

The History of Fishery in Boka Kotorska Bay and Traditional Types of Fishery

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Abstract Among oldest occupations that the local population in the Boka Kotorska Bay has been engaged in, since the ancient times, is sea fishing, but despite the fact that it has centuries' old tradition in this region, there are very few written records on the history and tradition of fishery in the Boka Bay. This paper provides an overview of the basic fishery types in the Bay over the past centuries, describes the boats and fishing gears used in those times, but also today, as well as the manner of use of certain fishing gear types. It gives also an overview of historical development and changes in some fishing gears over the time as well as changes in socio-economic and social relations in fishery. Apart from its economic significance, the fishing with traditional gear in the Boka Kotorska Bay also has a strong culturological and sociological importance for the local population and as such, it should be preserved and protected at the times of industrialization and development of the coastal area. Activities aimed to preserve the traditional fishery types in the Boka Kotorska Bay should also be implemented in order to diversify further the tourist offer of Montenegro since, in addition to provision of fresh, wholesome food from the sea the use of traditional gear is also a tourist attraction.

Keywords Boats, Boka Kotorska Bay, Fishing gear, Net, Traditional fishery

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1 Introduction

One of the oldest occupations in the Boka Kotorska Bay is fishery, which is also the case with other parts of the world where the population living on the shores of the rivers, lake and sea has from the ancient times been engaged in fishing. Fishery is mentioned as early as fourteenth century in the Statute of the Town of Kotor, proving that it was quite developed at the time and that, along with agriculture and seafaring, it was one of the main occupations.

Regardless of the importance of fishery in the Boka Kotorska Bay, there are very few written records on this activity. Written documentation was left by priest Savo Nakićenović in the book under the title *Boka* [1], there is a paper of Darinka Žečević *Toward a Study on Fishing in Muo, fishermen's settlement in the Kotor Bay* [2], as well as the capital work *Maritime and Fishery History of Montenegro by 1918* by captain Dinko Franetović [3]. The paper *Fishermen's Posts in the Bays of Kotor and Risan* by Vladimir Uljarević and Antun Tomić [4] gives an overview of the sites on the shore where fishermen take out their nets in traditional fishing using beach seine nets. The most comprehensive study on fishery and its history in the Boka is given by Dragana Radojičić in the papers *Fishing in the Bay of Kotor from the 19th Century to the present day* [5] and *Museological Valorisation of Traditional Fishing Gear in the Boka Kotorska* [6].

In the course of eighteenth century, majority of families in the Boka Kotorska lived on fishery, particularly in settlements Muo and Baošići. Today, a far smaller number of families are engaged in professional fishery. In the course of nineteenth century, particularly after the World War II (1945), seafaring, tourism and industry developed rapidly, resulting in closing down of fishermen's cooperatives, as people began engaging in occupations that secured monetary income, which is not the case with fishery. There is a well-known saying that seafarers' life is bread with seven crusts, and that the fishermen's bread is the one with nine crusts. This is highly demanding occupation, without working hours, guaranteed catch or income. Fishermen depend, first of all, on weather conditions, then on availability of fish as well as on the current market demand for fish.

2 Boat and Fishing Gear Types

Fishing requires a boat, nets or other gear and other accompanying tools. The boats used in the Boka Kotorska Bay were the same as those used in Dalmatia – *leut*, *gaeta*, *guc* and *svjećarica* (lamplight fishing boat) – all similar, differing only in size. Even today, wooden boats close to or even more than 100 years old can be found in the mole-enclosed berths in the Boka (the boat of the Krašovec family from Orahovac of 1929, *guc* of the Pasković family from Muo of 1930, etc.).

Leut is our largest boat, 8–12 m in length and 1 m above the sea level in height. It is propelled by six oars. Keel and flooring were made of oak, ribs usually of mulberry wood and the rest of the boat from pine and fir wood. The fore and aft third of the boat are covered by the deck; the aft deck is used to keep the nets and other gear. Below the deck, fishermen kept their personal items and sought shelter from bad weather or for rest (Fig. 1).

Gaeta was most commonly used and in terms of construction it is very similar to *leut*, only somewhat smaller, 7–9 m, propelled by 4–6 oars (Fig. 2). It is made of pine wood and oak beams. The fore third of the boat is covered by the deck and the stern had a small part roofed over, up to 80 cm. The *gaetas* were used for various nets. As *svjećarice*, *gaetas* of different lengths were used with a lamp holder fitted on the prow [7].

Fig. 1 Leut [7]

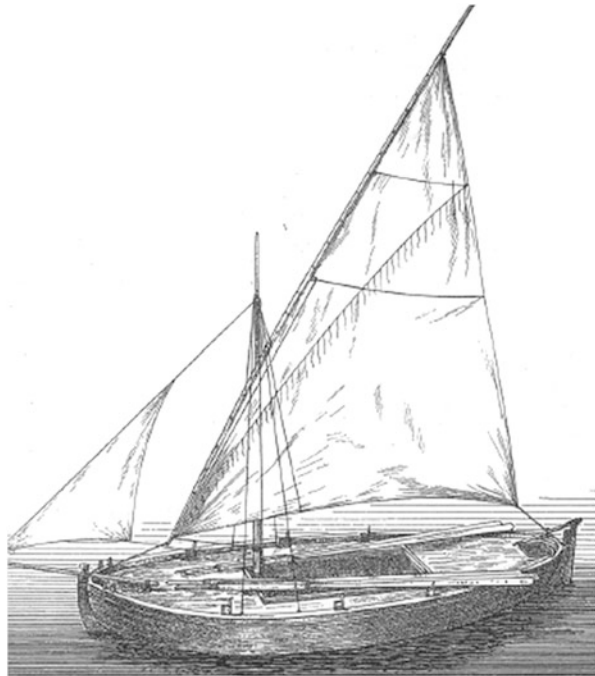


Fig. 2 Gaeta [7]



Guc is a light boat of 4.8–9.5 m in length, very suitable as a secondary boat in major fishing activities as its shape makes it very fast. It is 1.4–1.6 m wide in the central part, narrowing towards the prow and the stern (Fig. 3). The keel is usually made of pine wood and the rest of the boat from mulberry and pine wood. *Guc* is usually completely open, except for roofing of 50–60 cm on the prow and on the stern [7].

