SEA AND LAGOON FISHING ACTIVITIES ON THE WEST COAST OF PORTUGAL, NAZARÉ AREA (18TH – 20TH CENTURIES).

ATIVIDADES DE PESCA MARÍTIMA E LAGUNAR NA COSTA OESTE DE PORTUGAL, ZONA DA NAZARÉ (SÉCULO XVIII – XX).

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ABSTRACT:

This study analyses the evolution of the maritime and lagoon fishing activities on the west coast between the late 18th and early 20th centuries, with particular emphasis on Nazaré. It highlights the interdependence between human activity and natural dynamics, notably the silting up of the Pederneira and Alfeizerão lagoons caused by the erosion resulting from deforestation and agricultural development. This process compromised navigability

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and forced frequent relocating of ports and shipyards. During the transition from the 19th to the 20th century, the exploitation of resources was intensified thanks to the introduction of new fishing techniques and the renovation and modernization of the vessels, as briefly presented below. In search of capital, associativism was encouraged, but the activity came to be controlled by business elites, who also embraced the canning and fish fertilizer industries; this reflects the growing socioeconomic complexity of the fisheries sector and its related industries.

KEYWORDS:
Traditional maritime and lagoon fishing, west coast of Portugal (Nazaré), anthropic-natural dynamics, modernization of the fishing activity, associative and business practices.

RESUMO:
Neste estudo analisa-se a evolução das atividades de pesca marítima e lagunar na costa oeste, com destaque para a Nazaré, entre finais do século XVIII e inícios do século XX. Evidencia-se a interdependência entre dinâmicas naturais e ação antrópica, nomeadamente o assoreamento das lagoas da Pederneira e de Alfeizerão, causado pela erosão resultante do desmatamento e desenvolvimento agrícola. Este processo comprometeu a navegabilidade e forçou a sucessivas relocalizações de portos e estaleiros. Na transição do século XIX para o XX, observou-se uma intensificação da exploração dos recursos, impulsionada pela introdução de novas artes de pesca e pela reforma e modernização das embarcações, que, sucintamente, se apresentam. Na busca de capital, estimulou-se o associativismo, mas a atividade passou a ser controlada por elites empresariais, que também abraçaram o ramo da indústria conserveira e de adubos de peixe, refletindo a crescente complexidade socioeconómica do setor das pescas e seus derivados.

PALAVRAS-CHAVE:

Pesca marítima e lagunar tradicional, zona oeste de Portugal (Nazaré), dinâmicas antrópico-naturais, modernização da atividade piscatória, práticas associativas e empresariais.

1. Introduction

In this study, the typology of the vessels and fishing gear used along the coasts of Nazaré and S. Martinho do Porto between the late 18th and early 20th centuries, is presented in a multidimensional and systematic way. The changes in the environmental and geographical conditions of the coastline throughout history are enhanced, particularly the impact of the silting up of the Pederneira and Alfeizerão lagoons (Fig. 1) caused by land clearing, agricultural expansion and intensification, and by the shifting of the Alcoa and Alfeizerão river mouths. Consequently, ports and shipyards gradually moved from Pederneira to Nazaré beach, and from Alfeizerão to Salir (and later to S. Martinho do Porto)[3], and so did the fishing community.

In this context, not only the typological evolution of the fishing boats is analysed, but also the different construction forms and technical vocabularies according to their operational areas and functions. The morpho-functional adjustment of these boats to the coastal geography is taken up and also the technological innovations, particularly the transition from sail to motor. In conjunction with the vessel modernization, the revolution of fishing gear is studied, particularly through the so-called "new

[3]Subject developed particularly in J. M. DE MASCARENHAS. Os campos dos coutos de Alcobaça: ordenamento hidráulico e valorização do território, A. V. MADURO & R. RASQUILHO (coords.), *Um Mosteiro entre os Rios. O território alcobacense*, Leiria 2021, 483-539, and in A. V. MADURO; J.M. DE MASCARENHAS & V. F. JORGE, Water Planning In Alcobaça Cistercian Lands / O Ordenamento Hidráulico no Território Cisterciense de Alcobaça, *Riparia,* vol. 3, 2017, 95-126.

gear", as the fixed Valencian and round traps, and American purse seines, which resulted in a sardine fishing boom, responsible for the establishment of the canning industry.

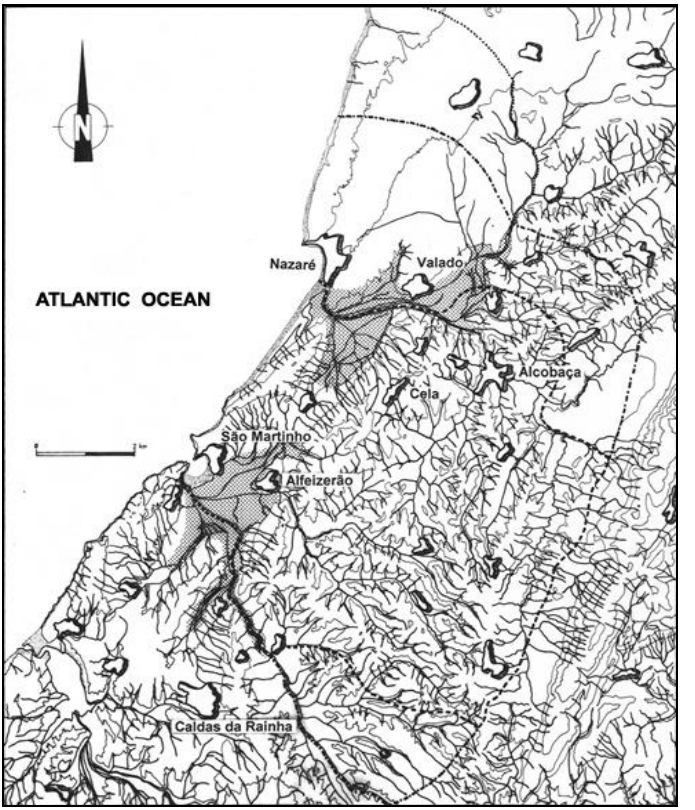

Fig. 1. *Hydrographic network and territory of the former couto of the Cistercian abbey of Santa Maria de Alcobaça, which included Nazaré and S. Martinho, do Porto (author: José Manuel de Mascarenhas).*

Dashed lines: boundaries in 1153; Dash-dotted lines: boundaries in 1358; Dotted lines: boundaries from 1368 to 1374; Dotted spots: areas corresponding to the former lagoons of Pederneira (to the north) and Alfeizerão (to the south).

