de Avilés - from Aviles, Asturias.

From the end of the 16<sup>th</sup> century onwards, West Andalucía attracted a high level of maritime movement. Spanish colonial trade, centred in Seville and Cádiz, unfolded via a route which crossed the Atlantic using the ports of Andalusia to the Canary Islands and arrived in the Antilles, to then fork off in the direction of the preferred ports with the two viceroyalties, Peru

and New Spain. After the first voyages of Christopher Columbus to America (1492-1493), the Spanish crown created legislation (influenced mostly by the economic elite close to the kings of Castille) stating that the colonisation and exploitation of America was a private emprise but with collaboration, supervision and fiscal matters dealt with by the crown and a few institutions created for this purpose. (*Casa de la Contratación* founded in 1503 in Seville and later in Cadiz, in 1717). Spanish colonial trade in the 16th to 18th centuries was an undertaking which was intended to be State business (subject to monopoly and licences) but financed privately. It was a model which had previously been unrolled in Europe when organising trade traffic in a particular area. For example, there was the case of Cantabrian trade with Flanders and the Mediterranean (Flanders Route and Eastern Route, from the Middle Ages onwards) and even in other parts of Europe (trade with La Hansa) and this was also taking place in Portugal. In 1503, Seville becomes the head office of the newly created *Casa de la Contratación* as well as the centre of operations for the trade with America, much to the detriment of other coastal areas. This had a great impact on the articulation of maritime routes and communication with America. Cadiz was a return port but lacked a protected harbour because its bay was large and exposed to enemy attack. The Administration focussed all its efforts to strengthen Seville's preponderance in the trade with America. In order to safeguard this established order a number of mechanisms were put in place –official supervision, private collaboration, a single-port policy and escorted shipping. The Sevillian *Consulado de Cargadores*, a guild of merchants or “loaders” (*cargadores*) in the Indies Trade, has the exclusive right to trade with America. By doing this, the Crown is effectively transferring the royal monopoly to this small but powerful group of subjects. Some years later similar institutions are created in Mexico (1592) and Lima (1613) with identical functions. Throughout the 17th century, the *Casa de la Contratación* begins to cease taking the initiative in matters relating to the Indies Trade, while the *Consulado* becomes the true ruling body of the *Carrera de Indias* (García Fuentes, 1980). Commerce is centralised in a single port city with the object of facilitating traffic control and tax collection. This town is Seville, although Cádiz becomes, from early in the 17th century, an important port of arrival owing to the difficulty involved in sailing up the River Guadalquivir. Generally speaking, this single-port policy is loosened after 1529, with other ports, such as La Coruña, Bayona, Avilés, Laredo, Bilbao, San Sebastián, Cartagena and Málaga, being allowed to trade with America. However, all ships must arrive in Seville in order to allow for the *Casa de la Contratación* to carry out its fiscal operations. In 1573 Philip II re-instates Seville as the monopoly's single port; it remains so until 1668, when fleets begin to load and unload in Sanlúcar and Cádiz.

In order to safeguard the monopolistic system and to protect the Spanish fleets to America from the increasing Atlantic activity of other European merchant nations, escorted

convoys sailing along fixed routes were established. The system of fleets was eventually regulated in 1564-1569; it consisted of two separate convoys (the two fleets were clearly differentiated): a) The fleet to New Spain, setting sail in April bound for Veracruz and calling at Santo Domingo, escorted by two warships - the *Capitana* and the *Almiranta*; and b) The “*Terra Firma Galleons*”, setting off in August, bound for Cartagena de Indias and then to Nombre de Dios in the Panama isthmus - in 1598 this final destination was changed to Portobelo. These galleons headed for the American continental area, the mainland or *Tierra Firme*, were a total of six or more since their main mission was to carry the silver from Peru on their return journey. Once the various fairs at the destination ports had been attended to, both fleets hibernated and then gathered at La Habana in March or April, from where they departed carrying the silver and the American produce. Known as the *Galeones de Tierra Firme*, they sometimes sailed together but each retained its own character. Every year, these two fleets spent the winter in the Indies and met in March at the port of La Habana to undertake the return crossing to the Peninsula together. This system created a maritime space related to what has been dubbed the Spanish Atlantic. According to documents from the time, both in letters from merchants and the testimonies of travellers aboard ships, this space was known as the “*Hispanic Sea*”. In the times of astronomical navigation, it was a route which followed the trade winds (Crespo Solana, 2014a) The Spanish colonial trade and the problematic situation of Spain in the international context produced the opportunity to create a legal, administrative and socio-economic basis for reform and manage the shipbuilding and the management of natural resources. Special historical documents that show the relevance of the interest of the Spanish crown are the *Ordenanzas* (Wing, 2014). In 1748 the *Ordenanza de Montes de Marina* was created. It was an attempt by the Spanish Monarchy to reactivate the naval policies which had been implemented earlier in the century. José Patiño y Morales, as head of the *Intendencia de Marina de Cádiz*, added some administrative modifications that led to the distribution of work between shipyards and arsenals (Crespo Solana, 1995). *Los Caños* served to store the wood transported to stocks with the intention that they were treated there for some years before being used in the construction of a boat. That places are well conserved today and provide some interesting archaeological sites to analyze the wood that was stored before its use (See Figures 1 and 4). Not only were shipyards the place for maintenance and shipbuilding work as the arsenals were the storehouses for timber and all the riggings and sails, as stipulated in the *Instrucción General de 1 de mayo de 1723*, known as the “*Ordenanza de Arsenales*”. These regulations also appointed a high official –a *Ministro*- to watch the arsenals and report directly to the *Intendente* (Martínez González, 2014: 571-602). That very year other Ordinances were passed that regulated the matters regarding “*Montes, Sus Cortas y Sus Plantíos*” (Mountains, Tree Felling and Nurseries),<sup>8</sup> also under the