The boats were propelled by rows made usually from oak, beech and maple wood. Rowing is strenuous and one oar was held by one oarsman. Even today, when all boats are engine propelled, oars are a mandatory part of the gear and are used when sailing out, landing or in other cases. Local craftsmen rarely built boats, as they were usually bought in Dalmatia, on the islands of Korčula and Gruž. The local craftsmen usually repaired the boats by *kalafatavanje*, i.e., they were caulking the crevices between the boards using tar, pitch and oakum [5]. The most beautiful fishermen's boats originated from the island of Korčula [7].

Renowned craftsmen for *kalafatavanje* and boat repairs in the Boka in early twentieth century were Blago Dabović from Baošići, Ante Pilastro from Prčanj, Viktorijo Panjoko from Muo and others [5].

As already stated, oak wood was most frequently used for building boats, then pine wood, mulberry, beech and fir wood. Due to its compactness, oak wood was used for the keel, main and foundation beams and lateral ribs to the sea level. Pine wood was used for *madijere* (boards that make the boarding/sides of the boat) as well as for the deck beams and in some cases also for the deck itself. Beech wood

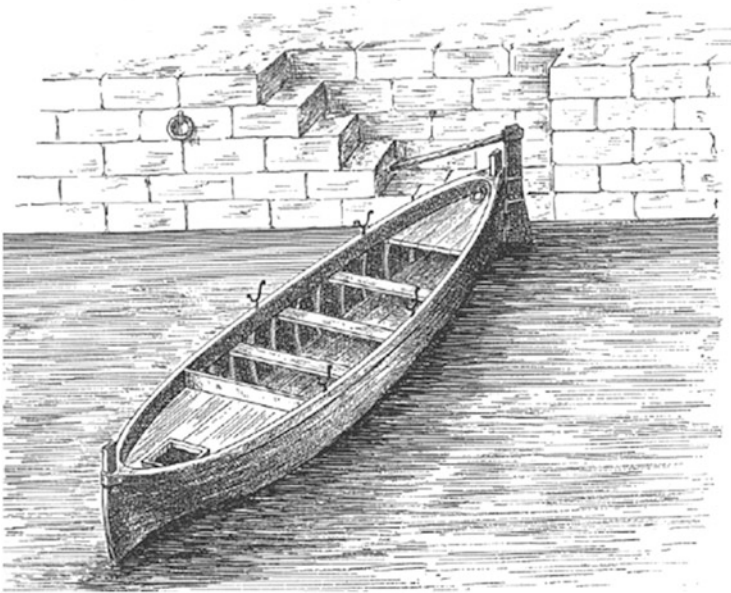


Fig. 3 Guc [7]

was used less frequently as it cracks easily and when used, parts of the boat that are outside the sea were made of it. Mulberry wood was often used for side ribs and deck beams as nails in it are well protected from corrosion, and sometimes wild olive wood was used instead of mulberry. Fir wood was never used for boat parts below the sea level because of its softness; instead, it was used for the deck only.

In order to last longer, the boat needed to be maintained well. Upon arrival from the fishing, the inside and the outside parts of the boat were rinsed by seawater that afterwards needed to be *isekati* – taken out by *palj* (a wooden shovel made for taking the water out of the boat). The boats were *katramavani* by fishermen in order to last longer – all interior sides of the boat were coated by hot tar – the more frequent, the better – only the upper part of the deck was not coated by anything.

Nets, longlines, spears and traps were used as fishing gear in the Boka. According to their construction and the manner of fishing, the nets are divided into gillnets, beech seines, encircling purse seines and trawl nets. The type of the net used depended on the season, so there is a difference between nets for winter and those for summer fishing. Nets used to be bought in Dalmatia in Zadar, Split, rarely they were made by fishermen or their wives. After the World War I, nets were supplied through barter with Italians.

The material used for making fishing gear changed over the times, depending on availability of the raw material. Nets used to be made of cotton thread, while today they are made from various synthetic materials. Materials for net used to be supplied mainly in Dalmatia and were bought in bulk, in kilograms [6]. The net needed was then tailored from the material supplied. In the making process, the net



Fig. 4 *Stirilo* – device used for net drying (photo from private collection of fisherman Anđelko Ivović)

was tailored with some tolerance in order to achieve the elasticity needed, i.e., in order to make a “belly” when towing in order to prevent the fish from escaping the net. In order to be able to use the nets for many years, they needed to be kept and maintained properly. Otherwise, the nets made of cotton thread would soon deteriorate and rot away.

Immediately after fishing, the net needed to be cleaned of fish parts, scales and other dirt, then washed in the sea and if possible, rinsed by fresh water. After that, the net needed to be dried and only a well-dried net could have been stored in the basement. *Stiralo*, devices made of several poles 4–5 m in height, connected by movable beams were used for net drying (Fig. 4). The net is spread over the movable beams that were then used to raise the net to the top of the poles and thus it would be left to dry. Nets could not have been left in the glaring sun and in hot weather. During the winter months and when a specific net was not used for fishing for some time, they were usually kept in basements of houses, but occasionally, they needed to be taken out and shaken in order to prevent mould and rotting as a result of humidity.

