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The Effects of EU Fisheries Partnership Agreements on Fish Stocks and Fishermen: The Case of Cape Verde

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The Effects of EU Fisheries Partnership Agreements on Fish Stocks and Fishermen: The Case of Cape Verde[1]

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Abstract
The viewpoints of 30 Cape Verdean fishermen are used together with an analysis of the state of tuna stocks in the Atlantic Ocean to question the EU's claim that their fleet only targets surplus species. Additionally, local marine catches of the artisanal and semi-industrial fleet are evaluated and the importance of the fisheries sector for the inhabitants of Cape Verde is shown. It is argued that even though the EU condemns illegal, unreported and unregulated fishing (IUU); their approach to stop IUU fails. In order to support this hypothesis, monitoring of the European fleet, movements of tuna fish and coverage of recent Fisheries Partnership Agreements (FPAs) are analysed. Finally, the prevalence of fisheries subsidies is discussed. Here, the focus is set on those subsidies embedded in two FPAs between the EU and Cape Verde. It is concluded that the subsidies provided by the EU to their fleet increase the problem of overfishing in Cape Verde. A theoretical solution is discussed and it is proposed that the external component of the European fisheries policy, namely Fisheries Partnership Agreements, has to change toward an association that deserves the name partnership.

JEL classification: O1, Q5, Q57, Q58
Keywords: Cape Verde, artisanal fishing, overfishing, Fisheries Partnership Agreement, IUU, fisheries subsidies, Yellowin tuna, Bluefin tuna, Skipjack, European fishing policy

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[1] I am grateful for having had the opportunity to travel to Cape Verde to combine theoretical knowledge with real life observations. Living with and meeting locals has been an enlightening experience and even though most of my findings have not made it into this paper, I believe that the background knowledge I have gained has helped to improve this project. During research and drafting of this study, I benefited from excellent help from Alfred Mandl and his family on the beautiful island of Santo Antão in Cape Verde. I would also like to thank all Cape Verdean fishermen who agreed to be interviewed, the local interpreters who supported me and all INDP (Instituto Nacional de Desenvolvimento das Pescas) members, especially Vanda Marques Monteiro and Delvis Graca for their time and advice.
All of these people deserve my gratitude, but none of them is responsible for any errors that doubtlessly have made their way into this paper. For any mistakes, I am solely to blame.

1. Introduction

The aim of this paper is threefold. First, the importance of the fisheries sector for the inhabitants of Cape Verde is shown and linked to local marine catches of the artisanal and semi-industrial fleet. The EU's claim to only target surplus species in the most recent Fisheries Partnership Agreement (FPA) with Cape Verde is questioned by combining an analysis of the state of tuna stocks in the Atlantic Ocean and the answers given by 30 local fishermen. Secondly, this paper tries to show that even though the EU condemns illegal, unreported and unregulated fishing (IUU); their approach to stop IUU fishing has failed. In order to support this hypothesis, monitoring of the European fleet, movements of tuna fish and coverage of recent FPAs are analysed.

Thirdly, the prevalence of fisheries subsidies is discussed. Here, the focus is set on those subsidies embedded in two FPAs between the EU and Cape Verde. It is concluded that the subsidies provided by the EU to their fleet increase the problem of overfishing in Cape Verde. The external component of the European fisheries policy, namely Fisheries Partnership Agreements, has to change toward an association that deserves the name partnership. This could be achieved, inter alia, by involving local fishermen and strengthening the surveillance of IUU. So called ugly fisheries subsidies have to be abolished and monitoring of fish stocks needs to be made a key concern of the European Union in order to improve our knowledge of local and especially migratory fish species.

Following section 1, the introduction, section 2 briefly discusses the state of world fisheries and the problems concerning precise calculations of biomass. Section 3 examines the history, nutrition situation and fisheries in Cape Verde and presents the questionnaire which was used to interview local fishermen. Catches of both the artisanal and the semi-industrial fleet of Cape Verde, in particular those of tuna species, are analysed and discussed. Section 4 explains the fishing policies of the European Union with a focus on their external component, the Fisheries Partnership Agreements. Here, the transformation of these bilateral agreements and the strategy of the European Union are reviewed and the problem of illegal, unreported and unregulated fishing is taken up. Section 5 discusses fisheries subsidies in detail and examines the use of subsidies in two fisheries agreements between the European Union and Cape Verde. The problem of subsidies is evaluated and a theoretical solution is presented. Section 6 concludes.

2. State of world fisheries

There is a consensus among almost all fisheries scientists and ecologists that the state, in which parts of world fisheries are in, is alarming. However, to what extend this is so, remains subject to debate. Myers and Worm (2003: 282) speak of a "general, pronounced declines of entire communities" and a paper by Worm et al. (2006: 790) later produced the well known and often cited 2048 deadline, where, if the current situation of overfishing remains unchanged, a "global collapse" is inevitable. Similarly, Pauly et al. (2002: 694) conclude that the "effective decommissioning of a large fraction of the world's fishing fleet will have to be implemented" to reverse the trends of overexploitation of fish stocks.

Others authors such as Hilborn (2006: 545f.) and Longhurst (2010: 155ff.) are sceptical of global projections and remark that precise calculations of biomass are nearly impossible. In order to assess the state of world fisheries, scientists rely on landing reports, which are largely reported nationally. As Longhurst (2010: 162) remarks, "this is a process fraught with uncertainty." Even if changes are observable in reported catches or landings, as long as data is missing on changes in fishing effort and illegal, unreported and unregulated fishing remains a nebulous grey area, an accurate calculation of the biomass of global fish populations seems impossible.[2]

Despite all the criticism, those who believe that Myers and Worm's estimations are faulty do not argue that overexploitation and depleted fish stocks are of no concern.[3] The question is not whether overfishing exists, but rather how some of the fish populations became depleted and which management policies should be implemented in the near future to try and avoid similar scenarios. Overfishing itself is not a new phenomenon. Clover (2006: 102) for example states that as early as in the 1860s, local small-scale fishermen from the North Sea reported that steam trawlers were systematically wiping out fish populations.

Figure 1 shows global trends in the state of world marine stocks from 1974 to 2008. A continuous decrease in underexploited and moderately exploited stocks is clearly visible, whereas overexploited, depleted and recovering stocks rose until recently. Expansion for future fisheries are only possible in the first two of these categories (underexploited and/or moderately exploited), which leaves the bulk of fish stocks in need of strict supervision and regulation.

[2] See section 3.2 for a brief description on how landings are reported in Cape Verde.
[3] For a critique of the Myers/Worm paper, see for example Polacheck (2006).

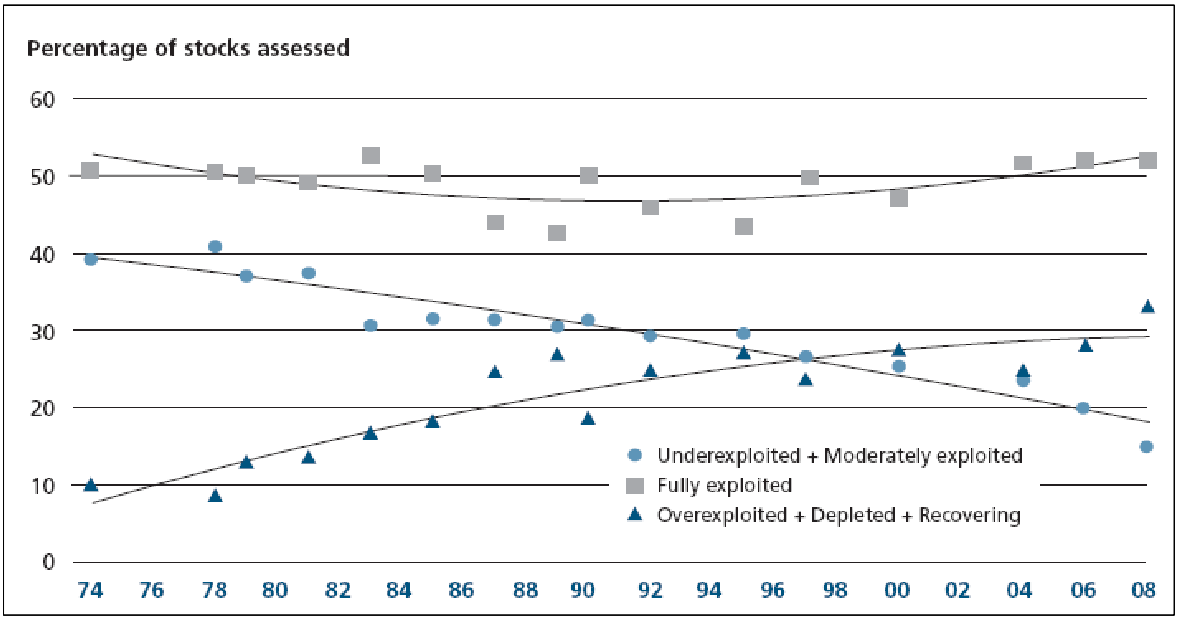

Figure 1: Global trends in the state of world marine stocks (1974-2006)
Source: FAO (2010b: 38)

It should be noted that figure 1 illustrates global trends and that the percentage of fish stocks in the different categories (fully exploited, overexploited etc.) varies greatly by ocean and area. In the light of these variations, the following sections will try and assess the situation in the waters surrounding Cape Verde.

3. Cape Verde

Cape Verde is located in the Atlantic Ocean (usually referred to as East Central Atlantic Ocean), approximately 500 km off the coast of Senegal, West Africa (between the latitude of 14° 50' - 17° 20'N and longitude 22°40' - 17°20'W). It consists of nine inhabited islands, another uninhabited bigger island and a few islets. The total population is estimated at 508,659 people (CIA 2010, figure from July 2010). Altogether, the land area of Cape Verde is 4.033 km², but because the islands are spread out over a reasonably large area, the Exclusive Economic Zone (EEZ) extends to 734,265 km² (Bravo 1985). The Sea Around Us Project (2010) speaks of 796,840 km².

3.1 Artisanal fishing in Cape Verde - a questionnaire

The following section describes research method, time, place and other relevant information which were used for the preparation of this paper. Between the 26 October 2010 and the 17 November 2010, 30 individual fishermen were interviewed in order to gain a more thorough understanding of their living situation and their fishing methods. The complete questionnaire is presented in the annex (figure 10 and 11). Most of the answers given by the fishermen are used throughout the entire paper.

The 30 interviews took place on three different Cape Verdean islands, all belonging to the “Ilhas do Barlavento” (windward) group. Ten fishermen were questioned in Sal Rei on the island Boa Vista, ten in the town of Mindelo on the island São Vicente, and another ten fishermen in the region of Paul and the village Ponta do Sol on the island Santo Antão. If not further specified in the text, the different locations of the interviews will be neglected and the collected data will be treated as though it speaks for the whole of Cape Verde. This, of course, is a very simplified approach and it is not claimed that the results are representative for the entire Cape Verde, but necessary due to a lack of time and financial resources available for the survey research.

Of the 30 respondents 28 were male and two respondents female. Whether this is representative is unknown as there is no data available on the sex ratio among fishermen. Personal observations are that almost entirely male fishermen fish out at sea and take care of boat and equipment, whereas their wives (or other female persons belonging to the family) are in charge of selling the catch. This is usually done in either a local market or by going from door to door.

Artisanal fisheries is a sector of fairly low-skilled workers where a large number of fishermen start to work at a young age. In the sample used in this paper, the average age of the respondents was 42 years (median = 44 years), with the oldest fisherman being 80 years and the youngest 18 years old. According to the answers to question 14 of the survey, on average the respondents started to work as fishermen at the age of 17 (median = 15). Some of the respondents started to work at ages as low as eight or nine. Due to the inability of the majority of fishermen to read and understand the Portuguese (and English) questionnaire (this holds true especially for the older generation), the interviewers’ inability to communicate in Creole and the problem that it remains a “spoken only” language, the questions were read out in Portuguese to the respondents. Throughout the entire length of the interview (approximately 15 to 25 minutes), a local interpreter was present to translate the questions to Creole in case they were not fully understood. In order to obtain unbiased answers, all fishermen were interviewed individually, not collectively. Thereby it was made sure that there was no need for individual fishermen to hide certain information or to preen themselves on something.

Collective interviews could have had a negative impact on questions number 1, 2, 4a and 11 especially.[4]

3.2 Fisheries in Cape Verde

The basis for almost all fisheries is coastal upwelling.[5] Marine life requires photosynthesis in phytoplankton, a process which exclusively occurs in the euphotic zone (a top layer of the ocean, less than 200 meters deep, where sunlight can reach). A second requirement is nutrients that support growth of phytoplankton and consequentially also the marine food chain.[6] Coastal upwelling regions count toward the very few areas of an ocean where nutrients are returned to the euphotic layer. There are several upwelling regions around the West-African coast, some of the most favourable ones for fisheries are found close to Mauretania, South Africa and Namibia (Benguela Current) and another one along the coast of Ghana and the Ivory Coast. There is *none* close to Cape Verde, but "the waters arriving at Cape Verde […] transport nutrients from the upwelling areas in northern Africa, creating favorable conditions for primary production" (Stobberup et al. 2004: 41).