As a consequence of these technological advances, socio-economic developments took place: the social and associative

organization of fishing sponsored the reform of fishing processes and methods and introduced rationality in the market. Thus, the ways of capital raising, the socioeconomic leadership, and the gradual corporatization of the sector are also exposed.

2. The Nazaré boats

From the late 18th century until the early 20th century, maritime fishing in Nazaré was the main economic activity and the structuring axis of the social and cultural life. This activity developed in close connection with the typology of the vessels, the natural coastal conditions, and the evolution of techniques and work organizations. The unpredictability of the sea and the harsh conditions made fishing a high-risk activity, frequently associated with tragedies and human losses.

The richness and diversity of the traditional Nazaré boats reflect the close relationship between the fishing communities and the sea, but also the necessary adaptation to the specific natural conditions of the coast. The boat types developed in response to the characteristics of the Nazaré sea, namely the strong breaking of the sea waves, a lack of sheltered harbors and steep sandy seabeds.

The vessels were operated by *companhas*, groups of fishermen organized with their own rules and well-defined roles, both on board and ashore. The work was marked by rituals, expressions and specific signals that ensured safety and operational effectiveness in a frequently hostile environment.

2.1. Typology of the boats

The typology of the traditional Nazaré boats is the result of a long adaptation to the natural conditions and demands of local

fishing[4]. Traditionally they were built of wood using techniques passed down through generations of local master carpenters. The artisanal know-how was reflected in the choice of resistant woods and the care taken in assembling the parts, ensuring the durability and functionality of the hulls. Although two distinct construction traditions met on the western Portuguese coast — the *clinker* construction (also known as *lapstrake*), with deep roots in Northern Europe, and the *carvel* building, presumably of Mediterranean origin — the boats studied fall within the latter tradition. Concerning the introduction of this *carvel* architecture in shipyards along the Portuguese coast, its spread from south to north along the coastline may be related to the history of the Arab-Muslim presence in Al-Andalus, particularly in Portuguese territory (Gharb al-Andalus), although other interpretations are possible[5].

On the other hand, many of the flat-bottomed boats, classified by O.L. Filgueiras under the generic category of *plank canoes*[6], fit into a context of technological hybridism between the *shell-first* method and the *skeleton-first* method[7], as inferred from the order of hull assembling.

The vessel typology corresponded to various fishing methods which enabled the catching of different species and to maximize

[4] J. M. DE MASCARENHAS & A. V. MADURO, *Barcos e artes de pesca nas costas da Nazaré e de S. Martinho, entre o século XVIII e 1930,* Leiria 2022.

[5] E. Rieth, *Pour une histoire de l'architecture navale Méditerranée, XVe-XVIe siècle*, Paris, 2023.

[6] O. L. FILGUEIRAS, *Os barcos da Nazaré no panorama da nossa Arqueologia Naval*, Lisboa 1981, 12.

[7] P. POMEY, Y. KAHANOV & E. RIETH, Transition from Shell to Skeleton in Ancient Mediterranean Ship-Construction: analysis, problems, and future research, *International Journal of Nautical Archaeology*, 41(2), 2012, 235-314.

the marine resources. Such boat diversity reflected the fishing practices developed over time and the capacity of the fishing communities for innovation and adaptation to the coastal environment requirements.

Table 1 briefly presents the relationship between the boat typology, the fishing areas and the equipment used in the late 19th century to early 20th century[8].

2.2. Synoptic characterization of the different types of Nazaré fishing boats

Boats designed for sea fishing – *Open-sea fishing*

In the 19th century and earlier, there were several vessels destined for open-sea fishing in Nazaré, each one with specific technical characteristics and functions (Fig. 2). One of them was especially notable: the *Barco da carreira* (Career Boat), also known as *Barco de mar e fora* or *Catraio*. It was used for open sea fishing with hooks and very likely for coastal navigation[9]. It stopped sailing around 1897, when the Port Authority deemed it unfit for navigation[10]. It was a flat-bottomed sailing boat with a raised bow reinforced with copper, a panel stern with a rudder, four oars, and two lateen sails on two tilted masts, crewed by 6 to 8 men. Following the mentioned prohibition, it was replaced by the *Batel do alto* (open-sea *Batel*), with one or two masts as well as oars. Designed for offshore fishing with hooks and nets, it also allowed transportation between anchored boats and the shore. Another vessel type is the *Bote do alto* (motorized), on which longlines and

[8]Table based on C. ESCALLIER, *L'Empreinte de La Mer, Identité des Pêcheurs de Nazaré – Portugal*, Nanterre 1995, Tableau 11, modified by the authors.

[9] As the term *carreira* (career) suggests.

[10] The only available documentation that allows the characterization of this type of boat, long disappeared, is attributed, according to Octávio Lixa Filgueiras (1981), to master Manuel Gomes de Loureiro, the author of a model made on 02/22/1897, which is currently held at the *Museu da Marinha* (Lisbon).

drifting gillnets were used, not very different from the first motorized *Nazaré* galleons and trawlers[11].

[11] Other types of open-sea fishing vessels frequented the Nazaré sea, notably the *Lancha* from Póvoa de Varzim, the Buarcos hake boats, the Peniche *sacada* boats, and the *Rasca* from Ericeira.