As nets were made of white cotton thread, they needed to be dyed so they would not scare the fish away. Today, the nets are made of very thin synthetic threads that are invisible to fish in water. At the same time, dyeing or oiling of the net extended its durability and lifespan. Fishermen used pine bark for dyeing. In Bigova, dyeing was done by a dye produced from the crushed myrtle (*Myrtus communis*) leaves. The net was dyed once in 22 days [6].

Pine bark was collected, dried well and then packed into sacks. Our fishermen used to buy pine bark, usually in Korčula and other parts of Dalmatia where it was

sold in shops, both in pieces and in powder [7]. To a lesser extent, it was supplied also in the Boka, from the Vrmac hill. Pine bark was then being crushed to a very fine powder – *krka*. Two days prior to net dyeing, the powder was dissolved in water (in large containers of 200–250 L), and on the day of dyeing it was cooked for 3–4 h. Once the dye cools and when the sediment falls onto the bottom of the container, the liquid was to be sieved and then the net was immersed into the dye and left for several hours. After dyeing, if not used for fishing immediately, the net was immersed into the sea, dried and placed in the cellar. When dying by myrtle, which was used in Bigova, the net was left immersed in the dye for several days [6]. In order to last and be used for longer, the nets needed to be mended and patched, which was done by fishermen themselves, or, rarely, their wives. Needles made of bone, wood or reed were used for mending the nets; later on, iron needles and nowadays, needles made of plastic are used.

Nets used in the Boka were beach seines, purse seines and trawl nets.

Beach seine nets are nets that are towed out to the shore or boat by hands; winch was rarely used for towing. These nets were of different sizes, with smaller or larger mesh size, depending on the target species. The net most frequently used in the Boka was beach seine net *srdelara* with the use of light – candle – intended for pilchard fishing (*Sardina pilchardus*). In addition to pilchard, the catch included anchovy (*Engraulis encrasicolus*), mackerel (*Scomber scombrus*), chub mackerel (*Scomber japonicus*), horse mackerel (*Trachurus* spp.), etc. This net consists of long wings to which two ropes are attached and of the cod-end – *sak*. Wings are 40–43 m in length, cod-end about 6 m, so the total net length is 85.5–93.7 m. In the cod-end part, the drop of *srdelara* is about 18 m and at the end of the wings 8–9 m. Mesh size is 8–10 mm, while towards the center it can be lower by 2 mm (6–8 mm) [7].

Among other beach seine nets that were used in the Boka, it is worth mentioning *geričara*, *geravica*, *šabakun*, *migavica*, *lokardara*, etc. *Geričara* is a small net used for fishing of sand smelt, *Atherina* spp. It consists of two wings of 8 m long, and of the cod-end – *sak*, which is quite dense and with mesh size barely 5 mm [7]. The total net length is 28–30 m, and its drop is 2.5 m in the middle and up to 1.5 m at the end of the wing, with wooden spear shafts. This net had been used within the bays, ports and breakwaters, where sand smelt would aggregate in dense shoals. *Geravica* is somewhat higher and longer than the previously mentioned net, used for fishing picarel (*Spicara* spp.). Its construction is the same as that of other seine nets – two wings and a cod-end, with 76 m in length and a drop of 7 m in the cod-end and 2.5 m at the end of the wings. This is a dense net, with mesh size usually 9–10 mm, 8 mm in cod-end and it was used at nights. The net has wooden spear shafts at the end of the wings and ropes of up to 80 m in length, for towing. Fishing is performed so that one end of the net is towed from the fishermen's post on the shore, forming a semi-circle and towing back towards the shore. Once the net falls onto the bottom, the fishermen on the shore – six of them – tow the net and pull it out onto the post (Fig. 5). This net was used in winter, from November to March, when sand smelt is on the very bottom. In spring, when sand smelt aggregate into the shoals and move further up from the bottom, the net is not used any more [7].

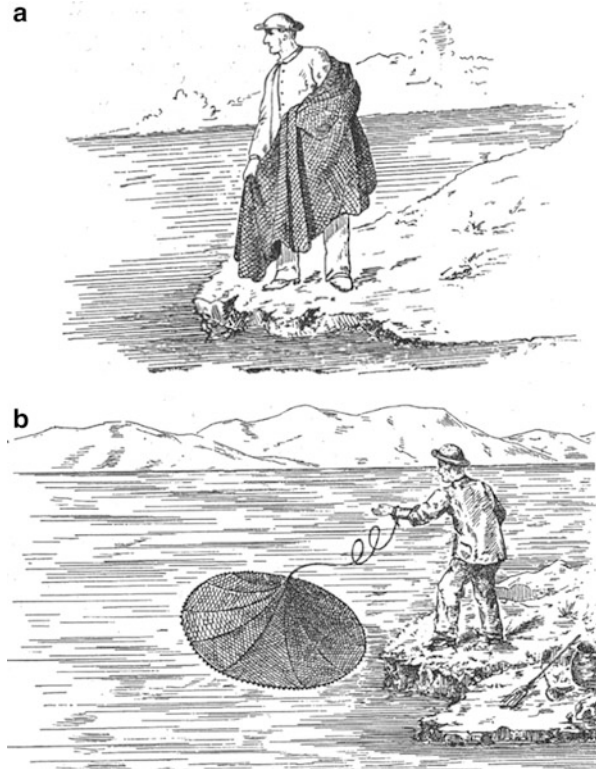


Fig. 5 Pulling of seine nets to a fishermen's post on the shore (photo by Aleksandar Joksimović)

Migavica is a net that was at first used only around Dubrovnik and then its use spread further throughout the eastern coast [7]. The primary use of this net is for fishing sand smelt in daylight, although it can be used for fishing other species, regardless of the species and size. Wing length in *migavica* is up to 70 m each, with funnel and cod-end length of about 10 m. Mesh size in *migavica* is up to 55 mm in the wings, 12–15 mm in the cod-end [8]. What differs *migavica* from other seine nets is the manner of setting the net – netting wall – as in it, the netting wall is set transversally; while in other seine nets meshes always stay open, in *migavica* the meshes are opening and closing, i.e., the net is “blinking” and that is how it got its name (*miganje* means blinking, winking). Šabakun is a net very similar to *migavica*, both by construction and by the manner of use, only larger and intended for fishing tuna and other related fish species. This net is rarely used today. Its length is 300–500 m and mesh size 28 mm and above [8].