Fishing is a sector of substantial importance to most African coastal states (not only those listed above) and Cape Verde is not the exception that proves the rule. Similar to many other developing countries the sector is not only a vital part of the country's goal to engage in world trade, but foremost serves as a crucial and inseparable segment of the Cape Verdean community. Fishing is a source of food, employment and income and contributes to poverty alleviation and food security. Decades back, missing equipment and no conservation methods lead to shortages of fish as an aliment. After independence (1975), a first cooperative of fishermen was founded on the island of São Vicente and the idea later also spread to other parts of Cape Verde. The cooperative collected money to buy freezers and tried to eradicate price fluctuations. One of the goals, often seen critical by fishermen, was to lower prices of fish in order to become a source of protein for everybody (Schleich/Schleich 1995: 50).

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[4] It is imaginable for example that fishermen might feel ashamed to admit that they are usually not able to catch certain types of tuna as this could be seen as a sign of weakness. Sensitive topics such as money or funding (question 11) might produce envy if asked among companions.

[5] Upwelling describes an effect where the Ekman transport (produced by equatorial winds) runs offshore and lowers the sea surface at the coast. The "lost" water is replaced by water from deeper ocean levels (an upward water movement). For a much more detailed explanation, see Tomczak/Godfrey (2003: 131ff.) Longhurst (2010: 99) describes effects of strong and weak upwelling on shapes and sizes of plankton, which in turn affect population growth of different fish species.

[6] "In contrast to the nutrient cycle on land, where dead organisms are composted and the nutrients returned to the soil, the nutrient cycle in the ocean is not very efficient: Much of the nutrient reservoir is locked below the euphotic zone because dead organisms sink and escape from the euphotic zone before they can be remineralized" (Tomczak/Godfrey 2003: 134).

According to the FAO (2010a) the per capita food supply from fish and fishery products in Cape Verde peaked in the year 1981 and then slowly declined until the end of that decade and after a second peak in the year 2000 declined again until now. Even though the precision of these findings is questionable, a declining trend of fish consumption is imaginable, firstly, due to the availability of other protein sources during the last decade and, secondly, due to the slowly declining tuna stocks in Cape Verdean waters in recent years (see further below for more details). With regard to fish and seafood consumption as a percentage of total calorie supply per day, a similar decline can be observed. Overall protein consumption on the other hand increased quite significantly during the last years (FAO 2010a, own calculations).

The question of interest is now whether this reduction might in any way be linked to the overall catch of fish in Cape Verdean waters. Altogether, 1036 boats were counted in the whole of Cape Verde, of which 766 (74 per cent) are equipped with an outboard engine (INDP 2010: 75, data from 2005). According to Fonseca (2000: 6), "[t]he artisanal sector is characterised by the use of 4-8 m long wooden boats with 8-25 HP outboard engines." The industrial or semi-industrial fleet[7] of Cape Verde fluctuates around 60 to 80 vessels "varying in size from 8 to 25 m with 40-510 HP engines" (Fonseca 2000: 6). The most recent bulletin of the INDP (Instituto Nacional do Desenvolvimento das Pescas or Institute for the development of fisheries) lists 70 industrial or semi-industrial vessels and 840 fishermen working on these. Together with 3108 artisanal fishermen, the total number of Cape Verdean fishermen is 3948 (INDP 2010: 75, data from 2005). Compared to not quite ten years earlier, the number is substantially smaller. Fonseca (2000: 6) cites the INDP bulletin from 1998 in which approximately 5000 fishermen were counted, working on 1500 boats. Asked about their equipment in question 3 of the interview, 26 of the 30 fishermen (86.67 per cent) interviewed in Cape Verde use a barge, a small wooden boat similar to the ones described above. The remaining three fishermen are part of a crew working on a bigger boat. None works on a ship or vessel similar to those used by the European Union. The composition is similar to that for the whole of Cape Verde (3018 artisanal fishermen equal 78.72 per cent of 3948 fishermen altogether).

[7] No precise definitions for the terms industrial or semi-industrial exist. Boats that count toward the industrial fleet in one country, might be too small or weak (in terms of HP) to fall into this category for another country. In the case of Cape Verde industrial or semi-industrial are used synonymously.

The INDP lists a total of 97 ports (INDP 2010: 5) in Cape Verde which are visited on a more or less regular basis by the staff of the INDP. With spot tests, the type of boats, fishing effort and the amount of catch are documented. Usually the amount of fish is only guessed and the accurateness of the evaluation relies on the expertise of the INDP staff. Reporting precisely which fish species are caught sometimes proves difficult, as artisanal fishermen often keep the caught fish in boxes on board and as soon as they land the fish is stored in cooling devices such as old fridges or freezers. In that case, the INDP staff can only ask the fishermen which species were caught and rely on their knowledge of domestic and migratory fish species. For question 6 of the interview, 17 of the 30 fishermen (56.67 per cent) stated that their parents were also fishermen and for question 7, 16 of the 30 fishermen (53.33 per cent) answered that a person in their family (father, brother, uncle) taught them how to fish. The rest of the fishermen were either taught by friends or older fishermen or simply learned how to fish by observing others. Knowledge of fishing techniques and species remains in fairly small circles on the islands and according to Fonseca (2000: 4), citing the INDP bulletin from 1999, ship owners are not only faced with technical and money problems (old vessels for example), but sometimes catching methods seem "inappropriate".

This paper concentrates to a large extend on tuna, mainly because this group of fish is targeted by the European Union in the current Fisheries Partnership Agreement, and also because all of the approximately forty tuna species (occurring in the Mediterranean Sea and the Atlantic, Pacific and Indian Oceans) do not spawn and live in a single upwelling region, but are migratory. Thus some of the species regularly occur in the EEZ of Cape Verde. None of the species travels all of the world oceans. In order to find out more about the knowledge about tuna species of Cape Verdean fishermen and whether tuna is of interest to the artisanal fleet, a few simple questions were asked. Right at the beginning of the interview, it was asked what type of fish is regularly fished (question 2). To make sure that no biased information was received, the fishermen were not informed that the questionnaire focuses on tuna. 24 of the 30 fishermen (80 per cent) mentioned tuna ("atum") in their answer, sometimes exclusively, but often together with other fish species. Two of these fishermen answered that they target all fish ("tudo") and were thus also included in the result above. Before the interviews were held, it was unsure whether any fisherman would mention tuna when answering question number 2. Thus, an additional question was added which asks whether it is (technically) possible for the fisherman to catch tuna. 29 of the 30 fishermen interviewed (96.67 per cent) answered with "yes" (it is possible), only one fisherman answered with "no".

According to the European Union, "[…] the European fleet has access to surplus resources which its partners cannot, or do not wish to fish" (EU 2010c: 1).[8] Judging from the interviews, the statement of the European Union does not correspond with the answers collected. As presented, most of the 30 fishermen are able to catch tuna and wish to do so - it is one of their target species and among the regular catch.

When analysing the whole of Cape Verde, it becomes clear that the majority of fishermen behave similarly to those interviewed. Both the artisanal- and the semi-industrial fleet target and catch tuna (see figure 2 below and figure 4 in the annex). To try and find out whether the fishermen know precisely which tuna species they are hunting, question 4a asked what kind of tuna is caught. Four different names and pictures of species were shown to the fishermen including one of an Atlantic Bluefin tuna (*Thunnus thynnus*), a species which is highly unlikely to appear in the Cape Verdean EEZ.[9] 29 of the 30 fishermen (96.67 per cent) interviewed answered with "yes", meaning that they catch Bluefin tuna. This either shows that the knowledge of the interviewed fishermen is insufficient to identify different tuna species, or it was a confusion of names of the species.[10] The rate of positive answers for other tuna species was equally high, but here much more likely to believe.[11]

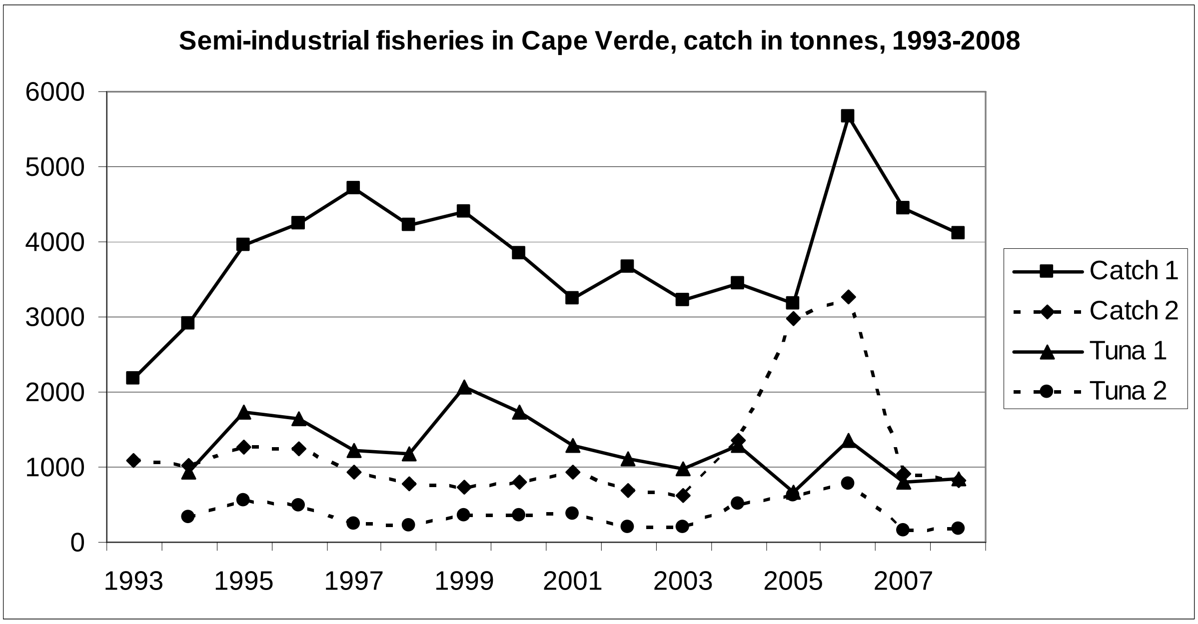


Figure 2: Semi-industrial fisheries in Cape Verde, catch 1993-2008
Source: INDP (2007, 2010) and own calculations

[8] Whether tuna can be considered a surplus resource is discussed in section 3.3 of this paper.
[9] See ICCAT (2006-2009: 95f.), Wilson et al. (2005) or De Metrio et al. (2005) for migration patterns of Bluefin tuna. It should be noted that both habitat and migration routes of Bluefin tuna remain an area of intensive research.
[10] The latter is possible, as only the Latin names of tuna species are unique (usually only known to scientists), whereas in most countries the ordinary names of the species sometimes overlap. For the interview, English names and local Cape Verdean names were used (found in the ICCAT manuals 2006-2009).
[11] It was also asked for Bigeye, Skipjack and Yellowfin tuna.

Figure 2 shows the catch of the semi-industrial fleet of Cape Verde during the years 1993 till 2008.[12] "Catch 1" represents the actual catch of all fish species as it is reported and listed in the INDP bulletin from 2010. Here an increasing trend can be observed until 1997, afterwards there is a decline until 2001, a four year period of stagnation and suddenly a strong increase in catch in the year 2006. Finally, the years 2007 and 2008 show landings similar to the year 1997. An accurate analysis of this data is difficult due to erroneous landing reports and very different levels of effort (the INDP uses "days at sea"). To try and account for fluctuating effort, "catch 2" was calculated, which does not represent the actual amount of catch, but sets days at sea at a constant 1000 days. The number of vessels was left untouched (it varies between approximately 60 and 80 vessels) and so was the number of fishermen, as it is not clear whether the equipment on the vessels changed and how long each vessel was out at sea and it is improbable that, for example, one more fisherman on a vessel can strongly affect the amount of catch. "Catch 2" shows a different trend. The increase during the first couple of years is, compared to "catch 1" not as significant any more, simply because the additional catch goes along with a strong rise in effort. The decrease in the period from 1999 till 2001 has been transformed into a small increase, as effort was reduced drastically, but the catch did not decline proportionally. The spike during the years 2005 and 2006, both for "catch 1" (only 2006) and "catch 2" is an anomaly. It is hard to imagine that nearly double the catch can be achieved with only a few vessels more (compare with table 8 in the annex) and less effort (days at sea). More likely is either misreporting or a typing error. "Tuna 1" shows the catch of tuna species only and "tuna 2", similar to before, sets effort at a constant 1000 days at sea. In both graphs, if the abnormalities during the years 2005 and 2006 are left out, a slow (not strong) decline starting around the year 2001 can be observed.