FISHING AREAS ***Types of Boats***	Rowing boats (*no. of oars*)	Sailing boats (*types and no. of sails*)	Motor boats (*engine type*)	Rudder (*location on the hull*)	Hull bottom (*type*)	Fishing techniques
OPEN SEA						
Barco da Carreira (career boat) or *Mar e Fora* (sea and beyond boat) or *Catraio.*	4	2 lateen sails	_	exterior	flat bottom	fishing line with several fishhooks (or longlining)
Batel do Peixe Grosso (big fish boat).	6	2 lateen sails	-	exterior	keel	longlining
Bote do Alto (1ª geração) (1st generation open sea boat).	4	1 or 2 lateen sails	steam engine	exterior	keel	longlining
Bote do Alto (2ª geração) (2nd generation open sea boat)	–	0 or 1 or 2 lateen sails	steam or combustion engine	interior	keel	longlining; fixed fishing net
COASTAL AREA						
Galeão(galleon) *da Nazaré*	12	1 bastard sail	_	exterior	keel	encircling net (american seine fishing)
Batel (boat) *de S. Martinho do Porto*	6	1 bastard sail	_	exterior	keel	lobster fishing; longline fishing
Traineira (trawler) *(1ª geração)*	_	0 or 1 or 2 lateen sails	steam engine	exterior	keel	trawling gear/purse seine
Traineira (trawler) *(2ª geração)*	_	0, 1 lateen sail	steam or combustion engine	interior	keel	trawling gear/purse seine
Bote (boat)	_	0 or 1 lateen sails	*Idem*	exterior	keel	purse seine; fishing creels
Batel de Armação (fishing trap boat)	9	-		exterior	keel	valencian fishing trap
LOCAL AREA						
Barco de Bico (beak boat or Nazaré xávega boat)	4	_	_	_	flat bottom	Beach trawling (*xávega /mugiganga* gear; *frachão* net)
Barco do Candil (candil boat)	4	_	_	_	flat bottom	rotating trawl (*candil* process)
Light holder boat (*candil* auxiliary boat)	2	_	_	_	flat bottom	fishing light attractor (*candil* process)
Barca (trawling auxiliary boat)	3	_	_	_	keel	fishing light attractor (trawling process)
Batel de Armação (fishing trap boat)	9	_	-		keel	valencian fishing trap; trawling support
FLUVIAL / LAGOON						
Masseira do Alcoa (Alcoa barge)	1 (or 1 pole)	_	_	_	flat bottom	*Tarrafa de mão* (cast net)
Barco do Alcoa (ou da lagoa) (*Alcoa* or lagoon flat boat)	1 ou 2	_	_	_	flat bottom	fyke nets / pots / creels / buckets
Xavasca de S. Martinho (*S. Martinho* flat boat)	2				flat bottom	fyke nets / pots / creels / buckets

Table 1. Summary of the characteristics of Nazarene boats in relation to fishing areas and capture techniques (end of the 19th century / beginning of the 20th century)

I) Open Sea fishing boats: examples

1) Barco da Carreira or Mar e Fora boat

2) Open-Sea *batel*

II) Coastal Area fishing boats: examples

3) *Nazaré* Galleon

4) Support boat for fishing trap frame

III) Local Maritime Area fishing boats: examples

5) *Xávega* boat (or Beak boat)

6) *Candil* boat

IV) River and lagoon fishing boats: examples

7) *Alcoa* or lagoon flat boat

Fig.2. *Some types of Nazarene boats in relation to fishing areas (end of the 19th century / beginning of the 20th century)*

Boats designed for maritime fishing: *Coastal fishing*

The *Galeão da Nazaré* (Nazaré galleon) stands out. Introduced from Spain in 1898, it fits into the transition between tradition and innovation in purse seining. Robust, these large vessels (9 to 17 meters in length; tonnage up to 9 tons) were designed for practicing American purse seining. With large crews (around 20 men), they were assisted by several smaller boats (*vigias*) during the complex net maneuvers. Another emblematic boat of coastal fishing was the *Batel de armação* (trap frames *Batel*), with an open bow and reinforced structure, intended for the complex Valencian trap nets—a traditional system of fixed nets at sea used for sardine fishing. Besides its function of serving as a trap frame, it was used to transport nets, fish, and crew between the mother ships (such as galleons and trawlers) and the shore (Fig. 2 and 3). It is also important to highlight the introduction of steam-powered fishing vessels, between 1887 and 1888, a turning point in the history of industrial fishing in Portugal. It was mainly in the 1920s that the galleons were progressively replaced by steam-powered boats like the *Traineira* (trawler) type. The *Traineira* was intended for sardine fishing through the *traina* (trawling) technique—a more efficient variation of the American purse seine. They differed from the galleons by using lighter and more effective nets (which fold upwards from the lower rigging) and by requiring fewer crew members[12].

[12]They could be steam-powered, or with a combustion engine, or even sail-powered. Since 1925, hybrid boats with auxiliary gasoline engines have been registered in Nazaré.


Fig.3. Support sailing boat for fishing trap (left) and hauling the "crab boat" (right) (author: Álvaro Laborinho).

Boats designed for maritime fishing: *Local fishing*

Within the Nazaré coastal zone, the most emblematic vessel was the *Barco de arte xávega* (*Xávega* boat, also known as *Neta* or *Barco de bico*), a flat-bottomed boat with a high bow, a wide-rounded stern - an extension of the flat bottom - and with no rudder[13].

This kind of boat, classified as "plank canoes", predominated in Nazaré at the beginning of the 20th century. They were propelled by four wooden oars and used in various fishing ways, such as the beach seine fishing (*xávega*). Resembling the *xávega* boat, but with a shorter and less prominent bow, the *Barco do candil*, propelled by four oars, was intended to fish with purse nets at night, using a light to attract small pelagic fish like sardines and horse mackerels. Usually, this boat was accompanied by an auxiliary launch equipped with lighting devices. In addition to the mentioned boats, there were smaller ones, *botes* and *lanchas*, used for other tasks such as transporting nets, supporting trawl and *xávega* fishing, and sometimes, fishing with hooks or nets.

[13] The flat bottom was designed to facilitate beach landing, withstand the impact of waves, and be easily hauled onto the sand with the help of oxen yokes.