Encircling purse seine nets are nets intended for pelagic fish. These nets are modification of the seine nets, in order to prevent fishermen being dependent on the shore, sea depth and bottom type, which is characteristic of seine nets. Larger fish quantities can be found mainly in sites that are beyond the area accessible by seine nets, i.e., locations where their use is impossible as a result of large depth and/or inconvenient bottom. Fishing is done usually by three boats, two lamplight boats and one parent boat that can be equipped also with a lamp. Fish aggregation into compact shoals using lights of both boats can last for several hours. After shoals aggregate, nets are thrown. All fish aggregated is placed under the light of one of the lamplight boats that the net is encircling. The parent boat sets the mooring line and one end of the net onto the other lamplight boat and starts throwing the net and

Fig. 6 (a) Fisherman preparing to throw the net *ričak*; (b) Fisherman throwing the net *ričak* [7]

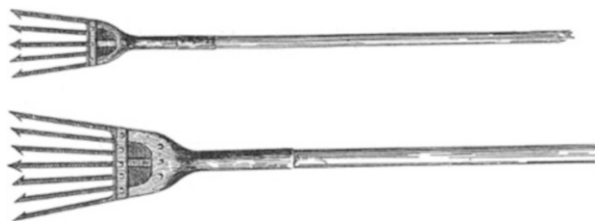


encircling the shoal by sailing round the first lamplight boat. Once it makes a circle and encircles the entire shoal it is attached to the other lamplight boat and starts closing the net with the purse line. The net is pulled out onto the parent boat until reaching the cod-end containing the fish, which stays between the parent boat and the lamplight boat and is pulled onto the parent boat using the scoop nets [8].

Trawls nets are nets towed along the bottom of the sea and catching all the flora and fauna on its way. The use of these nets in the Boka Kotorska Bay is now prohibited. Even the Austrian authorities prohibited the use of these nets in 1867 due to its negative impact on all marine organisms, but this prohibition was lifted some time later [9].

A small net called *ričak* (cast or throw net) had been used in the Boka, shaped as a circle of around 3 m in diameter (Fig. 6). It is operated from the shore; when thrown out of the hand *ričak* spreads up in a bell shape and falls onto the fish, covering it from above. This net is used for fishing coastal fish species, usually salem (*Sarpa salpa*) and mullets (*Mugilidae*). Lead weights are distributed along the edge of the net so that it sinks and falls onto the bottom quickly and the fisherman then pulls the handline that is surrounding the edge of the net and through the wooden or metal circle in the central part of the net, the edge closes down and the fish stays as if in a pouch [7].

Fig. 7 Spear (harpoon) [7]



Longlines were used to complement the net fishing. The longline consists of a thin but strong line, usually made of well wound hemp, with *pramule* (snoods) with hooks tied at the distance of 4 m. Hook size depends on the target fish species, which usually was quality demersal fish (common pandora – *Pagellus* sp., dentex – *Dentex* sp., gurnard – *Triglidae*), reef fish (grouper – *Epinephelus* sp., conger eel – *Conger conger*, Mediterranean moray – *Muraena helena*), as well as Elasmobranchs (dog fish – *Squalus* sp., rays – *Raja*, sp and *Myliobatis* sp.). Longlines are usually set in the vicinity of reefs and submerged rocks as such sites are usually rich in fish. Fishermen would keep such sites secret, particularly if the catch was good. Longlines were placed into oval-shaped wicker baskets, the edge of which was fitted with cork that hooks were pinned into (*kofijer*) [5]. The site where the longline is set is marked with a buoy or a cork piece (*senjal*) that a bell is sometimes attached to in order to enable fishermen to find the longline more easily at nights. Usually, longlines were used for fishing before dawn and the most frequent bait (*njeska*) was pilchard.

Spear (harpoon) is a fork-like iron device with 5–11 prongs, central of which has two lateral barbs, while other prongs have one barb each (Fig. 7). These barbs prevent the fish from sliding back from the spear once the fisherman stabs it. The spear is attached to a wooden pole of up to 5 m in length with a rope at the end of it in order to prevent the spear from being lost in the sea. Spear size depends on the target fish species. Spears are used in the coastal area, in calm weather, when the water is transparent. Fisherman is on lookout from the boat and once he sees the fish, he throws the spear at it and pulls it out of the sea.

Trap is a cylinder-shape fishing gear initially made of wicker or reed, and later on from the metal wire (stainless), and these are used even today (Fig. 8). A trap has one or two funnel-shaped openings that fish can easily enter through, but cannot get out through the same opening so it stays trapped. The traps are made from denser or looser netting (broader or narrower) depending on the target species; the loosest/broadest are spiny lobster (*Palinurus elephas*) traps.