Figure 4 in the annex shows the catch of the artisanal fleet of Cape Verde during the years 1993 till 2008.[13] The labelling of the graphs is identical to figure 2, but here effort is measured in trips (or journeys) and not days at sea. "Catch 2" and "tuna 2" are calculated with fixed trips of 100000. For "catch 1" a steady decline is visible since the year 2000, whereas for "catch 2" the overall catch of the artisanal fleet appears to be fairly constant. This does not hold true for the catch of tuna though. Here, in both the graphs ("tuna 1" and "tuna 2") a decline is visible starting around the year 2003. According to table 11 in the annex, the artisanal fleet caught 2224 tonnes of tuna in the year 2003 and 1197 tonnes in the year 2008. The latter is a new low, which had not been observed until then. While tuna catches of the

[12] For more details see also tables 5, 7 and 9 in the annex.
[13] For more details, see tables 4, 6 and 8 in the annex.

artisanal fleet declined, tuna catches of the semi-industrial fleet did not increase and thus it appears difficult to argue that the semi-industrial fleet takes the fish away that foremost was only caught by artisanal fishermen.[14]

Question 9 of the interview asked whether there have been more or less fish in the past. Of the 30 fishermen interviewed, 28 (93.33 per cent) answered with “mais” (more) or “muito mais” (lots more). Twelve of these 28 fishermen (42.86 per cent, question 9a) believed that foreign ships are responsible for the decline in fish stocks, eight fishermen (28.57 per cent) answered that there are too many boats (local and international) and thus too many fishermen present, four fishermen (14.29 per cent) blamed the local government for allowing foreign fleets to enter the Cape Verdean EEZ and another four fishermen gave different reasons for the decline in the fish stocks.

Of the 30 fishermen interviewed, 24 (80 per cent, question 10) actually saw foreign ships on the open ocean[15] and 17 of these 24 fishermen (70.83 per cent, question 10a) regarded the foreign ships as competition. Six of those who did not (85.71 per cent), argued that the foreign ships target different fish, which, as has been demonstrated further above, does not hold true for the European fleet. Having analysed local landings, it is imaginable that part of the reduction of fish and seafood consumption might be linked to the decline in tuna catches. The following section focuses on the state of tuna stocks in the Atlantic Ocean.

3.3 Tuna in the Atlantic Ocean

The Regional Fisheries Management Organisation (RFMO) in charge of observing tuna stocks in the Atlantic Ocean is the International Commission for the Conservation of Atlantic Tunas (ICCAT). They provide recommendations and advice for Yellowfin tuna, Bigeye tuna, Skipjack, Albacore, Bluefin tuna, Swordfish, Sailfish, Blue- and White Marlin, Pelagic Sharks, Small tunas and Billfishes. In this section, only stocks of the first three species are

[14] The Sea Around Us Project (2010, complete data is available until around 2005) provides data for both catches and values of different species, apportioned by fishing countries, using a variety of sources, but mainly the FAO database. Without going into detail, a trend similar to the one described above can be seen. All tuna catches are in decline: Yellowfin tuna (*Thunnus albacares*) since 2003, Skipjack tuna (*Katsuwonus pelamis*) since 2004, Bigeye tuna (*Thunnus obesus*) since 2001 and Albacore (*Thunnus alalunga*), with a much lower level of catches, since around 2003. Catches for both Yellowfin tuna and Skipjack tuna peaked in the early 1990s, for Bigeye tuna in 1996 and for Albacore in 1969. At least for the first three species, a strong increase in catches is visible around the time when the first fisheries agreement between the European Union and Cape Verde was in force. During the time of the first agreement, the fleet of Spain solely accounts for catches two to three times higher than those reported by Cape Verdean fishermen.

[15] Most of them did not encounter them directly as foreign fleets tend to stay far out on the open waters where at least the artisanal fleet does not reach. What had been seen by most of the fishermen are lights of foreign ships, which can easily be spotted during the night.

discussed due to their importance to both the Cape Verdean and the international fleet.[16] The reader should be aware that the study of tuna stocks remains a field of high uncertainty. "The general knowledge of most tropical fish stocks […] is often very limited and therefore sampling bias, incomplete coverage of the stock and misinterpretation of the data may easily occur." (Sparre/Venema 1998: 309)

3.3.1 Yellowfin tuna (Thunnus albacares)

ICCAT recommends "that there be no increase in the level of effective fishing effort exerted on Atlantic yellowfin tuna, over the level observed in 1992" (ICCAT 2010: 1). Catches of Yellowfin declined from nearly 200,000 tonnes in 1990 to below half of that (97,800 tonnes) in 2006. According to an independent review of ICCAT, led by Hurry et al. (2008: 53) it is unknown whether this reduction is due to a declining stock, reduced effort or other unknown causes. Given the high level of uncertainty and the lack of available data, Hurry et al. (2008: 54) come to the conclusion that more frequent stock assessments need to be conducted.

3.3.2 Bigeye tuna (Thunnus obesus)

ICCAT (2010: 10) states that "small juvenile bigeye tuna represent approximately 70 percent of bigeye catches […] with a generally increasing trend" and recommends to reduce total allowable catches (TACs) because of "the overfished status of Atlantic bigeye tuna". Similar to Yellowfin tuna, catches increased until the early 1990s (132,000 tonnes in 1994), before they declined to nearly half of that in 2006 (76,000 tonnes). According to Hurry et al. (2008: 42) the decrease is mainly "due to reductions in fleet size for purse seine and longline and lower CPUE [catch per unit effort] for longline and baitboat." It is also argued that there is a lack of data for sizes of Bigeye tuna (Hurry et al. 2008: 43).

3.3.3 Skipjack tuna (Katsuwonus pelamis)

Hurry et al. (2008: 49) decry the lack of knowledge concerning Skipjack tuna. When their report was published, the Skipjack tuna stock had not been assessed for around nine years, even though there were "signs of local overexploitation". A more recent study by ICCAT (2010-2011: 45) finds it "unlikely that skipjack be exploited in the eastern Atlantic". The same study also speaks of continuing difficulty to distinguish different Skipjack tuna stocks in the Atlantic Ocean and problems concerning the evaluation of changes in fishing effort.

[16] Information for all other species can be found on the ICCAT website: http://www.iccat.int/en/assess.htm (accessed: 24.01.2011).

Compared to other tuna species, the catch levels of Skipjack tuna have remained stable over the last eleven years (approximately 115,700 tonnes in the East Atlantic Ocean and about 26,500 tonnes in the West Atlantic Ocean) and stocks are largely seen as indestructible, even though the catch level "is notably lower than that of 1991 and 1993 when the highest level in catches of this species was reached (approximately 200,000 t)" (ICCAT 2009: 675).

Summing up, high uncertainty concerning the available data and often a lack of information regarding tuna species shape the findings of ICCAT. Nevertheless, one result sticks out: Catches of all three main target species have decreased since the early 1990s, the time when the first fisheries agreement between the European Union and Cape Verde was put into force. A reduction of fish and seafood consumption of the Cape Verdean population and a decline in local tuna landings was shown. The state of tuna stocks in the Atlantic Ocean is far from what can be described as ideal and the statement of the European Union (quoted further above) that only surplus species are targeted can undoubtedly be rejected.

4. Fishing policies in the EU and IUU

The European Union is home to a number of fishing nations including Spain, Italy, France, The Netherlands and Denmark. For nearly 30 years (since 1983), fishing in the European Union[17] has been governed under the Common Fisheries Policy (CFP). When countries, including member states of the EU, extended their territorial waters and subsequently introduced Exclusive Economic Zones (EEZs) in the late 1970s (EU 2009b)[18], it was deemed viable to organise fisheries under a commonly shared regime (similar to the Common Agricultural Policies). Some of the main aims were to organise market and fishery resources, harmonise structural and conservational policies, and, in light of the introduction of EEZs in non-member states (especially in Africa), gain access to foreign waters and fishing grounds through the negotiation of bilateral fisheries access agreements, today's FPAs (Northern Ireland Assembly 2001: 3).

Although the number of vessels decreased yearly from 1998 onwards, a decline in gross tonnage cannot be observed until 2003, when the EU implemented the so called "entry-exit scheme", which mandated "that all new fishing vessels be directly compensated by the withdrawal, without public aid, of equivalent capacity" (FAO 2006: 26). According to

[17] Back then the "European Economic Community". Throughout the entire text, the term European Union or the abbreviation EU is used.
[18] For more information on the development and establishment of the EEZ before the formulation of the United Nations Convention on the Law of the Seas (UNCLOS III) in 1982, see for example Extavour (1978).

Sumaila and Pauly (2006: 28) the fleet of the EU remains the third largest in the world. Even though a recent decrease in fleet size, gross tonnage and captures can be observed, it also holds true that the waters adherent to the EU have experienced severe overexploitation over the past decades. Similar to most other major fishing regions in the world, a stop to overexploitation is not yet visible. “The effect of trawling in deep water in the North Atlantic has been to reduce all known fish populations there to around 20 percent of what they were in the 1970s” (Clover 2006: 94). Froese and Proelß (2010) state that just three of the observed stocks in the North Atlantic are below maximum exploitation. Twelve species are so overfished that even if fishing were stopped entirely the stocks could not recover until the deadline in 2015 is passed. The same study concludes that the current fishing practices are in violation of both the UN Laws of the Seas and the EU’s Precautionary Principle, an approach to protect “human, animal or plant health” (EU 2000: 8).

4.1 The quota system

The European Union’s primary tool to preserve fish stocks is the determination of annual Total Allowable Catches (TACs), which are distributed among the European Union’s member states. Additionally to the set quotas, technical measures such as the regulation of mesh sizes, the establishment of marine sanctuaries and compulsory landing sizes for fish species are part of the European Unions toolbox. The alarming state of many fish stocks is on the one hand a direct result of ignored scientific advice and on the other hand a result of the problematic construction of the current TAC system. According to Ritterhoff and Borchers (2003: 402) the Fisheries Council is largely responsible for determining quotas above scientific recommendations. Oceana (2009: 2) found out that between 1986 and 2006, 78 per cent of all quota recommendations by the International Council for the Exploration of the Sea (ICES) were exceeded. Additionally, even though the quotas are set annually, they are valid for huge areas of waters. The result is that for many species a TAC can have devastating effects, when e.g. the stocks in one area are still plentiful, but in another, regulated by the same TAC, already overexploited (Zank 1995). Furthermore, as TACs are based “exclusively on landings”, discard is not taken into account and as such, the real loss in biomass is not included in the next year’s determination of TACs (Oceana 2009: 3ff.).

4.2 Fisheries agreements

Parallel to reforms of the CFP, the nature of fisheries agreements[19] between the European Union and African coastal states changed as well. Until the mid-1990s, agreements were signed for a much smaller period of time (usually one or two years duration) and described as "cash – for access" or "compensate and take back fish raw material to Europe" agreements (Kacynski/Fluharty 2002: 82). In the EU Joint Assembly Resolution presented by African, Caribbean and Pacific Group of States (ACP) in October 1993, it is concluded that the bilateral agreements are favourable from a financial point of view, but might have had a damaging effect on artisanal fisheries and perhaps contributed to the impoverishment of the population. Kacynski and Fluharty (2002: 82ff.) state that the rising awareness in African states and a number of critical voices in the European Parliament and DG VIII (Cooperation) have resulted in the creation of "second-generation" agreements. These were offered to some of the more wealthy countries and were seen as a step towards the liberalisation and privatisation of trade. A number of authors (see for example Porter 1998 and Gorez 2003) have criticised the second generation agreements and accused the European Union of following the same objectives as in older agreements: Satisfying consumer demand and supplying the European market with fish at the lowest possible cost. According to Kacynski and Fluharty (2002: 83) these agreements were unable to improve any of the existing problems, namely insufficient enforcement of regulation and control. Furthermore they argue that the agreements lacked "attention to the needs of local small-scale fishing communities [SSFs]" (ibid.). The same holds true nowadays for so-called "third generation agreements". Without going into detail, most suggestions from NGOs and scientists have been ignored, in particular those concerning a better integration of African SSFs and the abolishment of subsidies to the European distant water fleet. The European Union (2009b: 25) sees their current Fisheries Partnership Agreements as tools which not only ensure the satisfaction of EU taxpayers, but also contribute positively to their partners' development goals. In their user's guide to the CFP, the European Union states that their FPAs are not only fair in financial terms, but that

> [FPAs] guarantee that fisheries are sustainable, biodiversity is not at risk, and funds will be used in ways that genuinely contribute to local economic development and thus strengthen national food security. (EU 2009b: 25)

For question 11 of the questionnaire, 29 of the 30 fishermen interviewed (96.67 per cent) answered that they are not receiving any funding/money from the government or another

[19] Fisheries agreements, nowadays called Fisheries Partnership Agreements are an integral part of the CFP.

institution. According to Monteiro (2010), the annual payment provided by the European Union[20] goes directly to the Ministry of Foreign Affairs and thus the general national budget. No money is given to the only fisheries research institution of Cape Verde, the INDP, and due to a lack of communication between the INDP, the EU and the Cape Verdean government, it is unknown where exactly the financial contribution agreed to in the FPA goes.