Boats designed for *river and lagoon fishing*

These boats were primarily adapted for fishing in the Alcoa, Alfeizerão and Tornada rivers, and in the residual lagoon areas. They were mostly small traditional flat-bottomed vessels appropriate to shallow, calm waters:

- the *Masseira*, usually propelled by a pole and used for cast net fishing in the Alcoa river[14];

- the *Barca chata* do Alcoa (*Alcoa* flat barge) with an open bow, used for river fishing with oars or a pole.

- the *Xavasca* of S. Martinho do Porto, also with an open bow, propelled by two oars, mainly used for trawl net fishing and for catching eels[15].

Figures 2 and 3 present examples of the most emblematic types of boat, for the different fishing zones.

3. The evolution of maritime fishing gear in Portugal

Between the 11th and 14th centuries, maritime fishing had recourse mainly to lines for large fish and surface gillnets for sardines. Despite successive innovations, both techniques remained in use until the 19th century. In the 14th and 15th centuries, a first revolution occurred when appeared the fixed traps, the bottom gillnets, new purse seines, such as the casting-net, and different types of trawl nets, such as the dragnet, adapted

[14] According to O. L. FILGUEIRAS, it belongs to the group of "plank canoes" of the Mesopotamian type, showing structural similarities with the *xávega* boat, the *candil*, and the *xavasca* of S. Martinho.

[15] Also belonging to the "plank canoes" family, it had a wide stern, a natural extension of the bottom, and a bow similar to the flat barge of Alcoa, but less protruding. A typological description of this boat, for which there are very few iconographic references, is presented in Filgueiras (1981).

to sea or lagoon environments. Another revolution took place in the 18th and 19th centuries when more efficient purse seines (galleon and American purse seine), the beach trawl method (modern *xávega*), the fixed cup-shaped Valencian traps, and the stern trawling (for large fish) were introduced. The latter, together with the American purse seine (for sardine), caused the ruin of the other types[16].

In Nazaré, various fishing methods were practiced, in particular, the *xávega* gear, the purse seine fishing, and the use of gillnets and casting-nets (Fig.4). In the late 19th and early 20th century, new techniques were introduced, as the round and Valencian fixed sardine traps, which had a significant impact. They increased the fishery capacity and the local canning industry, and so the number of fishermen grew, and the fishing industry developed. The evolution of fishing methods, both for maritime and brackish water fishing, can be observed in Table 2[17].

The main fishery on the Nazaré coast was the sardine, although large quantities of other valuable species, such as hake, snapper and sole, were caught in the open-sea.

Since a description of all the fishing methods indicated in Table 2 does not fit in this study, only the fishing gear with technical innovations, in the 18th to early 20th centuries, are described, i.e., the fixed round and Valencian traps frames, the new purse seines (American purse seine and trawler) as well as the modern *xávega*, once it is the most emblematic fishing method of Nazaré.

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16 F. G. PEDROSA, A Evolução das Artes de Pesca em Portugal, *Anais do Clube Militar Naval*, vol. CXV, 1985, 313.

17The references indicated in this Table refer to the Captaincy of Nazaré and the Maritime Delegation of São Martinho do Porto and were obtained from publications of the Ministry of the Navy (see MASCARENHAS & MADURO, *Barcos e artes de pesca* … ,128, 129.

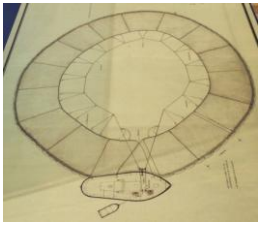
4. Fixed surrounding net devices

These are large ocean traps rather complex in terms of organization, composition, and assembly, mainly intended to catch sardines and other pelagic species along the western coast[18]. The fixed equipment for sardine fishing includes two types: round traps and Valencian traps. The *round fishing traps* have long been used in the Peniche cove, and sometimes in the Berlengas islands sea, and in the Pederneira cove. They consisted of a square of linen nets, arranged vertically from the surface to the bottom with an opening on one side of a net barrier to direct the fish, and of three floating nets to capture them inside the square.

[18] F. R. REBORDÃO, *Classificação de Artes e Métodos de Pesca*, Lisboa 2000, 28.

I) Open Sea fishing gear: examples

1) *Traineira a vapor* (steam trawler) boat - model



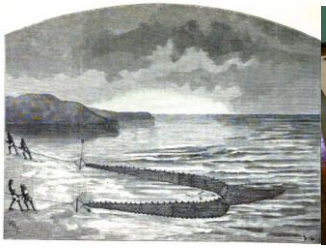
2) *Traineira* (trawler) gear – plan

II) Coastal Area fishing gear: examples

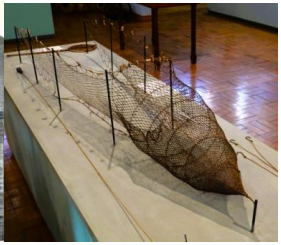
3) Valencian fishing trap

4) American seine fishing

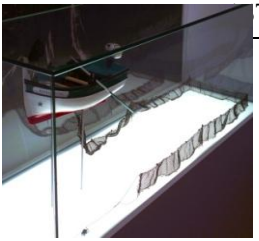
III) Local Maritime Area fishing gear: examples



5) *Xávega* gear



6) *Xávega* net – *Saco* (bag)



7) Bottom-set gillnet – model

IV) River and lagoon fishing gear: examples

8) *Galricho* fish trap

9) *Botirão* fish- trap

10) *Murejona* fish trap

Fig.4. *Some types of fishing traps and gear in relation to fishing areas (end of the 19th century / beginning of the 20th century).*