Karola or fishing line is a thread made of wound hemp, flax, cotton or horse hair with a hook attached at the end (Fig. 9). The line is wound onto a *kačak* (a piece of board made of cork or wood that the line is wound on and the hook is pinned into the board). The line can be thicker or thinner, depending on the target fish species, and hook size varies accordingly. One hook can be attached to the end of the line in case of fishing sea bass or sea bream, or several hooks (2–4) when fishing other species. Bait is put on the hook and lead or iron sinker that pulls *karola* to the bottom is put

Fig. 8 Trap [7]

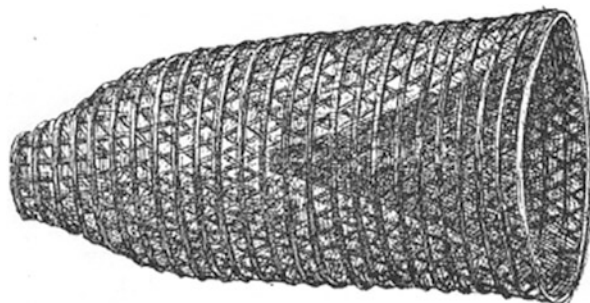
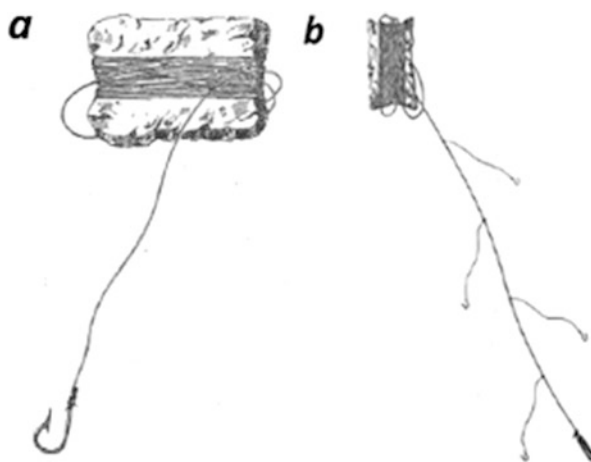


Fig. 9 *Karola* for Sea bass (*Dicentrarchus labrax*) and Sea bream (*Sparus aurata*) (a), or other species (b) [7]



below the hook. Hook sizes range from 1 to 24, with 1 being the largest. *Karola* is used for fishing small quantities of fish so it is used more by amateurs than by professional fishermen, operating it from the shore or from the boat.

Pendulanje is fishing using *karola* from the boat so that the fisherman tows the line by even repetitive movements while the boat is moving slowly. For fishing squid and cuttlefish *pušća* was used; it was made by fishermen by fitting a small metal pipe to the end of the line to which bait (fish) is attached, at the end of which rounded pins or hooks are placed (Fig. 10). In spring, when cuttlefish spawn, *sipac* was used as well. It is a piece of wood shaped like cuttlefish, lowered to the depth of 1 m (Fig. 11). Once cuttlefish sees it, it jumps and hangs on to it. Fisherman then hooks the cuttlefish by *brankarela* (a pole of 1.5–2 meters in length with several hooks fitted by either rope or wire, used for pulling the catch onto the boat once *karola* or longline are pulled out), or by scoop net and then landed on the boat or the shore.

In the area surrounding settlement Krtole, in Tivat Saline, where waters are very shallow, villagers used to catch fish by making wicker partitions. Once fish enters the encircled area in high tide, that part is closed by wicker gate and fish is then collected in low tide.

Fig. 10 *Pušća* with hooks (a) and rounded pins (b) [7]

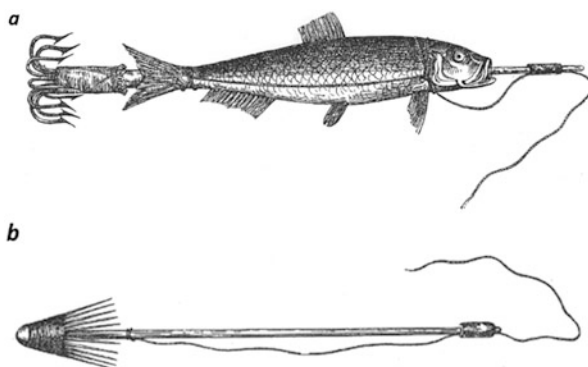
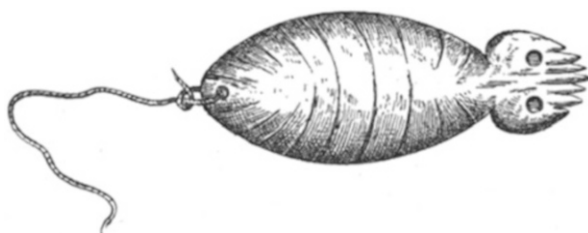


Fig. 11 *Sipac* – bait for *Sepia* spp. [7]



3 Nighttime Fishing Under the Candle Using Seine Nets

Pilchard fishing using lights deserves a special place and a detailed description. As early as during the first rule of the Republic of Venice, pilchard fishing was the most important fishing activity on the eastern coast of the Adriatic. Its significance has only grown over the time, so the Venetian *providur* (ruler) in Dalmatia, Dandolo, in his renowned rulebook of 1809, laid down the principle that pilchard fishing is so important that all other fishing activities are to give way to it, so that it would not be hindered. According to this rulebook, pilchard fishing starts on May 4, the fourth night after the full moon, lasts for 20 consecutive nights, until four nights before full moon. Pilchard fishing would cease for four nights before full moon and four nights after the full moon and then it was resumed for 20 consecutive nights, and so on until the end of August [7]. As stated, the pilchard fishing was allowed on those nights when the moon is either not showing or is showing just in one part of the night. Those moonless nights were known under the name *škuro*-dark. The main dark lasted from May till the end of August. During April and October darks, the Rulebook allowed fishing only of mackerel (*Scomber scombrus*), chub mackerel (*Scomber japonicus*) and horse mackerel (*Trachurus* spp.). The said Rulebook laid down that one seine net may have one light, *gradele* (grid) where wood is set to fire: "*Uno sola cratela sporadi cui si accende il lume*" [5]. This was the only fishery type prudently managed in the eastern part of the Adriatic as it was governed by specific rules issued by the administrative region. These rules applied to Dalmatia and the

Boka, while in Istria pilchard fishing was free as any other fishery type, so fishing was done both in daytime and at nights, in full moon and in the dark. The Rulebook on Fishing, issued later on by the Maritime Government in Trieste in 1906, allowed winter fishing of anchovy, tuna and Atlantic bonito under the lamp in all inland waters to the Verige Strait [10].