The European Commission names a number of challenges for their tuna fleet, such as the wish of less developed countries to participate in the hunt for tuna. Because "only 10% of catches by the tuna fleet of EU Member States are made in Community waters or international waters close to Europe" (EU 2004: 3), and the importance of protecting tuna as a resource, the European Commission sees RFMOs and bilateral agreements as vital parts of their international fisheries policies. New partnerships not only result in the extension of fishing zones for the European fleet, but

> can offer resource control measures (e.g. by helping the States concerned secure control and monitoring equipment), aid for the development of their local fishing and processing industry (thus creating outlets for European industries to transfer their technological know-how).
> (EU 2004: 3)

The European Union's point of view has scarcely changed during the last couple of years and in their green paper from 2009 (EU 2009c: 23ff.), RFMOs and FPAs are still seen as the best possible instruments for fisheries governance on the high seas. Whereas before the sheer presence of a European fleet in international waters was seen as a way to strengthen EU legitimacy, this is nowadays not regarded as relevant any more due to the increase of EU trade in fisheries products and the EU's increasing dependence on imports.

4.3 FPAs and IUU

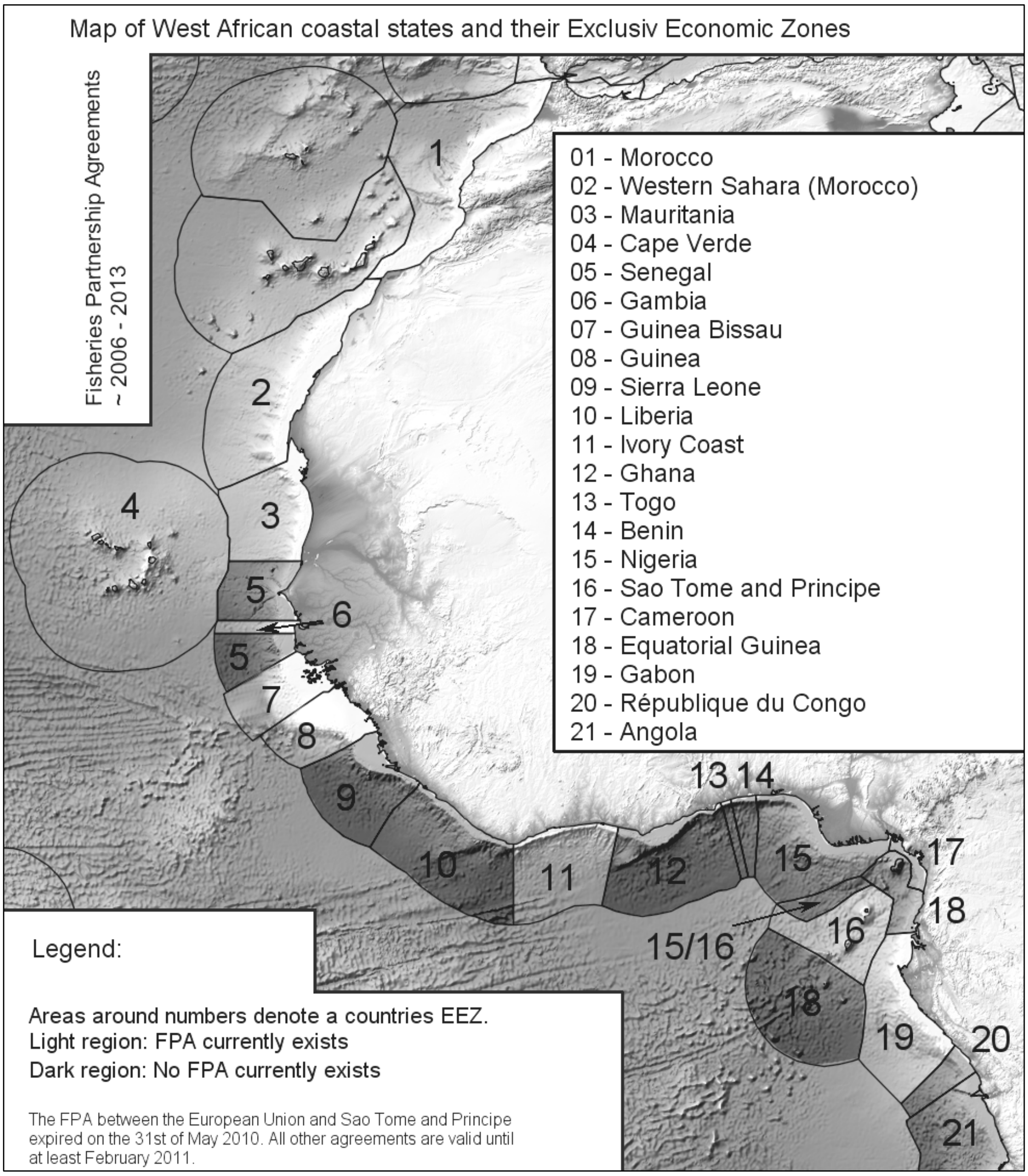
Not counting the Northern agreements,[21] there are currently 15 EU fisheries access agreements with African states, both on the West- and East coast, and one contract with Greenland in force. Not taking into account that some of these contracts include variable annual payments, the European Union pays approximately EUR 158 million a year to its partners (listed in table 16 in the annex). The amount of base compensation is slightly lower, but still similar to those calculated by Porter (1998: 120) who computed payments for 16

[20] The amount of money provided by the EU and other aspects of the FPA are discussed in section 5.2.
[21] These are agreements with Iceland, Norway and the Faeroe Islands. Due to the very different construction of these agreements, they are not going to be covered in this paper.

agreements of ECU[22] 162 million for the year 1991 and of ECU 176 million for 1995 and 1996.[23] The composition of countries has slightly changed over the years, because the European Union has established new business ties with a couple of African states and because most of the bilateral agreements are not renewed automatically, but are discussed by the two sides until a new protocol is created or one of the partners decides not to continue the fisheries relationship.

In the case of Cape Verde, the European fleet had to stop its fishing activities on 30 June 2005, when the then current agreement expired. For five months, until December 2005 there was no protocol in force and thus the European fleet was not allowed to fish in Cape Verde waters. According to a map created by Kacynski and Fluharty (2002: 79), who have analysed several fisheries agreements from the 1990s, there is a good chance that the activity of the European fleet targeting Skipjack and Albacore in the region of Cape Verde is high around the month June. Due to the gap in fishing contracts between the European Union and Cape Verde it follows that the fleet would only have been able to follow the tuna, but not use their gear to catch it. They would have needed to wait until the tuna migrates further north towards Mauritania and Morocco or later on during the year when the tuna changes its direction to migrate further south passing the EEZs of other African coastal states. Following the tuna schools while not being allowed to catch them is costly for vessel owners as they not only need to pay for fuel and the wages of employees, but risk that foreign fleets might participate in the race and get their hands on the tuna before them.

[22] The European Currency Unit (ECU) was used in the European Union as a unit of account and was finally replaced by the Euro in 1999 (currency exchange rate 1:1). EUR and ECU are used interchangeably.
[23] The figures do not include payments for tuna catch beyond the minimum levels agreed to in the protocols. This is not because of simplification reasons, but due to unavailability of figures for additional compensation.



Map 1: Map of West African coastal states, their EEZs and FPAs.
Source: Own illustration, map material by VLIZ (2009).

Map 1 resembles a map of West African coastal states. The areas around the numbers denote a country's EEZ. Light regions symbolise that a FPA is currently in force, whereas dark regions demonstrate that no FPA exists. For the creation of the map, only the latest round of FPAs was taken into account (from around2006-2013) to show the situation European vessels are confronted with at the time this paper was written. It can be seen that apart from the vast areas of Moroccos' EEZ (plus Western Sahara) and Mauretanias' EEZ, where access for European trawlers is granted, the map resembles a patchwork. Going south from Cape Verde (number 4 on the map), European vessels are currently allowed to catch tuna in the waters of Gambia (6), but not Senegal (5). In Guinea (7) and Guinea Bissau (8) fishing is possible, in Sierra Leone (9) and Liberia (10) it is not. In the EEZ of the recently struggling state Ivory

Coast (11) the hunt for tuna is allowed, but already a bit further East in the EEZs of Ghana (12), Togo (13), Benin (14) and Nigeria (15) it is not. The same holds true for Cameroon (17) and Equatorial Guinea (18) and also the latest FPA between the EU and Sao Tome and Principe (16) expired in May 2010. Coming from the West, if the owners of European vessels wanted to fish in the EEZ of Gabon (19) (which is legitimate), they would first need to cross part of the EEZ of Equatorial Guinea (18), where their fishing gear has to remain unused or take a detour around the EEZ. Further south no more FPAs exist.

As one can imagine, tuna fish do not seem to care much about invisible ocean boarders or with whom the EU has managed to establish Fisheries Partnership Agreements. All of the approximately forty species (occurring in the Mediterranean Sea and the Atlantic, Pacific and Indian Oceans) are migratory. Yellowfin tuna undertake the “largest migrations” (ICCAT 2006-2009: 11) of all tuna species. Figure 7 in the annex shows movements of 1711 tagged and recovered Yellowfin tunas. Apart from horizontal journeys across the Atlantic Ocean, it can be seen that a large number of specimen travel along the West African coast.[24] Similar patterns are observed for two other main target species of the EU fleet: Bigeye tuna and Skipjack tuna. All species regularly cross EEZs of African countries where no FPA with the EU is in force.

The European fleet is highly specialised and expensively equipped. Purse seiners are usually longer than 45 meters and the tonnage is normally above 100 GRT. “The search for tuna schools is often carried out by a helicopter, for which a landing platform is provided on the superstructure” (FAO 2011). Longliners engaging in the hunt for tuna are similar in size and sometimes “equipped with [a] processing plant including mechanical gutting and filleting equipment with accompanying freezing installation” (FAO 2011). Pole-and-line vessels are smaller and use echosounders and/or sonars for detecting tuna schools.

The European Union condemns IUU because it “depletes fish stocks, destroys marine habitats, distorts competition, puts honest fishers at an unfair disadvantage, and weakens costal communities, particularly in developing countries” (EU 2010e). Nevertheless, until today surveillance of the European fleet is largely nonexistent and thus, whether or not European vessels engage in IUU remains the subject of debate and speculation. As long as no comprehensive monitoring of the fleet is enforced by the EU, data on catches of tuna and other species (bycatch) continue to be incomplete and faulty. It is imaginable that vessels enter and fish in an EEZ of a country with which no FPA is signed and ratified. Given the

[24] Figures 6 and 7 in the annex show movements of 3021 Bigeye tunas and 5990 Skipjack tunas.

equipment of modern European vessels, the patchwork of FPAs with West African countries, the competition between international fleets regarding migrating tuna schools and the lack of surveillance, "unlicensed boarder hopping", as MRAG (2005: 11) call it, is highly likely, but cannot be proven.

The exact amount of illegal caught fish is, obviously, unknown. Rough estimates have been presented by Agnew et al. (2009: 2ff.), who have analysed catches in 54 EEZs and 15 high seas regions. According to them, the quantity of illegal captures during a four year time period (2000-2003) is estimated to lie between a lower bound of approximately five million tonnes and an upper bound of some12 million tonnes. This equals a loss of 13 to 31 per cent of fisheries and a value somewhere between USD 4.5 billion and USD 11 billion.

> Taking the total estimated value of illegal catch losses and raising by the proportion of the total world catch analysed in this paper, lower and upper estimates of the total value of current illegal and unreported fishing losses worldwide are between \$10 bn and \$23.5 bn annually, representing between 11 and 26 million tonnes. (Agnew et al. 2009: 4)

Compared to previous estimates by MRAG (2005: 101) of approximately USD 4.2 billion to USD 9.5 billion and estimates by Pauly et al. (2002: 691) of roughly USD 25 billion, the newer findings by Agnew et al. fit right in the middle. Perhaps more insightful than these numbers is their finding that illegal fishing in regions adjacent to developing countries is substantially higher than in regions close to developed countries. The East Central Atlantic is the most illegally exploited region (taking into account both the upper and the lower bound), followed by the South West Atlantic, the North West Pacific, the West Central Pacific and the East Indian Ocean. In the worst case, almost 50 per cent of the official amount taken out of the Eastern Central Atlantic needs to be added on top of that as illegally caught fish. According to Agnew et al. (2009) the rate of illegal exploitation in developing countries (approximately 35 per cent) is more than three times higher than in waters controlled by developed nations (round about ten per cent). This finding is not unanticipated as the key solution to stop IUU in a countries' EEZ is monitoring foreign fleets, which is usually done with surveillance boats. Due to the enormous size of some EEZs, most developing countries cannot afford to buy large numbers of surveillance boats and pay for equipment and staff. In the case of Cape Verde, a couple of boats (for most years in the past only one surveillance boat existed) have to cover an area of at least 734,265 km² (Monteiro 2010).