Harbour	Fishing gear	Number of fishing gear			Number of boats			Target-Species
		1900	1914	1930	1900	1914	1930	
Nazaré	motor trawling gear	---	---	12	---	---	12 mt	sardine, horse mackerel, etc.
	rowing trawling gear	---	1	12	---	---	?	*Idem*
		---	14	5	---	122 + 1(mt)	78	*Idem*
		4	7	4	56	77	47	*Idem*
	american seine fishing	19	2	2	39	?	?	*Idem*
		61	77	84	57	8	250	*Idem*
	valencian fishing trap	262	---	---	51	---	---	crawfish
	round fishing trap	3	---	---	3	---	---	mullet, red mullet, etc.
	xávega drag seine	3	---	---	?	---	---	sea bass, skate, black sea bream, etc.
		---	100	10	---	85	?	
	cachoceira (baited conical bottom net bag)	---	4	3	---	4	?	sardine, horse mackerel, etc.
		---	150	250	---	49	109	sea bass, etc.
	trammel net	58	39	110	50	inc.		common

	majoeira (floating trammel net that is anchored on foot)	1950 3980	6525 ---	7700 200	inc. inc.	inc. ---	inc. inc.	lobster, crawfish, spider crab, etc. porgy, sea bass, tub gurnard, hake, snowy grouper, etc.
	crab net							hake, conger eel, silver scabbardfish, etc.
	branqueira (type of two-panel net)							sea bream, horse mackerel, blackspot seabream, etc.
	net pot							
	longline							
	line							
	gorazeira (long line type)							

S. Martinho do Porto	*Cachoceira* (baited conical bottom net bag)	104	185	---	26	30	---	porgy, moray eel, conger eel , etc.
		52	1	100	inc.	---	?	crawfish, etc.
	line	---	125	8	---	1(?)	6	sardine, horse mackerel, etc.
	xávega drag seine	---	1	---	---	1(mt)	---	*Idem*
	trawling gear	---	1	---	---	?	---	*Idem*
	american seine fishing	---	---	750	---	---	30 + 1(mt)	common lobster, crawfish, etc.
		---	---	7	---	---	?	
	net pot	---	---	8	---	---	?	sardine, horse mackerel, etc.
	crab net							porgy, moray eel, conger eel, sea bream, etc.
	longline							

Table 2. Sea fishing gear, number of devices and boats in 1900, 1914 and 1930, and target species, in Nazaré and S. Martinho do Porto

The *Valencian fishing trap frame* was a complex system of nets with meshes of various sizes, anchored in a coastal area. Two net systems (one large and one small) were interconnected, and the fish was drawn in and trapped in the central pool (the "cup" or "glass"). The nets were raised every morning and evening thanks to boats strategically positioned around. The first trap frame was inaugurated in 1892, and the highest number of records occurred from 1901 to 1903[19].

5. The new surrounding fishing methods – *Purse seine*

These involved high and long nets, cast and set vertically by one or two boats that described a circular trajectory. Cables with floats ran along the top edge of the nets and cables with lead weights along their bottom edge.

The typological differences are related to various factors, such as the mesh size of each device and the way the floats and weights were tied to the net.

In the *galleon gear*, the device consisted of two main parts: the bands (*bandas* or *alares*) and the *copejada*. Through net panels, the former part surrounded and guided the fish into the latter, where it was caught. The vessel involved was 16 to 20 meters long and called *galleon,* as the gear. Another type of surrounding fishing gear was the *American purse seine*, whose net was similar to the galleon one, but with the particularity of being folded upwards, at the lower rigging, when the fish was collected[20]. The net had to be long, wide and very heavy, and consequently could only be hauled aboard by at least twenty men. The boats carrying the fish would

[19] C. ESCALLIER, *L'Empreinte de La Mer*…, Tableau 19, 221.

[20] MASCARENHAS & MADURO, *Barcos e artes de pesca* … ,86-88.

come to shore by their own means or be towed by the galleon. These labor conditions became less arduous with the advent of the steam-powered galleons, which often had on deck a steam-powered winch with a drum. The first galleon with American purse seine in Nazaré was inaugurated in 1898, and it was from 1901 to 1904 that the number of records concerning this gear was the highest.

The *traineira* gear (or *traina*) is a variety of American purse seine that uses the same type of capture device but with a middle-size net between the *candil* and the galleon net. This gear enabled year-round fishing in a more versatile way, with a greater mobility, a faster net setting and a smaller crew. In Nazaré, this technique made possible the exploitation of fishing grounds beyond the cove and the resumption of the coastal sardine fishing, which had been abandoned by the galleons. This gear has been identified in Nazaré since 1914, and it is in 1930 and 1931 that the number of records was the greatest[21].

6. The modern x*ávega* gear

According to F. G. Pedrosa, the ancient trawl fishing method of medieval origin, known as *enxavega*, never spread north of Lisbon[22]. The author argues that the modern *xávega* of the west coast is similar to the *jábega* brought by Valencians and Catalans to Galicia in 1750. By 1758, seven *xávegas* were already known in Buarcos, and others were established in Ovar in 1776[23]. Later, fishermen from Póvoa de Varzim and Ílhavo spread them northward to the mouth of the Douro River and southward to

[21] C. ESCALLIER, *L'Empreinte de La Mer* …, Tableau 19, 221.
[22] F.G. PEDROSA, A Evolução das Artes ..., 296,297.
[23] According to the notarial books of Aveiro, as early as 1751, 1764, and 1765, there already existed several fishing companies operating along the coast, as noted by m. j. marques, *Arte Xávega em Portugal, Uma arte secular em decadência, Organização, caracterização e declínio*, Faculdade de Letras da UP, Porto 2011, 302.

Sines[24]. Each *companha* involved a bustling, semi-nomadic encampment of about 200 people, including crew members, helpers on land and family members, who built movable huts. In Nazaré, in the mid-19th century, new gear (modern *xávega*) and old gear (*chinchorros*[25]) coexisted[26].

Xávega is a type of encircling-dragging fishing gear, which includes techniques that surround or encircle the shoal, besides dragging. In this gear, the nets can be cast by hand or with the help of a boat. The fishing operation begins with the loading of the gear on board. Then a hauling rope (*cala*) is thrown into the sea, while one extremity of it remains on land, and the boat sails out releasing the net in an arc-shaped path to encircle the shoal. It heads back to shore, throwing a second *cala*, after which starts the net hauling from the beach[27]. In 1906, an important innovation took place that eventually spread to all the beaches: fishing that had previously been done with the help of two boats began to be done with one only, bigger and transporting all the gear. The new *xávegas* allowed to go farther from the coast with a crew ranging from 36 to 46 men[28].