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<sup>8</sup> Biblioteca Museo Naval de Madrid. 2008.

*Intendencia de Marina*. In 1725 three *Departamentos Marítimos* were created in Cádiz, Ferrol and Cartagena, and each *Intendente* was responsible for the mountains and forests within his respective designated area (Martínez González, 2013: 8-10; Wing, 2014: 176). The 1717 royal decree for the conservation of mountains and nurseries for the provision of timber for shipbuilding within its/their appointed area of influence (Aranda y Antón, 2003: 359-379), and the 1719 royal order for the survey of the Galician mountains in order to identify timber that was adequate for shipbuilding, were the precursors of the Jan 31, 1748 royal decree which included the Ordinance for the conservation and growth of the Navy forests in the designated provinces and districts (Rey Castelao, 1995). In 1776, the “*Ordenanza para el gobierno militar y económica de arsenales*” was published.<sup>9</sup> Currently some of the historic arsenals in Cantabria and in Cádiz are archaeological sites. These sites contain archaeological material, mainly timber. In the case of Cadiz, in the arsenal of La Carraca, the “*Caños de estero*” (sewers) contain timber buried in layers of mud and sea water. The timber (mainly oak and pine, but also other imported species) was stored there during 7 or 8 years to be used in shipbuilding and many of this timber are still buried in *los caños* (See Figures 1 and 4).

(Figure 1)



Figure 1: View of “Los Caños” in Shipyard of La Carraca, Cádiz. Private collection of Ana Crespo Solana. Pictures taken by Ana Rita Trindade.

<sup>9</sup> *Ordenanza para el gobierno militar y económico de arsenales de 1776*. (Archivo de Viso de El Marqués) En Madrid: en la imprenta de Pedro Marín, impresor del Despacho Universal de Marina, 1776.

Besides previous fragmentary research, it can be said that three big enigmas still remain unanswered: Where, how and with what natural, social and economic resources were the Spanish ships in the Early Modern Era built? Or, where were these ships built? Where did the timber come from? And, most important, can we use the above two points to define the Iberian ship? Classical studies give information about these three enigmas. But, at the moment, it is not possible to build a map of the provenance of timber in Spain together with the species that were used merely by using historical sources. According to the information at our disposal, much of that timber, like that used for building the ships' hulls came from the forests in Northern Spain and was mainly oak (Goorman, 1997: 68-108). However, much wood was also imported from Northern Europe. And we still have to analyse the timber that was used in other areas of Iberia, like Andalusia, and even, in the colonies. Only an analysis that connects submerged archaeological sites (wrecks), the wood which remains deposited in the areas belonging to these historic shipyards, as the "timber Cemetery" of the *Caños de la Carraca* (Sewers) in Cadiz, with a dendrochronological study of the Iberian Peninsula, will let us advance our understanding of historical processes related to forest resources and shipbuilding.



Figure 2: View of "Los Caños" in Shipyard of La Carraca with deposits of timber, Cádiz. Private collection of Ana Crespo Solana. Pictures taken by Ana Rita Trindade.



Figures 3: Rests of timber from a frigate of 1791. “Caños de la Carraca”, Shipyard in Cádiz. Private collection of Ana Crespo Solana. Pictures taken by Ana Rita Trindade.

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