For illegal fishing of tuna, Angew et al. (2009: 3) come up with fairly low (not zero) estimates. MRAG (2005: 24) refers to estimates calculated by ICCAT which state that IUU catches for Bluefin tuna have decreased to levels of about one per cent since the introduction of a tuna document scheme. The same holds true for Bigeye tuna; here estimates of IUU catches have decreased to five per cent.[25] The data above was recently indirectly challenged by the International Consortium of Investigative Journalists (ICIJ 2010). A team of twelve journalists investigated Bluefin trade for two years and found not only huge irregularities, but also fraud.

Perhaps more easily obtainable and thus more meaningful than the rough estimates for IUU catches presented above, is the way European vessels are able to operate in foreign countries' EEZs. Chapter VIII (Number 4) of the current FPA between the EU and Cape Verde states that "all Community vessels fishing under this Agreement shall be subject to satellite monitoring […]" (EU 2006: 18). There is no further information provided by either the EU or the Cape Verdean authorities on where to obtain this data, or whether IUU fishing has been observed in the past. Whereas in the first bilateral fisheries agreement from 1990 (EU 1990), point G in the annex allows the Cape Verdean authorities to request that European vessels (of more than 150 GRT) are to be accompanied by a local observer, the recent FPA is missing this privilege. Now, observers are appointed by ICCAT, the regional RFMO (EU 2006: 16). In both agreements, old and new, observers are not allowed to stay on board the vessels for the entire duration of its trip through the Cape Verdean EEZ. Thus, in both cases, the observers are able to note the equipment used on board of the vessel, perform biological sampling or observe how the crew operates, but for the longest time of the vessel's trip through the Cape Verdean EEZ and other countries EEZs, the amount of catch taken out of the water, species targeted, bycatch and discard remain uncontrolled and thus largely unknown. This situation could drastically be enhanced by the appointment of independent observers who stay on board the vessels for the entire journey. To try and account for irregularities and erratic behaviour, it is recommendable to hire at least two independent observers and to install some kind of rotation system, so that the observers are not only responsible for monitoring a single ship. Furthermore, the observers should get paid by an unbiased institution (not the vessel owner or the parties involved in the FPA) and the data obtained should be accessible for scientists and the general public.[26] Precise data on tuna fisheries is rare and often intransparent or inaccessible. Kacinsky and Fluharty (2002: 87)

[25] MRAG (2005: 24) uses the same data for Yellowfin tuna and estimates between 5000 and 10000 tonnes of illegal caught fish in the Atlantic Ocean. For Skipjack tuna there is no data presented.

[26] Some of these basic steps for the improvement of monitoring the world oceans could have become part of FPAs years ago, but have not - mainly due to political will. The reader should be aware of the limits of these ideas. Well known ways to circumvent fishing restrictions such as ports of convenience and flags of convenience would in some cases not be targeted and hence still remain problematic. For further information on these issues, see for example Sumaila/Jacquet (2008).

report that all information regarding tuna catches is send to ICCAT in Madrid, after being reprocessed by national institutes.

> These data are readily available for the ICCAT member countries while coastal states […] cannot afford the cost of membership and have no official access to the data collected by ICCAT member-states. (2002: 87)

In summary, it was shown that even though the CFP of the European Union (and with it the embodied FPAs) has changed over the years, surveillance of the European fleet is largely nonexistent. As long as a lack of monitoring persists, precise data on tuna catches and bycatch are rare. This not only dampens the ability of scientists to estimate tuna stocks, but also puts FPAs on a shaky base as it remains questionable whether the European fleet really targets surplus species. Migration routes of three tuna species and the equipment of European vessels were presented to demonstrate that the patchwork of FPAs with West African coastal states incentivises boarder hopping and illegal fishing.

5. Fisheries subsidies

One of the key questions concerning subsidies in the fisheries sector is their effect on the nowadays indisputable mismatch between capacity/effort and available natural resources. The overall impact of subsidies in the fisheries sector on the environment is hard to determine due to their bipolar character. Whereas subsidies that reduce fishing costs and promote capacity building are seen as harmful because they can lead to increasing fishing effort and participation of fishermen, subsidies that aim at improvement in resource management and the conservation and/or establishment of marine reserves are considered as being beneficial (Milazzo 1998: 64ff.). A first estimate of worldwide assistance in fisheries was presented in 1993 by Francis T. Christy Jr. and the FAO Fisheries department. Even though their approximate calculation of USD 54 billion (FAO 1992: 32) is nowadays regarded as too high, their pioneering work has led to a whole series of publications on that issue. A global estimate of US$ 14-20.5 billion was presented by Milazzo (1998: 73) and the most recent publication from Sumaila et al. (2010: 201) "suggests that global fisheries subsidies for 2003 are between US$ 25 and 29 billion".[27]

Khan et al. (2006: 13f.) have identified three categories of subsidies, based on their theory that fishery resources are, similar to other natural resources, natural capital and can be regarded as a portfolio of natural capital assets. Thus it is possible to either invest by pausing

[27] This figure is lower than their estimate of USD 30 to 34 billion for the year 2000 (Sumaila/Pauly 2006).

fishing activities to let the resource rest and eventually rebuild or it is also feasible to disinvest by overfishing the resource. Khan et al. (2006) distinguish between good subsidies, bad subsidies and ugly subsidies, the latter being highly controversial and, depending on the viewpoint of the observer, capable of either being beneficial or harmful. According to Sumaila et al. (2010: 214ff.) ugly or as they call it “capacity enhancing” subsidies are by far the largest category with an estimated USD 16.2 billion in 2003, of which 65 per cent were supplied by developed countries.

Foreign access agreements including the European Fisheries Partnership Agreements are part of the category of bad subsidies which are defined as “all forms of capital inputs and infrastructure investments from public sources that reduce cost or enhance revenue” (Khan et al. 2006: 15). Sumaila et al. (2010: 213) have estimated that four per cent of the global total of fisheries subsidies is spend for these kinds of fishing access agreements, resembling a sum of USD 1 billion, entirely spent by developed countries. This figure is similar to the USD 0.5 billion to USD 1 billion estimated by Milazzo (1998: 73).

5.1 Bioeconomics and subsidies

Before two bilateral fisheries agreements between Cape Verde and the European Union and the subsidies embedded in them are analysed, it is necessary and helpful to present a short introduction to bioeconomics, a field of research developed in the 1950s by Gordon (1953, 1954) and Schaefer (1954, 1957).[28] This section tries to show the link between biology, economics and politics, or to be more precise, it shows the negative effects of subsidies on fisheries.[29]

In figure 3 the vertical axis is denoted in money whereas the horizontal axis describes fishing effort. TR stands for total revenue (catch multiplied by price) and TC stands for total cost of effort. Here, “it is assumed that for the fishing industry as a whole, an extra level of effort requires a constant extra cost – for example, […] one more boat-day costs an additional $ 1,000” (Iduicello et al. 1999: 48). In reality, a more complex curve is likely, for example if economies of scales are introduced. For now, the proportionality of cost to effort serves well enough to explain the effects of subsidies.

[28] See also Pearl (1925) for some basics and Fox (1970) for a slightly different approach.

[29] For further information on stock assessment, biostatistics, growth equations etc., Sparre and Venema’s introduction manual (1998) serves as a good starting point.

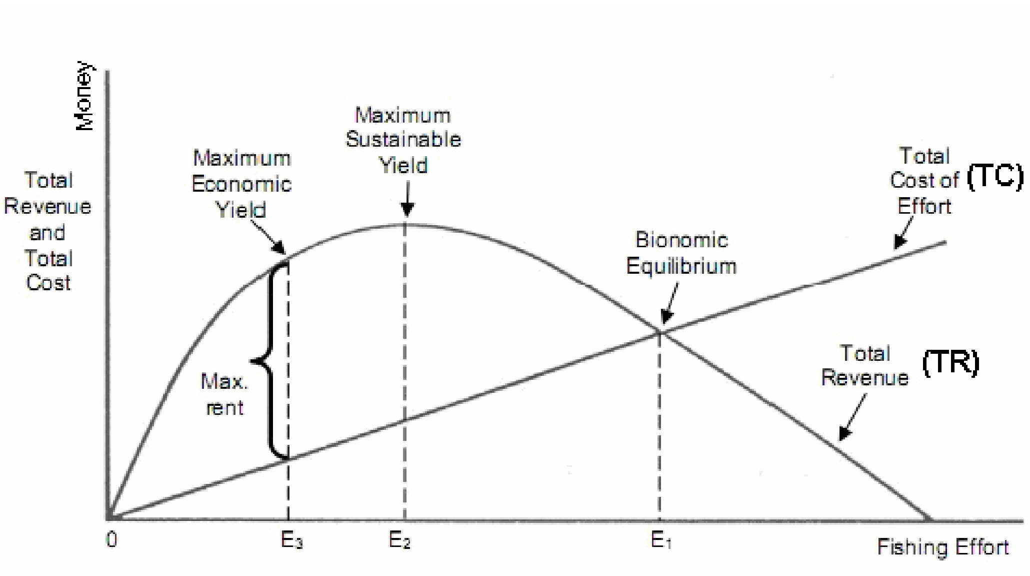


Figure 3: Revenue and costs
Source: Sumaila (2006) plus own captions.

The key question is: Why does TC intersect with TR behind both the maximum economic yield and the maximum sustainable yield? One answer to this question is given by Meadows et al. (2004: 232) who have argued that "the market gives no corrective feedback to keep competitors from over-exploiting a common resource such as marine fish." Even scarce fish stocks can be detected and harvested with modern technology used on board giant vessels (as mentioned in section 4.3). Those fishermen benefit who can catch most, a situation first popularised by Hardin (1968) in his seminal paper entitled *The Tragedy of the Commons*.

> Each man is locked into a system that compels him to increase his herd without limit-in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. (Hardin 1968: 1244)

Whereas Hardin describes a pasture freely accessible for all, the world's oceans are similar common goods, where each fisherman strives to catch additional fish to increase his sales without regard for the exploitation of fish stocks. Those fishermen get rewarded who catch most: the unregulated market fails at putting an end to overfishing. Even if the price of fish rises (a sign of scarcity), those who are better off will keep consuming, which means they are willing to pay higher prices. This short-sightedness by the fishing industry (but also those responsible for fisheries management and to some extent the consumer), to see profits today and value them higher than long-term fishing rents, indicates a failure to think logically about the economic concept of net present value, informally stating that a little less today is a substantial bit more tomorrow (Sumaila 2006: 8-11). Partly, the introduction of 12-mile internal waters and the 200-mile exclusive economic zones have restricted access to areas of the world ocean for fishermen. But with a substantial amount of IUU fishing going on[30], the creation of bilateral agreements and often a lack of regulation within the EEZs, overfishing is still a major concern and large parts of the world ocean are still open to everyone. In an open access fishery there is no limit on how much effort is applied. If the owner of one vessel decides to use a larger net, a stronger engine (or some other effort enhancement that has proven to be useful for his personal profit maximisation), the other skippers have an incentive to follow suit. Fishing effort increases until eventually no additional profit can be made (Iudicello et al. 1999: 49). This happens after point E1 in figure 3, where costs are higher than revenues. Until there, the return on a unit of effort is higher than its cost. E1 connotes a point on the graph which lies behind E2, the maximum sustainable yield, or maximum sustainable growth (M), as it was described above. Past this point, increased effort will reduce catches because growth becomes limited as the stock size decreases. This is the crux of the matter: Too many fishermen (symbolising too much effort) chase too few fish.

If there were to be a single fisherman (a sole owner of a fishery), he or she would behave in quite a different way. Point E3 in the presented model would bring the maximum economic yield as the distance between TC and TR is largest (labelled as "Max. rent"). Here, profits can be maximized, a situation which would be beneficial for everybody, but can only be realized if a single fisherman is able to exclude all other fishermen.

> Such a skipper would be concerned about the number of fish he could catch in the future as well as those he might catch today. If he could exclude others, he would not have to worry about leaving fish for others to catch. (Iudicello 1999: 53)

The model presented above incorporates a few biological assumptions which are widely seen as unproblematic (for a good summary, see, for example, Ricker 1975). Other assumptions (non- biological) seem more challenging. It was assumed that the price of fish remains constant. This means that the first kilogram of fish caught has exactly the same price as the very last kilogram. Usually this should not be seen as problematic, but one could imagine a decreasing price with an increase in catch. Moreover the price of certain types of fish, such as tuna, sometimes depends on the size of an individual species; a larger fish can be of greater value, simply due to its enormousness. More complications arise with the assumption that mortality of fish is proportional to effort. Sparre and Venema (1998: 286) have argued that

[30] See section 4.3 of this paper.

> in most cases the efficiency of the boats has changed over a long period; often the boats have become larger and better equipped. Thus, 100 boat days in say 1978 may create a larger fishing mortality than 100 boat days in 1968.