Success in fishing using seine nets with light depends on the skills and knowhow of the fisherman, while in all other fishery types it is a matter of fortune. Fishing is done first by one lamplight boat, where earlier, when fatwood was used, crew consisted of two fishermen – one *svjećar* (lamplighter) who fires the fatwood and the other who rows quietly where the lamplighter tells him to. Later on, when other lamp types were used, one fisherman was enough. The lamplighter was maintaining the fire with fatwood for hours and aggregate the fish shoals. Whether fish gathered under the light and how big the shoal is, the fisherman could tell based on the bubbles surfacing, jumping of fish, visual noting of fish and their shimmering. The lamplighter was setting off several hours earlier, while other fishermen were sleeping and then gathering at the call of *patrun*, i.e., the owner of the boat and the net. Other fishermen were met at the fishermen's post and the lamplighter was moving the boat with the light and the aggregated fish slowly towards the fishermen's post. This was done very quietly, the rows had to be in the water all the time in order to prevent scaring the fish away, since, as fishermen say "so many *drača* (bones) in a pilchard, that many minds in it". Once the lamplight boat approaches the fishermen's post, shoal encircling was began. One end of the net was kept by fishermen on the post and the other boat was placing the net into the water, forming a semi-circle around the lamplight boat until the other end of the net comes to the post where the other group of fishermen takes it over. The fishermen on the post were towing both ends of the net evenly and the lamplight boat with the fish enclosed in the central part of the net was approaching the fishermen's post. Once the fishermen towed the net almost until the end, the lamplight boat was rapidly taken over the cod-end beyond the net, and all the fish, following the light, ended up in the cod-end.

Over the years, lighting means have changed. The wood rich in resin and burning easily – fatwood – was used since ancient times. Pine – *Pinus* spp., then fir – *Abies* spp. and juniper – *Juniperus* wood were commonly used as fatwood. This lighting method was used in fishery for the longest period, until the end of nineteenth century, and that is one of reasons why forest lands in Dalmatia and on the islands are denuded. Namely, a single seine net required 100–120 m³ of wood for a single summer. In Krašići, *fraška* was used instead of fatwood; it is a bundle of strawberry tree *Arbutus unedo* branches, growing in the area. Lamplight boats had metal *gradele* (grid) fitted onto the bow, where wood was put on fire [6]. The lamplighter would prepare and take as much wood as he would need for one night, set off to the site rich in fish – according to his experience – and then light a fire that he would maintain for the following several hours.

The next step in lighting development was the use of oil lamps. Thus, in 1853, a Danish society conducted a number of trials with oil use on this coast [5]. There were numerous oil lamp manufacturers and models (Heinz from Kölding in

Denmark, Lepante, Sautter and Lemonnier from Paris, etc.). However, large quantities of oil were used, which was financially demanding and at the same time, it created large quantities of smoke and soot, so both fishermen, the boat and the gear were completely sooty and dirty after fishing, so this lighting method was not used for long.

With the invention of acetylene lamps, the lamplighters' work became much easier. Acetylene was used worldwide for various purposes, and its use in fishery began as of 1898. That year, Mr. Ivan Dellaitti from Senjska Rijeka designed a lamp using acetylene gas, which was fitted to the fore part of the boat, instead of old lamps [7]. Acetylene lamps were further developed and improved, and in this region, the best known was Verka, designed by Ivan Pastrović in 1911. The common name for these lamps in the Boka was *garbitača*. Each *garbitača* had 15–20 *bakuči* or *rubineti*, valves that released the gas into the lamp and the light intensity depended on the number of *bakuči*. While lighting, the lamplighter has been opening or closing as much *bakuči*, to obtain the intensity of light that he needed [5].

Further step in lighting development was design of lamps burning compressed gas, where oil is not burning directly through a wick, but the gas generated by air pressure. The first of such lamps appeared on this coast in the beginning of twentieth century, supplied under German reparations, *Petromax* brand. The Fishing Rulebook for the Boka Kotorska of 1906 lays down that in fishing with seine nets only one lamp of no more than 400 candles may be used [5].

These were followed by gas lamps, which were in use for long, and are used even today. The last stage in lighting development is used of electric lamps supplied with power from a power generator.

As already stated above, seine nets were pulled out at the fishermen's post – a part of the sea and the shore where fishermen place their nets in the water and tow them out (Fig. 12). In those places, the bottom of the sea has to be clean, to prevent the net from tearing or hook up for something – the so-called domesticated posts. The names of the posts date back to long ago, and usually they wore the name of a site on the shore or some other landmark. These are the names of some of the posts: *Pod Anetu*, *Pod Milinovića*, *Planika*, *Veliki Jamac*, *Mali Jamac*, *Pod Vodu*, *Dražin Vrt*, *Bajova Kula*, etc. Regardless of the fact that by the World War II some parts of the shore, including the sites where the posts were located, were private property, fishermen were entitled to fishing freely and take out their nets in each of the posts [4]. The order in which the posts were used was determined by the Port Master's Office by drawing lots – *brušketa*. If needed, port authorities would clean the posts once a year. When drawing lots, only the so-called domesticated posts were taken into account, while for "wild" posts no lots were drawn and they could be used by all. Each fisherman with a fishing permit received a *kartelon* specifying from which post he would fish during one *škuro*-dark. The fisherman would have to occupy the post until 9 p.m. by anchoring his boat or by leaving the nets or fish crates. In the village of Muo, fishermen agreed among themselves on the use of posts for tuna fishing by drawing lots and port authorities did not intervene. The authorities would