The highest number of registered boats intended for the *xávega* gear was reached in the three years period from 1914 to 1916[29]. This art fell into disuse in the last decades of the 20th

[24] To deepen this subject see, in particular, O.N.A. PEREIRA, J. A. DIAS & M. R. Bastos, Considerações sobre a arte xávega em Portugal: sua introdução, desenvolvimento e teorias inerentes, in S.D. PEREIRA, M.A.C. RODRIGUES, S. BERGAMASCHI & J.G. FREITAS (eds.), *O Homem e as Zonas Costeiras*, Tomo IV, Rio de Janeiro 2015, 121-139.

[25] *Chinchorro* was a type of dragnet where the bag was extremely small in relation to the side sleeves and where the nets were hand-hauled. It was generally used in non-oceanic inland waters.

[26] M. J. MARQUES, *Arte Xávega* ..., 303.

[27] R. MARTINS & M. CARNEIRO, *Artes de pesca artesanais em Portugal*, Lisboa 2021, 116. *https://www.ipma.pt/pt/media/noticias/documentos/2021/Artes_Pesca_artesanais.pdf* [cosult. 01/06/2022]; F. R. Rebordão, *Classificação de Artes* ..., 36.

[28] M. J. MARQUES, *Arte Xávega* ...

[29] C. ESCALLIER, *L'Empreinte de La Mer* …, Tableau 19, 221.

century, not only because of economic and social factors but mainly as a result of advances in fish capture technology.

7. Fishing partnerships on the Nazaré beach

From the 1890s onwards, the notarial deeds from Nazaré reveal a significant rise in the number of fishing partnerships and companies. This reflects an increasing activity and the introduction of new fishing techniques and methods, both in fishing gear and vessels. The founding documents of these corporations detail the different fishing methods developed, with an emphasis on the catching of small fish, particularly sardines and horse mackerels, but larger fish was also captured by means of handlines and longlines.

The share capital of the maritime companies analysed was diverse, including monetary resources, fishing gear and devices, nets and boats. The notarial deeds frequently detailed each partner's share, which allowed to identify the partners who exhibited a capitalist profile. In the context of the fish traps and seine nets, these entities presented themselves as cooperatives, but there was a network of investors, usually spread across different family groups. Thanks to the number of shares they held, these families concentrated capital and often ended up assuming leadership positions in the corporate bodies of the companies, such as manager, chairman of the general assembly, of the supervisory board or director of the treasury. Thus, they managed to ensure the control of the corporate decision-making mechanisms, imposing a management logic aligned with their own interests. The case of the Periquito, Caiado, and Carmo families illustrate this situation. Together they held 127 shares of the União de Pesca Partnership (1892), corresponding to 37.3% of its share capital. Similarly, they held 82 shares of the Fraternidade Partnership (1893), that is, 49.1% of this company's capital.

As regards the *xávega companhas*, the investing partners of more modest social condition, who did not directly participate in the fishing activities, were often small landowners or craft professionals, such as carpenters and caulkers. The presence of such investors reflects a situation of capital application with lower returns, thus unattractive to the local economic leaders.

The notarial deeds provide relevant information about the associates' profession and investment profile and allow us to analyse the investors' geographical range, revealing the attractiveness of the maritime companies as business opportunities. Furthermore, they put forward the capital diversification strategies adopted by farmers, merchants, and other professionals, who saw the fishing activity as a way to expand and maximize their investments, outside the sectors associated with their traditional occupations.

These contracts also inform us about the type, function and number of boats assigned to fishing and to the support of this activity. Additionally, they describe the fixed and mobile fishing systems used by the companies and partnerships, such as the circular and Valencian fishing traps and the American purse seines, which allows to assess the spread and representativeness of these techniques in the studied area. The contract duration varied, but was often unlimited for the economically and socially more important companies and partnerships, which reflects the stability and consolidation of these structures in the fishing sector.

In some cases, the notarial sources specify the type of fishing traps to which societies and partnerships were dedicated. Among these, the *Parceria União do Pescal* (1891) stands out for the fixed traps, the *Sociedade das Armações Redondas* (1900) for the circular traps and the *Sociedade Carvalho & Silvério* (1901) for the valencian traps. According to Almeida D'Eça, the investment required to install a trap was high, the cost could range between 7 and 14

contos (a traditional unit of currency)[30]. The proliferation of these frames limited coastal fishing, as the barriers thus created prevented the sardine schoals from passing[31]. However, the traditional *xávega* fishery, which required far fewer resources, ended up expanding. More than 140 devices were in use by 1910, despite a decrease in profitability due to the scarcity of sardines.

The purse seine sardine fishery, which initially used galleons and later on sailing boats from Póvoa do Varzim[32], was referred in societies such as *Raposo & Breyner* (1901) and *Cerco do Alto Mar* (1904), both engaged in *xávega* fishing also. Between 1907 and 1909, several other societies dedicated to seine fishing emerged, such as *Cerco dos Pescadores da Nazaré*, *Cerco Esperança*, *Cerco Vitória*, *Cerco Igualdade*, *Cerco Naval*, *Cerco Praiense* and *Cerco Liberdade*. Other fishing systems were also put into practice, as in the *Parceria Aliança de Pesca* (1903), responsible for introducing line fishing with steamship support.

In 1905, Nazaré was already the sixth largest fishing port in Portugal, after Setúbal, Aveiro, Vila Real de Santo António, Lisbon, and Sesimbra[33]. There were 1,378 fishermen and onshore assistants registered, 273 fishing and support boats, and the total value of the landed fish amounted to 253 *contos de réis*. The workforce increased by 155.7%, the number of vessels by 320%, and the value of the fish caught went up 212.4%[34], when

30 V. A. D'EÇA, *As Pescas Marítimas em Portugal*, Lisboa 1909, 10.
31 N/A, Nazaré, *Grande Enciclopédia Portuguesa Brasileira*, vol.18, undated, 509-510.
32 P. M. L. COELHO, A Pederneira - apontamentos para a história dos seus mareantes, pescadores, calafates e das suas construções navais, nos séculos XV a XVII, *O Archeologo Português*- 1.ª Série , vol. 25, 1921/1922, 241-242.