Due to difficulties in embodying changes of effort over time, it is usually assumed that effort remains constant.[31] For a critical view on surplus production models such as the one presented here, see Hilborn/Stokes (2010: 116). They argue that instead of using "unknowable quantities like B0" (B0 describes the virgin stock, a situation when no fish are caught), fisheries management strategies should be tied to historical stock sizes which are known.

> Within the historical record, we usually know when stocks were abundant and productive, and for overfished stocks we know we would like to rebuild to those levels. Many stocks also have been historically fished to low abundance, and we know we would not want to go that low again. (Hilborn/Stokes 2010: 116)[32]

Similarly, Longhurst (2010: 3ff.) describes that it is not due to positive peer reviews that the concept of surplus production models (MSY models) are widely used, but because of political will. He criticises the treatment of marine ecosystems as static environments and argues that a "natural dynamic equilibrium" does not exist (Longhurst 2010: 10) and thus should not serve as the basis for calculations of, for example, TACs. Keeping in mind the assumptions and limitations of the model (figure 3), it can nevertheless help to understand the effects of fisheries subsidies. Before these are explained in section 5.3, the following section discusses the amount and character of the subsidies embedded in FPAs between the EU and Cape Verde.

5.2 Subsidies embedded in FPAs between the EU and Cape Verde

In analogy to the tables presented by Porter (1998: 29), EU compensation per vessel and the license fee per vessel for the most recent and the initial FPA between the EU and Cape Verde are calculated. The aim of this exercise is to estimate the license fee each vessel owner has to pay as a percentage of total costs and subsequently to be able to make a statement regarding the subsidies provided by the European Union to its distant water fleet.

The data used below is drawn from the current Fisheries Partnership Agreement between the European Union and Cape Verde (EU 2006). For a brief overview, all necessary

[31] Sparre and Venema (1998: 286) suggest to use short time series of data, or, if possible, account for changes in effort.
[32] Their approach deserves recognition and further study, but will not be discussed at length in this paper.

numbers are presented in a condensed form in table 3.[33] The calculations relate to the full duration of the agreement, which was put into force on 30 March 2007 and is valid for five years until 19 March 2012.

Fisheries Partnership Agreement between the EU and Cape Verde I	
Duration of the agreement:	5 years renewable (30.3.2007 - 29.3.2012)
Duration of the protocol:	4 years and 5 months (30.3.2007-31.8.2011)
Nature of the agreement:	Tuna Fishery Agreement
Financial compensation:	385 000 EUR
Number of vessels:	84
Fee for ship owners:	35 EUR per tonne caught (seiners and longliners)
	25 EUR per tonne caught (pole and liners)
Advances:	Tuna seiners: 3 950 EUR per year (ref catches: 110 t)
	Surface longliners: 2 900 EUR per year (ref catches: 80 t)
	Pole and line: 500 EUR per year (ref catches: 16 t)
Reference tonnage:	5 000 t./year

Table 1: Fisheries Partnership Agreement between the EU and Cape Verde I
Source: Own illustration based on original protocol (EU 2006) and the table presented on the European Commissions' website (EU 2010).

Article 1 of the protocol states that access to the Cape Verdean EEZ is granted for 25 European tuna seiners (v1), 48 European surface longliners (v2) and 11 European pole-and-line tuna vessels (v3). Adding these up results in the total quantity of vessels (tv). The website of the European Commission lists a specific key of fishing possibilities according to which the majority of vessels is under Spanish control, followed by France and Portugal. In this section of the paper, a distinction between countries is neglected and all vessels are referred to as "European".

$$v_1 + v_2 + v_3 = tv \qquad (1)$$

$$\Rightarrow 25v_1 + 48v_2 + 11v_3 = 84tv \qquad (1a)$$

Tuna seiners and surface longliners have to pay a fee (f) of 35 EUR per tonne of highly migratory and related species caught (t) and pole-and-line tuna vessels a fee of 25 EUR per tonne caught, both fees and catches resulting in fixed amounts (ft). For a reconstruction of the set amounts (advances) listed in the table, the license fees have to be multiplied with the denoted tons and 100 EUR have to be added which, according to chapter 1, section 2 of the annex of the FPA, are reserved for an observer programme.[34]

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[33] The alert reader will notice that the dates of the duration of the agreement (and protocol) listed in table 3 and written down in the FPA are different. This is due to "lengthy ratification procedures and late entry into force of the relevant legislative texts" (EU 2010). An additional arrangement (EU 2009a: 4ff.) between the EU and Cape Verde was agreed to in 2009 where it is put on record that the FPA is valid for four years and five months instead of the full five years and consequently the payments by the European Union to the Cape Verdean authorities plus the license fees the vessel owners need to pay and the reference tonnage agreed upon are reduced proportionally. The numbers in this paper are drawn from the original protocol as due to the proportional reduction the results stay the same no matter which numbers are used.

[34] More information on the observer programme can be found in chapter VII of the FPA.

$$f \times t + 100 = ft \tag{2}$$

The advances have to be paid according to the following scheme:

a) EUR 3950 for each tuna seiner (equivalent to sum of fees for 110 tonnes),

$$\Rightarrow 35f \times 110t + 100 = 3950\,ft_a \tag{2a}$$

b) EUR 2900 for each surface longliner (equivalent to sum of fees for 80 tonnes),

$$\Rightarrow 35f \times 80t + 100 = 2900\,ft_b \tag{2b}$$

c) EUR 500 for each pole-and-line tuna vessel (equivalent to sum of fees for 16 tonnes),

$$\Rightarrow 25f \times 16t + 100 = 500\,ft_c \tag{2c}$$

Article 2 of the FPA deals with an annual financial contribution which the European Union has agreed to pay the Cape Verdean government. “EUR 325000 equivalent to a reference tonnage of 5000 tonnes per year and a specific amount of EUR 60000 per year for the support and implementation of initiatives taken in the context of the Cape Verde sectoral fisheries policy.” (EU 2006: 8). Adding the first amount of EUR 325000 (c1) and the second amount of EUR 60000 (c2) together results in the total compensation (tc) per year in Euros. Whereas the protocol states under article 7 (EU 2006: 9) that 80 per cent of the total compensation should be allocated to the support of responsible fishing in Cape Verdean waters, on the website of the European Commission it can be read that “as proposed by the Cape Verdean authorities, the two parties agreed to increase the share of the financial contribution to be earmarked for the country's fisheries policy support, from 80% to 100%” (EU 2010a).

$$c_1 + c_2 = tc \tag{3}$$

$$\Rightarrow 325000c_1 + 60000c_2 = 385000tc \tag{3a}$$

To obtain the amount of money (in Euros), which is provided by the European Union for every vessel (cv = compensation per vessel), the total financial compensation (equation 3a) is divided by the total quantity of vessels (equation 1a). The results are rounded off to two decimal points.

$$\frac{tc}{tv} = cv \tag{4}$$

$$\Rightarrow \frac{385000tc}{84tv} = 4583.33cv \tag{4a}$$

The fixed amount each vessel has to pay (equations 2a-c) is added to the compensation per vessel (equation 4a), to calculate the total cost of access per vessel in Euros (tcv).

$$cv + ft = tcv \tag{5}$$

$$\Rightarrow 4583.33cv + 3950\, ft_a = 8533.33tcv_a \tag{5a}$$
$$\Rightarrow 4583.33cv + 2900\, ft_b = 7483.33tcv_b \tag{5b}$$
$$\Rightarrow 4583.33cv + 500\, ft_c = 5083.33tcv_c \tag{5c}$$

To complete this exercise, the fixed amounts (equations 2a-c) are now divided by the total cost of access per vessel (equations 5a-c) and the results are multiplied times 100 to estimate the license fee as a percentage of total costs (fpt). Again, the calculated numbers are rounded off to two decimal points.

$$\frac{ft}{tcv} \times 100 = fpt \tag{6}$$

$$\Rightarrow \frac{3950\, ft_a}{8533.33tcv_a} \times 100 = 46.29\, fpt_a \tag{6a}$$

$$\Rightarrow \frac{2900\, ft_b}{7483.33tcv_b} \times 100 = 38.75\, fpt_b \tag{6b}$$

$$\Rightarrow \frac{500\, ft_c}{5083.33tcv_c} \times 100 = 9.84\, fpt_c \tag{6c}$$

Before the results of these calculations are analysed in detail, a similar approach was undertaken for the initial agreement between the European Union and Cape Verde. It dates back to the year 1990 and was valid for a period of three years. A summary of the protocol is presented in table 4. In addition to freezer tuna seiners, pole-and-line tuna vessels and surface longliners, the protocol includes two bottom longliners (not targeting highly migratory species) and two vessels assigned for experimental cephalopod[35] fishing. For the latter two groups which are not targeting tuna, no reference catch is given and thus, in order to be able to compare the two contracts and especially the license fees as a percentage of total costs, they are excluded in the calculations.[36]

[35] Squid and octopus are, among other species, cephalopods.

[36] The method of deduction used is not entirely accurate as the value of the experimental and bottom longliner catches for the European Union is unknown and hence the results merely serve as a basis of comparison and should not be seen as carved in stone.

Fisheries Agreement between the EU and Cape Verde II	
Duration of the agreement:	3 years (~1990 - 1993)
Nature of the agreement:	Mixed agreement
Financial compensation:	750 000 ECU/year
Number of vessels:	45
Fee for ship owners:	20 ECU per tonne caught
Advances:	Tuna seiners: 1 000 ECU per year (ref catches: 75 t)
	Surface longliners: 300 ECU per year (ref catches: 15 t)
	Pole and line: 300 ECU per year (ref catches: 15 t)

Table 2: Fisheries Agreement between the EU and Cape Verde II
Source: Own illustration based on original protocol (EU 1990). A number of vessels and part of the financial compensation are deducted due to reasons described above.

Table 3 summarises the main results of the calculations in section 5.2 of this paper.

	Current FPA (2007-2012)			Old FPA (1990-1993)	
Type of vessel	Tuna seiner	Surface longliner	Pole-and-line vessel	Tuna seiner	Surface longliners & Pole-and-line vessel
Equation number	6a	6b	6c		
Cost of access for vessel operators (%)	46,29	38,75	9,84	8,26	1,77
Subsidies provided by the European Union (%)	53,71	61,25	90,16	91,74	98,23
Total	100	100	100	100	100

Table 3: Compilation of FPA calculation results
Source: Own illustration.

A look at equations 6a-c shows to what extent the European fleet is subsidised in the most recent agreement. The license fee for tuna seiners accounts for 46.29 per cent of the total costs of access and thus the fishing access subsidies from the European Union for each trawler of that fleet add up to 53.71 per cent. The same can be done for the remaining vessels; for both surface longliners and pole-and-line tuna vessels the subsidies provided by the European Union are even higher (61.25 per cent and 90.16 per cent respectively). The estimated results for operators, especially for the first two groups of vessels, are far higher than those presented by Porter (1998: 29). His calculation for the EU fishing access subsidy to the tuna seiner fleet in the years 1994 to 1996 is similar to the one displayed here for the very first contract between the EU and Cape Verde. The license fee for tuna seiners in the 1990 contract amounts to 8.26 per cent of the total costs of access, whereas Porter has come up with approximately 10 per cent. A declining trend over the years is visible when the cost of access for vessel operators is compared. This could be due to a reduction of subsidies over the past two decades or Cape Verde's increasing bargaining power. As no transcripts of the meetings before the ratification are published, only a general observation about the amount of the payment by the European Union can be made. Usually, the higher the allowed tonnage, the number of vessels, and duration of the protocol is, the larger the bulk compensation provided by the European Union gets. This rule of thumb does not hold true in all cases though; a number of countries it seems, have stronger negotiating powers than others. Clover (2006: 50) found out that in the case of Senegal the last FPA was only signed due to "political and diplomatic reasons", meaning that EU representatives made a link between the signature of the FPA and aid given to the country.[37]

Both of the presented agreements are bilateral, not multilateral, even though both of them concern migratory fish species (tuna), and the successful conservation of such stocks through (?) bilateral agreements is more than doubtful. As with all other FPAs, the European Union is unable to provide a reason for the disuse of multilateral agreements. Mwikya (2006: 5) argues that the insistency on bilateral agreements is a form of control and power over distant water fishing nations (DWFNs). According to him "financial compensation […] is more a factor of the different negotiating powers of the host countries than the value of the catch. […] ACP countries usually find it difficult to successfully negotiate fair compensation." Furthermore, Mwikya (2006: 20) argues that most African countries do not fully know the status of the stocks being targeted in the FPA which they are agreeing to, whereas the European Union can benefit from their own "unpublished historical data" used to estimate future catches.