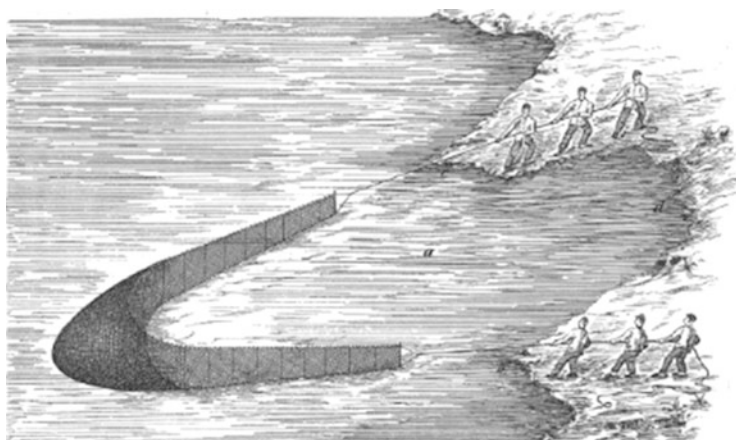


Fig. 12 Pulling of beach seine net to fisherman's post [7]

intervene only when pilchard would be caught outside the fishing season, and in those cases fishing had to stop [4].

Over the past century, particularly over the past decades, due to intensive construction and tourism development, a large number of fishermen's posts have been destroyed. All the remaining fishermen's posts – 107 in the entire Bay – are now protected, recognized by the Law and properly marked [11].

On the territory of the Boka Kotorska Bay there used to be a fishery guard, hired by the Port Master's Office in Kotor. The guard wore uniform and was paid from the funds collected from issuing of fishing permits. At the beginning of the fishing season, the guard would notify the *patruni* that he would come to inspect the nets and mesh sizes. Mesh size on the cod-end could not be less than 9 mm and if a fisherman breached some of the regulations in force, the guard would set and collect the fine on the spot. In 1930s, the fine could be up to 120 dinars (at that time, one kilogram of pilchard was 3–4 dinars, of high quality fish 15–18 dinars), and this was a relatively mild sanction compared to the suspension of the fishing permit for the upcoming period [5].

4 Relations in Fishery

Fishermen engaged in fishing either individually or grouped in crews. A fishermen crew consisted of a *patrun* and several fishermen; one crew was formed by 6–20 fishermen. Usually, the crew consisted of members of the broader family of the *patrun* and other fishermen from that town. Fishermen's sons, preparing to become fishermen were going together with them, as this profession was passed from father to son, from one generation to another. *Patruni* were owners of the boat, fishing gear and holders of the fishing permit and only wealthy fishermen could become

patruni. They went to fishing together with the rest of the crew and in nighttime fishing with seine nets they usually were the lamplighters. In cases when a *patrun* would be prevented from going fishing, he would usually be replaced by the next of kin, or some other person designated by him. Each fisherman in the crew had his own duties and the work of the entire crew was quite synchronized. Income was divided among fishermen on the basis of their duties in the crew.

Income used to be divided immediately after catch, particularly if fishermen worked for a share of the catch, and sometimes only at the end of the *škuro*-dark. One half of the catch, or income, always belonged to the *patrun*, and the other half was divided among other fishermen in the crew and *patrun* would again had a share in it. The distribution was not equal, it depended on duties the fisherman had during fishing. Due to demanding work, the lamplighter would get one share and a half, meaning the income for “one and a half mate”, while boys preparing to become fishermen, as well as fishermen not performing well, received one quarter, or “one quarter of a mate”. In some parts of the Boka, in Bijela, for example, *patrun* would take up to 70 % of the catch of income, by taking first a half of the income as the owner of the boat and nets, and then took a share in the other half just like other fishermen, and then again take a share for the boat and the nets. As a result of such attitude of *patruni*, a fishermen mutiny was organized in Bijela in early twentieth century, which resulted in the same method of distribution of catch and income that was used in other parts of the Boka. *Patrun* was the one who set the price at which the fish would be sold, who would sell it and where it would be sold, and the income would be shared. Fish was sold directly from the boat that was sailing slowly along the shore and fishermen would call buyers by yelling “fish, fish”. Another way of sale was in *peškarija* (fish market) in Kotor, Risan and Herceg Novi. At the *peškarija*, every fisherman had his own selling point. Fish sold in *peškarija* had to be classified by species and put in boxes and used to be controlled by the municipal doctor.

Each town in the Boka used to have *patruni* and crews (Fig. 13). The crew of Božo Jančić from Njivice was interesting, as its crew included also female family members. This crew used the fishermen’s post called *Pećina* (Cave, which exists even today) and as that post is remote and used only by members of this crew, they did not take part in lot drawing or had any *kartelon*. This is one of very few cases where women took part in fishing as their work usually included fish salting, nets mending and making. Women from Bigova had the task of selling fish that they carried to the *peškarija* in Kotor on their backs or on donkeys.

In early twentieth century, fishermen began forming cooperatives (Fig. 14); thus in 1906, the cooperative in Baošići was formed, which had 44 members. In the village of Muo, fishermen cooperative of 27 members was formed the same year, while in the village of Prčanj a cooperative of 37 members was formed in 1925. In Bigova, 14 fishermen formed the cooperative in 1928, and in Strp, a cooperative of 10 fishermen in 1933. After the World War II, all the cooperatives joined the Association of Fishermen Cooperatives, based in Herceg Novi. Today, the only operational cooperative in the Boka Kotorska Bay is the one in Baošići, under the name *Kiril Cvjetković*.