33 V. A. D'EÇA, As Pescas em Portugal. As salinas, *Exposição Nacional do Rio de Janeiro em 1908. Secção portuguesa. Notas sobre Portugal*, Lisboa 1908, 279.
34 A. BALDAQUE DA SILVA, *Estado Actual das pescas em Portugal*, Lisboa 1891, 125; a. loureiro, *Os Portos Marítimos de Portugal e Ilhas Adjacentes*, vol. III, Lisboa 1904, 64-65; v. a. d'eça, *As Pescas em Portugal. As salinas*…, 279; *A Nazareth*, 250, de 9 de janeiro de 1909.

compared with 1885, before the fish traps and seines were put into practice and the fleet renewed.

The restructuring process of the fishing activity was strongly influenced by the expansion of the fixed fishing traps. But, as shown by the data series in Figure 5, these structures began to face the increasing competition from the American purse seines, a mobile technique, which by 1909 gave an income almost equal to the one generated by the Valencian fishing trap frames[35].

This progress resulted from the formation of a new business and associative network, which enabled the modernization of the fleet and to introduce new fishing methods, thus promoting a sustainable growth in the fish value.

[35] ARQUIVO DISTRITAL DE LEIRIA, *Livros Notariais da Nazaré*, Dep. V-86.

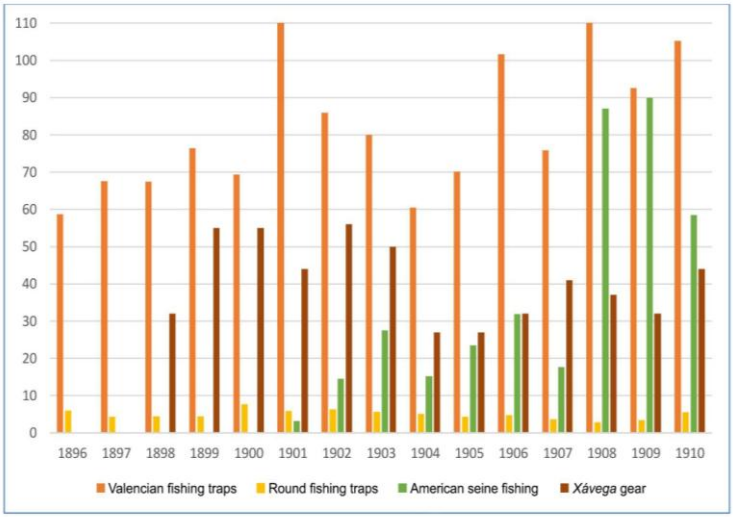


Fig.5. *Value [in* contos de réis*] of the fish caught in the Nazaré Sea by using the Valencian and Round traps, the American seine fishing, and the* Xávega *gear (1896--1910) (author: António Maduro).*

According to the local periodical *A Nazareth*, fishing became the true driving force of the economy thanks to the sector modernization:

> "Nazaré is today one of the spots on the Portuguese coast where fishing is more intense. Advanced devices are used, both fixed and mobile, such as valencian trap frames and american purse seines. Thus, if the sardine, the precious and prized fish, comes close to the coast, it falls into the fixed traps, and if it goes further out at sea, it is captured by the mobile devices - which today are mostly owned by fishermen's cooperatives. As a result, the profits from fishing are divided among hundreds of families."[36]

Actually, the prosperity of fishing at the port of Nazaré came to depend mainly on the sardine catches. In the 1908 revenue

[36] Translation of a text in *A Nazareth,* 250, de 9 de janeiro de 1909.

records, the small fish accounted for nearly 85% of the income, followed by the offshore fish at 12.6%, the crab at 1.2%, and the lobster at 1.1%. The lobster and crayfish catches in Pederneira/Nazaré and S. Martinho do Porto areas reached their peak in 1898, with more than 38,000 individuals. However, between 1911 and 1920, the overfishing caused a sharp decline in these species, and the catches rarely exceeded 4,000 individuals per year.

8. Canning and fish fertilizer industry

Drying was the most used method to preserve fish, it ensured a greater availability of fish for consumption. The process consisted of splitting open and cleaning the fish, then placing it in brine for a variable period according to the desired type of curing. After this, it was sun-dried on reed beds for two to three days. However, the traditional preservation methods proved insufficient to guarantee the export and profitability of surplus fish. The local press called for investment in the canning sector in order to stimulate the beach economy:

> "But if the fishing industry is highly developed among us, the same cannot be said of related industries, as the fish preparation for export to foreign countries and colonies. Much of the sardine could be exported preserved in olive oil, brine, or *escabeche*, but is only sent salted, and at most pressed."[37]

From the end of the 19th century onwards, the development of the canning industry proved essential for the local economy. It kept in step with the abundance of fish and answered the external market demand. During that period, the establishment of sardine canneries brought new technologies and a large number of skilled workers from industrialized canning centers, along with apprentices and unskilled labor from neighboring places.

[37] Translation of a text in *A Nazareth*….

«Sea and lagoon fishing activities on the west coast of Portugal...»

The volatility of the canning sector was high, due to the scarcity of investment capital, to the internal competition and to the export market fluctuations, all factors compromising the stability of the local enterprises. The leadership of the canning sector in Nazaré was, to a large extent, in the hands of entrepreneurs from Setúbal, then the main fishing port in the country.

Crab fishing was a complementary and extraordinary resource for the *xávega companhas*, which sold the product to farmers and ox drivers, to be used as fertilizer for farmlands, especially for maize and potato crops (Fig.3). The surplus of fresh crab with no market was preserved by drying or salting in *tulhas* (stores). From the early twentieth century, this traditional conservation method began to face competition with the fish fertilizer factories which were set up near the Nazaré beach to meet the increasing demand for organic fertilizers from intensive agriculture.