A second kind of subsidy is indirectly included in the FPAs. According to Porter (1998: 29), the license fees in bilateral agreements account for about two per cent of the actual price of tuna at that time. Because the price of tuna fluctuates and depends on the type of tuna sold, a set percentage seems problematic. As reported by Oceanic Développement (2005: 186) in a paper funded by the European Commission, tuna prices vary due to seasonal changes in stocks and speculative action. Their figures show realised prices on several international markets for Skipjack tuna weighing over 1.8 kg in a two year period (2002-2004) which move inside a corridor of EUR 500 to EUR 1500 per tonne. The price for Yellowfin tuna moves in a corridor of around EUR 1000 to EUR 1500 per tonne. Regarding the latest FPA between the European Union and Cape Verde, the fee per tonne of tuna caught is set at EUR 35 for tuna seiners and surface longliners and EUR 25 for pole and line vessels. For seiners and longliners, this represents approximately seven per cent of the value of a ton of tuna if we take the lower bound of the corridor price (EUR 500) and about 2.3 percent when considering the upper bound of the corridor price (EUR 1500). For pole and line vessels, the percentages are five per cent and about 1.67 per cent respectively. In either case, the resulting income for Cape Verde in the form of license fees is similar to the ones found by Porter for other countries and is "far below the minimum regarded by most governments as fair and reasonable" (Porter 1998: 29).

[37] This issue is also addressed by other authors; see for example Mwikya (2006: 22).

5.3 The problem of subsidies and a theoretical solution

The calculations above are not evaluating the *amount* of money provided by the European Union. It should be noted that Cape Verde would, ceteris paribus, benefit from higher payments, but subsidies would increase at the same time. In this paper, more essential than the amount of money is the underlying incentive for European fishermen. Above in section 5.1 it was shown that total costs (TC) and total revenues (TR) intersect at a point past MSY. By providing the fishermen with access to the Cape Verdean EEZ, the European Union subsidises their journeys and reduces the cost of effort.[38] As a result in the model, the TC curve shifts further to the right. The slope becomes smaller and fishing (and depending on the stock also overexploitation) increases. Without compensation by the EU, fishermen would (if allowed by the country) need to pay the full cost of the license fee and depending on the price and expectations, might decide not to engage in the catch of tuna in these waters.[39]

With the price of the right to fish set right and the abolishment of subsidies, TC would shift upwards to TC' (see figure 8 in the annex). Ideally TR and TC' would intersect at effort E3, the Maximum Economic Yield. At this point, not only significant increase in biomass would be achieved, but also the incentive to increase effort would be eliminated. Any point past the intersection is not desirable as total costs would exceed total revenue. The challenge lies in establishing the correct price of the right to fish (the license), monitoring and surveillance of the fleets and the elimination of so called bad or ugly subsidies. In the case of many countries, the price of licenses would be much higher than they are today and thus an additional incentive for IUU activities might be created.

6. Conclusion

The EU argues that it "[…] is the only fishing power in the world which conducts its relations with third countries in total transparency, by making all their details publically available" (EU 2009b: 25). Of the 30 fishermen, 24 (80 per cent, question 13) interviewed have not heard of a fisheries agreement between the European Union and Cape Verde. The six remaining fishermen know that one exists, but are not aware of its content. It holds true that all FPA protocols can be found on the website of the EU, but additional information is usually not available. Thus it remains unknown how many licenses to European fishermen are issued

[38] Not included here are other subsidies such as those for fuel or social security payments.

[39] Namibia sells fishing licenses to private fishing companies and ranks sixth in the world concerning compliance with the UN code of conduct. For further information, see Pitcher et al. (2009: 658-659).

annually and how much tuna and other fish is caught or discarded. Similarly, data on bycatch is missing entirely.

This paper demonstrates to some extent that the EU breaches the goals it sets for itself. The EU states that “coherence with other EU policies must be ensured within all parts of the CFP. In the case of the external component, the EU development and environment policies have a particular role to play” (EU 2009c: 22). It was shown that despite a decline in tuna catches by the artisanal fleet in Cape Verde and the continuing overexploitation of some tuna stocks, the EU has not altered or stopped its fisheries operations in foreign waters.[40] Acheampong (1997: 18) criticised that “[…] the commercial nature of the agreements still dominates the negotiations.” Over ten years later, this is still the case; the horizontal coherence between development and fisheries programmes of the EU is in constant conflict as on the one hand financial aid is given to developing countries such as Cape Verde, but on the other hand the EU’s fisheries management disturbs the operations of artisanal fishermen and with them all those relying on fish as a protein source.

Of the 30 interviewed fishermen, 29 (96.67 per cent, question 12) answered that they are satisfied with their job. Overexploitation of tuna stocks could negatively affect this positive result and thus the external component of the European fisheries policy, namely Fisheries Partnership Agreements, has to change drastically toward an association that deserves the name partnership and a tool that shows real concern for fish stocks and artisanal fishermen. This could be achieved by strengthening the surveillance of IUU activities and by abolishing so-called bad and ugly fisheries subsidies. If the price of fishing rights is set right and not distorted by subsidies, the incentive to increase fishing effort would be eliminated and a significant increase in biomass could be achieved. Furthermore, the monitoring of fish stocks needs to be made a key concern of the European Union in order to improve our knowledge of local and especially migratory fish species. Here, much more research is needed in the near future in order to avoid a total collapse of tuna stocks and the depletion of many other fish populations.

[40] At the beginning of 2011, the EU and Cape Verde have initiated a new fisheries protocol. The press release can be found online: http://ec.europa.eu/fisheries/news_and_events/press_releases/2011/20110104/index_en.htm (accessed: 27.01.2011).

7. Annex

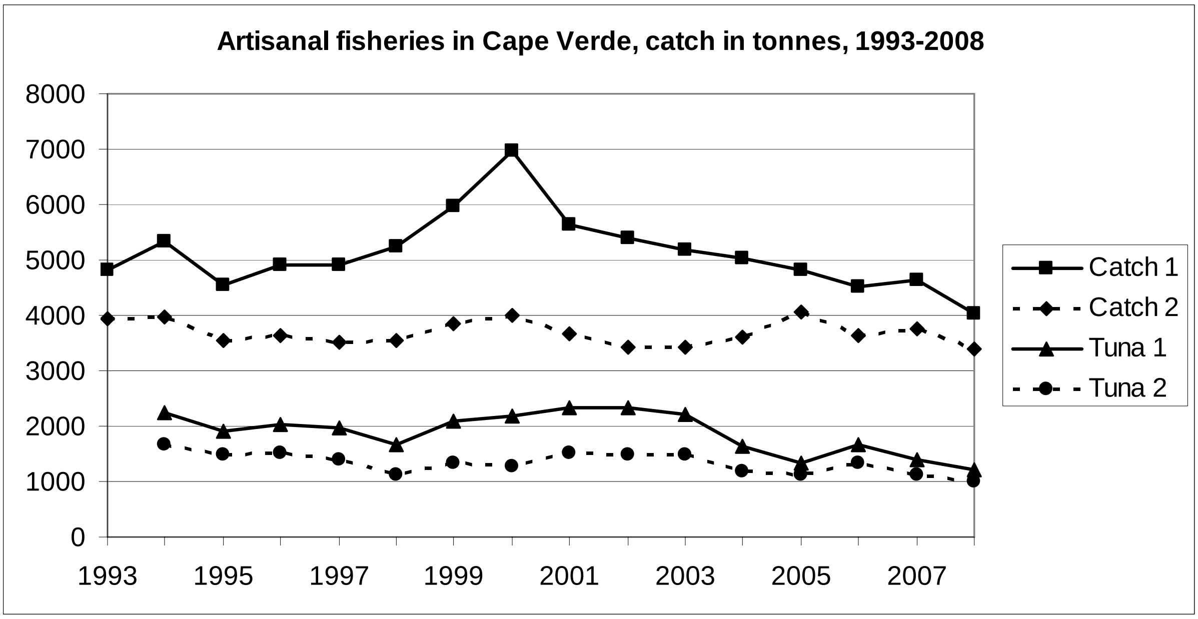


Figure 4: Artisanal fisheries in Cape Verde, catch 1993-2008
Source: INDP (2007, 2010: 67) and own calculations

ANOS	Desembarque (Ton)	Esforço (Nº Viagens)	Número de Botes	Número de Motores	Número de Pescadores
1993	4 829	123 016	1 354	881	4 388
1994	5 347	134 699	1 455	1 000	5 481
1995	4 547	128 732	1 476	1 012	5 538
1996	4 912	134 667	1 424	986	5 406
1997	4 920	140 404	1 400	986	5 675
1998	5 242	148 158	1 400	986	5 724
1999	5 968	155 009	1 257	920	4 283
2000	6 977	173 856	1 257	920	4 283
2001	5 649	154 408	1 257	920	4 283
2002	5 383	156 714	1 257	920	4 283
2003	5 172	150 915	1 257	920	4 283
2004	5 034	139 552	1 257	920	4 283
2005	4 822	118 854	1 036	766	3 108
2006	4 530	124 740	1 036	766	3 108
2007	4 633	123 686	1 036	766	3 108
2008	4 018	118 311	1 036	766	3 108

Table 4: Artisanal fisheries in Cape Verde, 1993-2008
Source: INDP (2010: 67)

ANOS	Desembarque (Ton)	Esforço Dias/mar	Número de Barcos	Número de Pescadores
1993	2 171	1 980	57	684
1994	2 909	2 829	64	768
1995	3 948	3 106	80	960
1996	4 243	3 426	69	828
1997	4 707	5 057	77	924
1998	4 218	5 359	77	924
1999	4 403	5 949	83	996
2000	3 844	4 822	75	900
2001	3 241	3 450	66	792
2002	3 669	5 366	60	720
2003	3 213	5 123	61	732
2004	3 441	2 553	62	744
2005	3 180	1 068	69	828
2006	5 668	1 738	66	792
2007	4 435	4 916	61	732
2008	4 110	4 971	73	876

Table 5: Semi-industrial fisheries in Cape Verde, 1993-2008
Source: INDP (2010: 68)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Tunídeos	2242	1919	2042	1967	1681	2089	2194	2335	2339	2182	2102	2301	2538
Peq. Pelágicos	2040	1413	1527	1184	2165	2460	2931	1849	1708	1715	1652	1712	1889
Demersais	801	882	1013	1313	994	915	1224	1042	925	935	901	910	1003
Diversos	264	333	330	456	402	504	628	423	411	359	370	428	472
Total	5347	4547	4912	4920	5242	5968	6977	5649	5383	5191	5025	5350	5902

Table 6: Artisanal fisheries in Cape Verde, catch of species, 1994-2006
Source: INDP (2007: 1)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Tunídeos	940	1737	1640	1233	1188	2065	1742	1284	1103	1398	1220	737	1404
Peq. Pelágicos	1823	1990	2230	3230	2734	2003	1892	1734	2471	1889	2083	2360	2407
Demersais	58	126	240	137	156	164	90	74	40	81	75	148	80
Lagostas	68	60	29	25	27	35	29	26	23	28	26	36	36
Diversos	20	35	104	82	113	136	91	123	32	134	53	21	120
Total	2909	3948	4243	4707	4218	4403	3844	3241	3669	3530	3457	3302	4048

Table 7: Semi-industrial fisheries in Cape Verde, catch of species, 1994-2006
Source: INDP (2007: 1)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tunídeos	2089	2194	2335	2339	2224	1 648	1339	1 674	1390	1 197
Peq. Pelágicos	2460	2931	1849	1708	1655	2 164	2151	1 383	1 483	1 291
Demersais	915	1224	1042	925	879	1 065	909	935	1 112	962
Diversos	504	628	423	411	414	382	423	538	649	568
Total	5968	6977	5649	5383	5172	5259	4822	4530	4634	4018

Table 8: Artisanal fisheries in Cape Verde, catch of species, 1999-2008
Source: INDP (2010: 71)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tunídeos	2065	1742	1284	1103	987	1 294	675	1 366	801	835
Peq. Pelágicos	2003	1892	1734	2471	2088	2 027	2 358	3 743	3360	3 158
Demersais	164	90	74	40	22	61	83	159	64	62
Lagostas	35	29	26	23	17	26	12	11	8	8
Diversos	136	91	123	32	99	33	52	389	207	47
Total	4403	3844	3241	3669	3213	3441	3180	5668	4440	4110

Table 9: Semi-industrial fisheries in Cape Verde, catch of species, 1999-2008
Source: INDP (2010: 71)