Fig. 13 Crew of fisherman after fishery (photo from private collection of fisherman Anđelko Ivović)



Fig. 14 Fishery of small pelagic fishes (photo from private collection of fisherman Anđelko Ivović)

5 Current State of Affairs in Fishery in the Boka Kotorska Bay

Today, marine fishery is governed by the Law on Marine Fishery and Mariculture (Official Gazette 56/2009, 47/2015) and related Rulebooks. All professional fishermen have to be registered as businessmen in the Central Register of the Business Court of Montenegro, and pay withholdings, contributions and insurance.

With a view to protecting the fish stocks and biocoenoses in the Boka Kotorska Bay, the law prohibits use of certain types of fishing gear within the Bay; thereby the Bay was to a certain extent proclaimed a fisheries restricted areas. In the area of the Boka Kotorska Bay fishing with the bottom trawls, pelagic trawls and encircling purse seine nets of large-scale fishery is prohibited [12]. Only fishing by encircling purse seine nets with a drop of up to 70 m and up to 400 m in length is permitted at the entrance of Boka Kotorska Bay from the village Rose to the Cape Arza along the entire eastern shore at the distance of up to 1000 m as well as in the area around the Island Lastavica – Mamula [13]. In this way, only the small commercial fishing gear may be used within the Bay, such as set nets, seine nets, longlines, traps, spears and harpoons. Minimum mesh sizes are set for specific nets in order to prevent catch of juveniles, as well as the maximum length of the net that may be cast into the sea. Length of a single set net in the Bay may not exceed 160 m and a fisherman may have two or five nets, depending on whether he is engaged in small-scale or large-scale commercial fishing [14]. For all these gear types, the law lays down also the period in which their use is allowed or prohibited in order to protect the species in spawning periods. The law and related Rulebooks lay down that additional measures or protection such as full prohibition of fishing in certain areas or in specific parts of the year, full prohibition of use of certain gear and other management measures may be introduced at proposal of a scientific institution and based on scientific research, with a view to protecting fish stocks. Fishery resources management in Montenegro is based on the principles of sustainable fishery in order to prevent overfishing of certain species and hence distortion in the entire ecosystem community.

As a country in the process of accession to the European Union, Montenegro is bound to accept, incorporate into its legislation and implement all the regulations and rules of the Common Fishery Policy. Some types of fishing gear that have been in use in Montenegro for centuries, which are used mainly in the Boka Kotorska Bay, are not fully harmonized with the EU legislation. This particularly refers to the use of seine nets for pilchard and anchovy. As stated in previous chapters, this fishing gear has centuries' long tradition in this area, a strong sociological and culturological significance for the population of the Boka Kotorska Bay. At the same time, fishing with seine nets has major significance for tourism as well, primarily because it provides fresh, healthy food from the sea, rich in Omega 3 fat acids, and it is at the same time a tourist attraction, since this fishing method, involving a large number of people, is quite attractive to tourists. Significance of fishing by seine nets is recognized by the Fishery Development Strategy of

Montenegro [15], which states that efforts would be made to preserve this traditional fishing manner on the principle of sustainable development through drawing up of a management plan for use of seine nets. The management plan will set the maximum number of seine nets to be used in the Bay and continuous supervision and control of the catch would be provided, as well as monitoring of other biocoenoses as regards use of seine nets, particularly as regards biocoenoses of marine flowering plants (*Posidonia oceanica*).

The number of fishermen using traditional fishing gears today has been decreasing. Intensive tourism development and construction of tourist facilities on the coast has resulted in reduction in number of fishermen's posts, while cruising tourism development resulted in increase of noise and water turbidity, which affects fish stocks. Just around 20 fishermen in the entire Bay use seine nets, a few of them use *ričak* nets, etc. In order to enable use of this traditional fishing gears in the future it is necessary to ensure protection of fish stocks; otherwise, if there is no fish, there will be no fishermen and seine nets and this fishery type would just live in the memories of older fishermen of this region.

Impact of fishery on marine environment cannot be neglected in any part of the world, as well as in Boka Kotorska Bay. According to marine scientists main reasons for decreased biomass of fish stocks are climate changes, pollution and fishery. Boka Kotorska Bay is already protected from use of fishing gears that has most negative effect on marine environment, which are bottom trawl nets [12]. Most numerous fishing gears used inside the Bay are set nets (trammel nets and gillnets) which are very selective and have minimal negative effects on marine environment. Those nets are set to certain bottom, they are fixed and do not influence on other organisms or biocoenoses of marine flowering plants (*Posidonia oceanica*), except on target species of fishery resources (fish, crustaceans and cephalopods). Mesh sizes on those nets are determined by legislation and they depend on target species and period of year [14] and they are already fully harmonized with the EU legislation. Other types of nets used in Boka Kotorska Bay that can have more significant impact on the marine environment are beach seine nets. Those nets are pulled to the fishermen's post on the shore, during these fishing operations biocoenoses of marine flowering plants (*Posidonia oceanica*) can be endangered, which is the main reason why EU regulations prohibit the use of those nets in the areas inside 3 nautical miles from the coast (except in certain cases) [16]. In the Boka Kotorska Bay beach seines are used for centuries and pulled always on the same places, fishermen's post, which are strictly localized and accurately defined dimensions. In this way impact on the marine environment and *Posidonia oceanica* is reduced to a minimum. As stated in previous chapters, maximal number of licences for this type of fishery is determined and management plan will be developed in order to monitor impact of this type of fishery on fishery stocks and marine environment, and to prevent any possible negative effects [15]. Considering all mentioned in this chapter it can be concluded that fishery in the Boka Kotorska Bay has no significant impact on the environment, since most of the fishing gears used are very selective and influence only on target species of fishery resources.

The inland part of the Boka Kotorska Bay, the Risan–Kotor Bay, was proclaimed the world natural and cultural heritage site by the UNESCO Charter. On the basis of this decision, our society has a major duty to protect the centuries' old culture of living in this area. Traditional fishery, as the style of living in the Boka, obliges us to make this activity a postcard of history kept for the generations to come.

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