9. Conclusion

The study of the fishing vessels and techniques along the coasts of Nazaré and São Martinho do Porto, between the late 19th and early 20th centuries, has revealed that the evolution of boat types and fishing methods resulted from a dynamic process of adaptation to multiple constraints, notably geomorphologic transformations in maritime and lagoon areas, which led to the progressive silting of the circulation canals in both lagoons. Such process imposed successive relocations of the shipyards and impacted both the spatial and functional organization of the fishing fleet.

These transformations of the lagoon and maritime landscape, combined with the market opportunities and pressures regarding the fish catches and commercialization, required a profound and systematic reinvention of the fishing activity, which intensified at the turn of the 19th to the 20th century. One of the main vectors

of this transition is the technological importation concerning both vessels and techniques, with some adaptations according to the characteristics of the available fishing grounds. This process was also made possible by the increasing capital availability, directed towards the establishment of fishing partnerships and companies, and by the foundation of canning and fish fertilizer industries.

As a result, a new elite of local investors, together with those from other port areas, restructured the fishing activity and the fish processing sector, and thereby ensured the transition from an artisanal-based fishing economy to an industrial exploitation model. This new model was progressively framed within capitalist market logic and dynamics and brought about a radical transformation in the maritime economy practised by these communities.

Location and authorship of the photographs, engravings, map and charts

Figure 2:

Photographs 1 and 2 – Museu da Marinha (Lisbon); author: José Manuel de Mascarenhas. **3 and 4** - Museu Dr. Joaquim Manso (Nazaré); author: Álvaro Laborinho. **5** - Museu Dr. Joaquim Manso (Nazaré); author: Caroline de Mascarenhas. **6 and 7** -Museu Dr. Joaquim Manso (Nazaré); author: José Manuel de Mascarenhas.

Figure 3:

Photographs 1 and 2 - Museu Dr. Joaquim Manso (Nazaré); author: Álvaro Laborinho.

Figure 4:

Photographs 1 - Museu de Portimão; author: José Manuel de Mascarenhas. **2, 3 and 7** - Museu Marítimo de Sesimbra; author: José Manuel de Mascarenhas. **4, 6, and 10** - Museu Marítimo *Almirante Ramalho Ortigão* (Faro); author: José Manuel de Mascarenhas. **8 and 9** – Museu das Pescas – *Fundação ELA*; author: José Manuel de Mascarenhas.

Authorship of the map, engraving and chart

Figure 1 - map by José Manuel de Mascarenhas.

Figure 2 (5) – engraving by J. Almeida, in A. A. Baldaque da Silva (1891).

Figure 4 – bar chart by António Valério Maduro.

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Bibliography

A Nazareth, 250, de 9 de janeiro de 1909.

ARQUIVO DISTRITAL DE LEIRIA (A.D.L.), *Livros Notariais da Nazaré*, Dep. V-86.

P. M. L. COELHO, A Pederneira - apontamentos para a história dos seus mareantes, pescadores, calafates e das suas construções navais, nos séculos XV a XVII, *O Archeologo Português* -1ª Série, vol. 25, 1921/1922, 241-242.

V. A. D'EÇA, *As Pescas Marítimas em Portugal*, Lisboa 1909.

V. A. D'EÇA, As Pescas em Portugal. As salinas, *Exposição Nacional do Rio de Janeiro em 1908. Secção portuguesa. Notas sobre Portugal*, Lisboa 1908, 279.

C. ESCALLIER, *L'Empreinte de La Mer, Identité des Pêcheurs de Nazaré – Portugal*, Université Paris X, Nanterre 1995.

O. L. FILGUEIRAS, *Os barcos da Nazaré no panorama da nossa Arqueologia Naval*, Lisboa 1981.

A. LOUREIRO, *Os Portos Marítimos de Portugal e Ilhas Adjacentes*, vol. III, Lisboa 1904, 64-65.

A. V. MADURO; J. M. DE MASCARENHAS & V. F. JORGE, Water Planning In Alcobaça Cistercian Lands / O Ordenamento Hidráulico no Território Cisterciense de Alcobaça, *Riparia,* vol. 3, 2017, 95-126.

M. J. MARQUES, *Arte Xávega em Portugal, Uma arte secular em decadência, Organização, caracterização e declínio*, Faculdade de Letras da UP, Porto 2011.

R. MARTINS & M. CARNEIRO, *Artes de pesca artesanais em Portugal*, Lisboa 2021, 116.https://www.ipma.pt/pt/media/noticias/documentos/2021/Artes_Pesca_artesanais.pdf [cosult. 01/06/2022].

J. M. DE MASCARENHAS & A. V. MADURO, *Barcos e artes de pesca nas costas da Nazaré e de S. Martinho, entre o século XVIII e 1930,* Leiria 2022.

J. M. DE MASCARENHAS. Os campos dos coutos de Alcobaça: ordenamento hidráulico e valorização do território, a. v. maduro & r. rasquilho (coords.), *Um Mosteiro entre os Rios. O território alcobacense*, Leiria 2021, 483-539.

N/A, Nazaré, *Grande Enciclopédia Portuguesa Brasileira*, vol.18, undated.

F. G. PEDROSA, A Evolução das Artes de Pesca em Portugal, *Anais do Clube Militar Naval*, vol. CXV, 1985, 313.

O.N.A. PEREIRA, J. A. DIAS & M. R. BASTOS, Considerações sobre a arte xávega em Portugal: sua introdução, desenvolvimento e teorias inerentes, s. d. pereira, m.a.c. rodrigues, s. bergamaschi & j.g. freitas (eds.), *O Homem e as Zonas Costeiras*, Tomo IV, Rio de Janeiro 2015, 121-139.

P. POMEY, Y. KAHANOV & E. RIETH, Transition from Shell to Skeleton in Ancient Mediterranean Ship - Construction: analysis, problems, and future research, *International Journal of Nautical Archaeology*, 41(2), 2012, 235-314.

F. R. REBORDÃO, *Classificação de Artes e Métodos de Pesca*, Lisboa 2000.

E. RIETH, *Pour une histoire de l'architecture navale Méditerranée, XVe-XVIe siècle*, Paris, 2023.

A. BALDAQUE DA SILVA, *Estado Actual das pescas em Portugal*, Lisboa 1891.