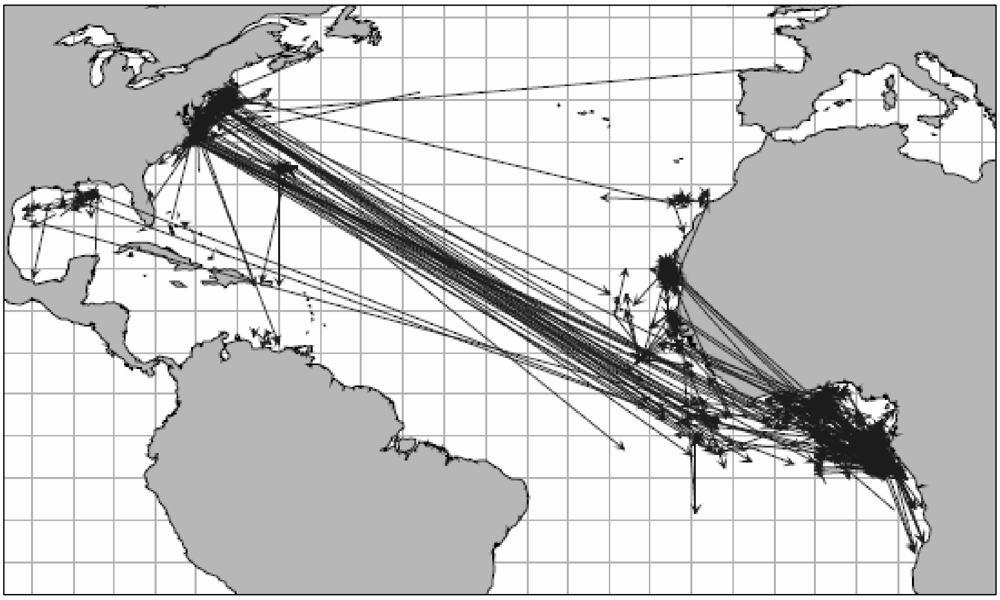


Figure 5: Movements of tagged and recovered Yellowfin tuna
Source: ICCAT (2006-2009: 12)

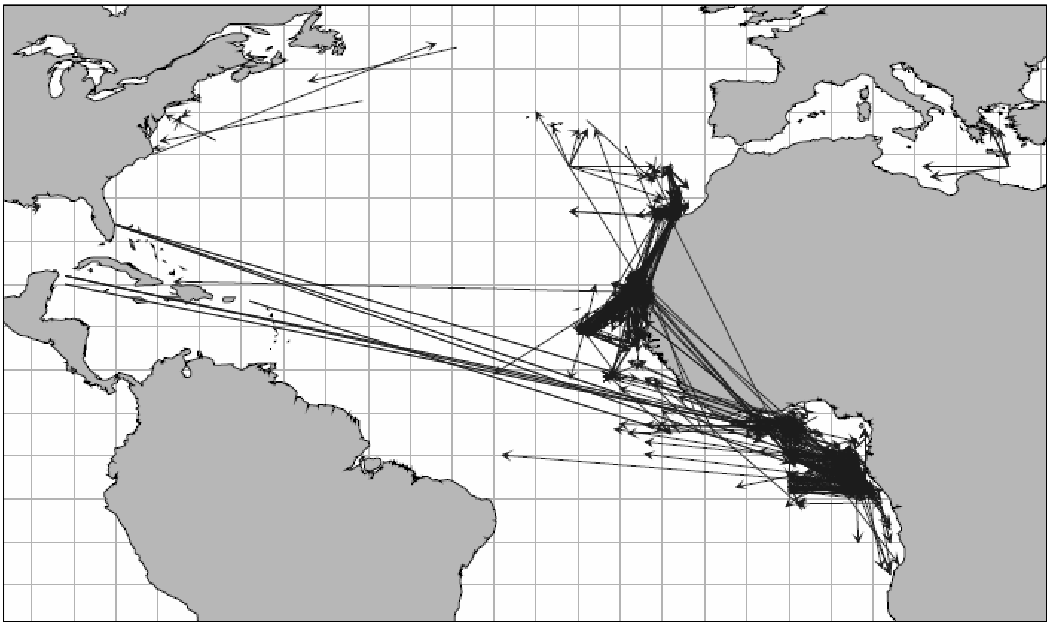


Figure 6: Movements of tagged and recovered Bigeye tuna
Source: ICCAT (2006-2009: 38)

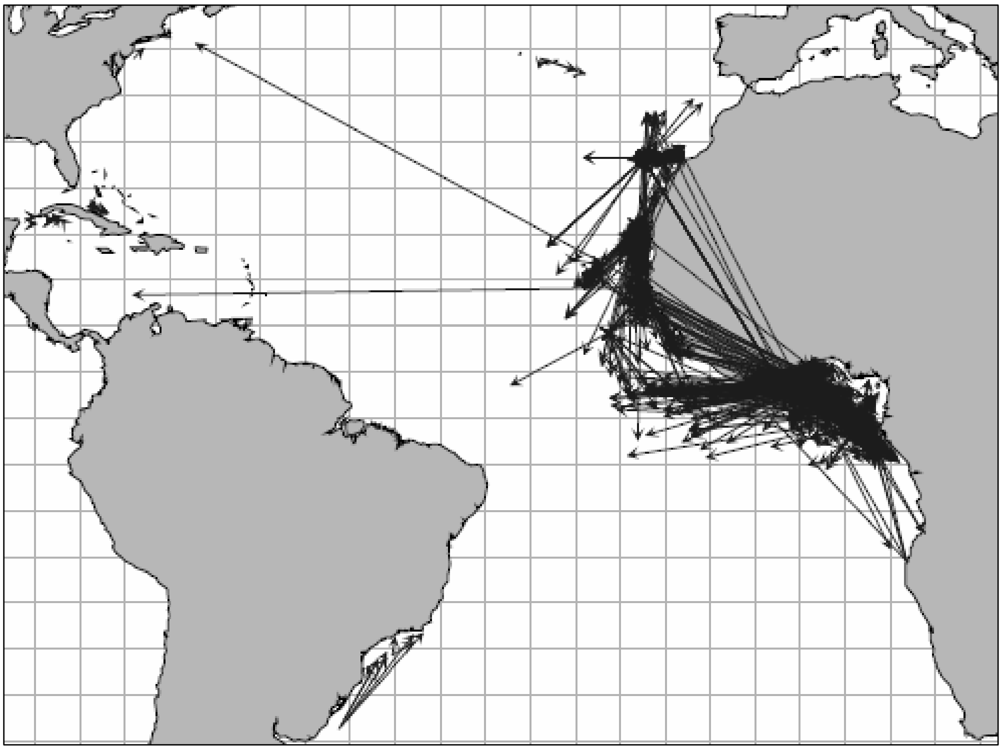


Figure 7: Movements of tagged and recovered Skipjack tuna
Source: ICCAT (2006-2009: 63)

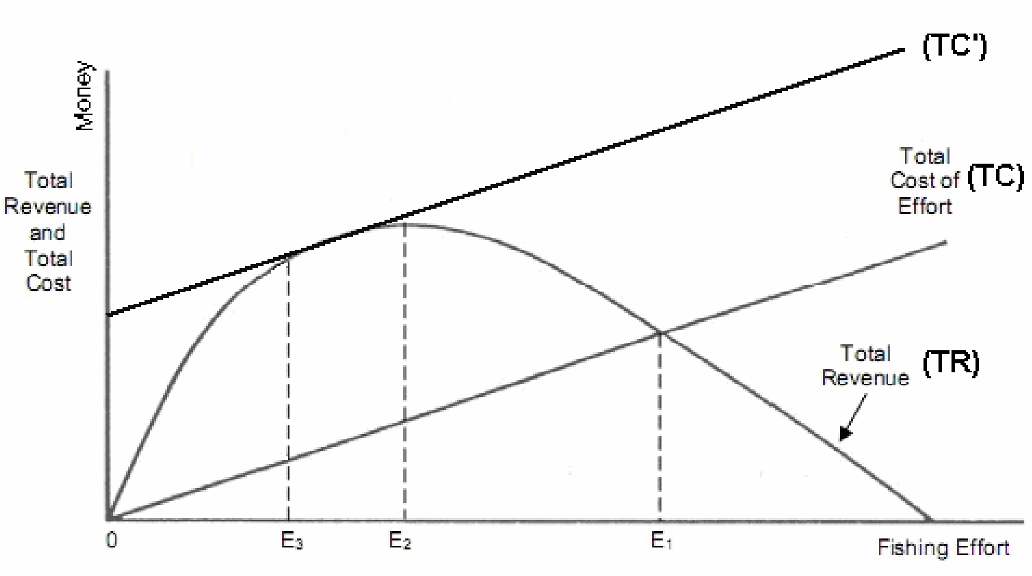


Figure 8: Revenue, costs and a theoretical solution
Source: Modification of Sumaila (2006)

Country	Expiry date	Type	EC contribution per year	Earmarked for fisheries policy development
Angola	No protocol in force			
Cape Verde	31.8.2011	Tuna	385 000 €	100 %
Comoros	31.12.2010	Tuna	390 000 €	60 %
Côte d'Ivoire	30.6.2013	Tuna	595 000 €	100 %
Gabon	2.12.2011	Tuna	860 000 €	60 %
Gambia	No protocol in force			
Greenland	31.12.2012	Mixed	15 874 244 €	3 261 449 €
Guinea	31.12.2012	Tuna	1 050 000 € 1st year decreasing the following years	100 %
Guinea-Bissau	15.6.2011	Mixed	7 500 000 €	2 950 000 €
Equatorial Guinea	No protocol in force			
Kiribati	15.9.2012	Tuna	478 400 €	30 % to be increased to 40 % the second year, later to 60 %
Madagascar	31.12.2012	Tuna	1 197 000 €	80 %
Mauritania	31.7.2012		86 million € 1st year decreasing the following years	11 million € / year increasing in the following years
Mauritius	No protocol in force since 3.12.2007			
Micronesia	25.2.2010	Tuna	559 000 €	18 %
Morocco	27.2.2011	Mixed	36.1 million €	13.5 million €
Mozambique	31.12.2011	Tuna	900 000 €	100 %
São Tomé and Principe	31.5.2010	Tuna	663 000 €	50 %
Senegal	No protocol in force since 1.07.2006			
Seychelles	17.1.2011	Tuna	5 355 000 € (as from 17.01.2008)	56 % (as from 17.01.2008)
Solomon Islands	8.10.2009	Tuna	400 000 €	30 %

Figure 9: List of all current FPAs
Source: EU (2010f)

Artisanal fishing in Cape Verde: Questionnaire for local fishermen
Matthias Mundt 2010

Nome/Name: Sexo/Sex: Idade/Age: Residência/Residence:

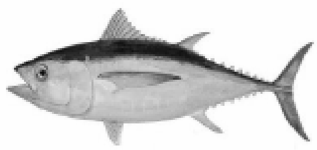
1) Onde pesca normalmente? (Em qual região, em qual praia, em qual ilha?)
   Where do you fish normally? (In which region, on what beach, on what island?)

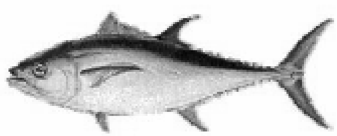
2) Que tipo de peixe pesca regular?
   What type of fish do you regularly fish?

3) Que tipo de embarcação usa? (Barca, barco, navio)
   What kind of boat are you using? (Barge, boat, ship)

4) É possível pescar atum com essa embarcação? (sim, não)
   Is it possible to fish tuna with your boat?

   Sim/Yes → 4a) Que tipo de atum?
   What kind of tuna?


Atum-de-olhos-grandes / Bigeye tuna


Atum-azul / Bluefin tuna

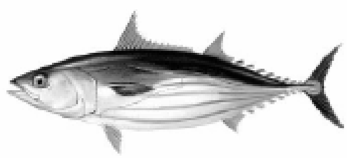
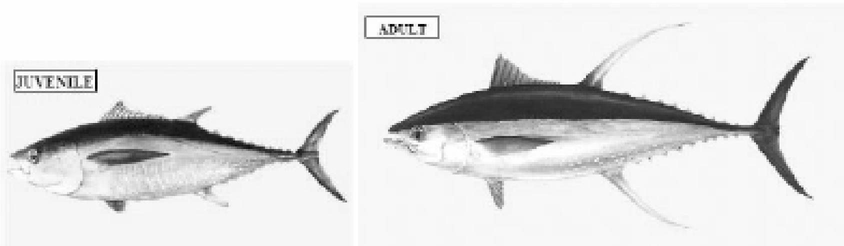

Bonito / Skipjack tuna

Figure 10: Questionnaire for local fishermen I
Source: Own compilation



Albacore / Yellowfin tuna

5) Qual equipamento usa para pescar?
What equipment do you use for fishing?

6) Os pais do senhor eram pescadores?
Were your parents fishermen as well?

7) Como aprendeu a pescar?
How did you learn to fish?

8) Onde vende os peixes normalmente?
Where do you sell the fish usually?

9) Antigamente havia mais peixes ou menos peixes?
Have there been more or less fish in the past?

Não/No → 9a) Quem tem a culpa por isso?
Who do you think is responsible for that?

10) Já viu alguma embarcação estrangeira no mar alto?
Did you encounter foreign ships on the open ocean?

Sim/Yes → 10a) As embarcaçoes estrangeiras são concorrentes?
Are these ships competition for you?

11) Há (tem) financiamento/dinheiro do governo ou de algum instituto?
Do you receive funding/money from the government or another institution?

12) Está contente com a profissão do senhor?
Are you satisfied with your job?

12a) Porque?
Why?

Figure 11: Questionnaire for local fishermen II
Source: Own compilation

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