



The impact of Illegal, Unreported, and Unregulated (IUU) fishing on Biodiversity and Societies in West Africa

Thesis in Sustainable Coastal Management

Supervisor: Stefan Heinänen PhD

Keywords:

IUU fishing, Exploitation, Gulf of Guinea, West Africa, International Law of the Sea

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Abstract: West African waters are rich in marine biodiversity, providing livelihoods for the fastest growing population on the planet. The sea supports various fish species, but illegal, unreported, and unregulated (IUU) fishing is a persistent threat to West African societies and biodiversity. In the last years numerous vessels were detected practicing illegal fishing methods with various facets in the Gulf of Guinea and other West African coastal states. This thesis describes the maritime environment as well as giving a historical comparison of the aspect of overfishing and its outcomes. However, the focus lies on the impact of IUU and the situation in West Africa such as the unfair competition between artisanal fishermen and industrial vessels, food security. Also, ecological outcomes, like diminishing fish populations or bycatch are in the focus. Furthermore, the thesis brings countermeasures on various levels on the table and tries to propose recommendations on how solutions can look. A concerned United Nation Security Council (UNSC) is more and more alert and has recently ratified another resolution concerning the situation in West Africa. Piracy and other unlawful activities are on the rise and interlockings between those activities and IUU fishing can be found in a spiral of violence. That's why countermeasures on various levels are important to prevent an escalation of instability in the region.

Language: English

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Figure 1 Map of West Africa with Gulf of Guinea to the south <https://earth.google.com>

Figure 2 Fishing Area 34 (FAO, 2022)

Abbreviations

CECAF - Fishery Committee for the Eastern Central Atlantic

DESA - United Nations Department of Economic and Social Affairs

DG SANCO - Directorate-General of Health and Consumers (European Commission) before 2014

DG SANTE - Directorate-General for Health and Food Safety (European Commission)
Successor of DG SANCO since 2014

EEZ - Exclusive Economic Zone

EU - European Union

FAO - United Nations Food and Agriculture Organization

GDP - Gross domestic product

HDI - Human Development Index

IEZ - Inshore Exclusion Zone

IPCC - Intergovernmental Panel on Climate Change

IUU - Illegal, Unreported and Unregulated (fishing)

km² = Square Kilometer

MCS - Monitoring, Control and Surveillance

MPA – Marine Protected Areas

Nm - nautical mile = 370,4km

SAIKO – Saiko fishing is an illegal fishing practice where foreign trawlers sell their catch
back to local fishermen

SDG - United Nations Sustainable Goals

USD – United States Dollar

TRACES - Trade Control and Expert System

UNDP - United Nations Development Programme

UNSC - United Nations Security Council

1 INTRODUCTION

Africa has a long history of exploitation (Hochschild, 1998, p. 10). The trade in the late medieval period in Eurasia predominantly consisted of gold being transported through the Sahara, primarily in the Western Sudan. Diamonds, and other natural resources such as valuable ores were mined and transported to Europe. Furthermore, slaves were exported to North Africa and further. While the Trans-Saharan slave trade (Wright, 2007, p. 2) mostly affected women that were sold as concubines and servants the Atlantic slave trade that happened later deported mostly males (Headrick, 2021, pp. 165). Over 12 million Africans were deported across the Atlantic Ocean as a resource, mainly to contribute to agricultural labour in the Americas (slavevoyages.org).

Later uranium, natural gas, oil and other ores were extracted and also, coltan and cobalt, were exploited. Recently large deposits of rare earths have been detected (FAU, 2021). The resource curse is often associated with the occurrence of conflicts within a country, as a result of natural resource abundance (Thorpe et al., 2009, pp. 393). According to the United Nations Environment Program (UNEP), over the last 60 years, natural resources have been linked to at least 40% of all intrastate conflicts, which doubles the risk of conflict relapse in the first five years. Furthermore, since 1990, a minimum of 18 violent conflicts have been instigated by the exploitation of various natural resources, including high-value commodities such as timber, diamonds, gold, minerals, and oil, as well as scarce resources like fertile land and water. (UNEP, 2023)

For decades the pressures on our oceans through overfishing have increased and have reached an infamous peak in the crash of the cod population in the 1990s (Headrick, 2021). Many waters are extremely affected by overfishing and fish populations have collapsed. That's when West Africa has come into sight for foreign trawlers (Sea Shepherd, 2022).

1.1 PROBLEM

In May 2022 the United Nations Security Council (UNSC) ratified the Resolution 2634 regarding the situation in the Gulf of Guinea. The UNSC is in deep concern about the security situation in the Gulf of Guinea and the region in general.

In recent years illegal activities such as armed robbery at sea and piracy have been on the

rise. Transnational crime, illegal, unreported and unregulated (IUU) fishing and other unlawful activities destabilize an already fragile environment. (*UNSC Resolution 2634, 2022*)

1.2 AIM AND GOAL

With this work I want to show the impacts of overfishing and IUU fishing on societies.

- a) How does IUU fishing affect stakeholders, societies, and ecology.
- b) How can the situation be improved.

2 METHODS

- a) The thesis consists of two parts. The first part, a framework for describing and narrating literature is the theoretical approach that defines terms and clarifies, reviews, analyses, and compares subject connected literature. The reader should get a broader picture of the many facets of the effects of over, - and IUU fishing in West Africa and approaches and ideas to tackle IUU fishing effectively.
- b) The second, part consists of a content analysed semi-structured interview, being held with an IUU fishing expert for gaining a subjective perception on the current situation, the impact of IUU fishing and which countermeasures are conducted or suggested. The evaluation of the interview has similarities to the qualitative content analysis by Mayring (Mayring, 2022, p. 13).

The steps for the empirical part are as follows:

1. Interview with one expert on IUU fishing in a coastal West African country.
Duration: 30 minutes. Recording of the interview will be transcript and smoothed.
2. Based on the data gained from the interview, main themes and subthemes will be identified by highlighting key phrases and concepts, grouping similar ideas together, and creating a rough outline of the main themes in different tables.
3. Developing a coding scheme to categorize the raw data into tables. The tables reflect the main themes and subthemes identified in step 2, as well as any additional tables that may be relevant and have not been addressed within the theoretical part.

4. Analysing the data, where I will look for patterns, relationships, and connections between the different tables.
5. The findings will be summarized, compared with the literature part and the results will be presented.

The combination of these two main parts allows a more objective sight on the problem and in addition to existing literature, incorporates the experiences of a local resident, who is familiar with the topic.

3 AREA AND CATCHMENT

After a total failure in defining borders at the Berlin Conference from 1884 to 1885 the continent quickly was divided by European continental powers, (Hochschild, 1998, p. 84) (Mark-Thiesen & Mihatsch, 2019, p. 884) and it should remain under colonial rule for decades, until around 1960 when the vast majority of states in West Africa gained independence. (Nugent, 2012, p. 24)

West Africa consists of various independent nation states, depending on definitions. The area described in this work concludes the coast of West Africa, from the Senegal southward to the Equator whereas the focus lies on states with access to the Atlantic. The countries listed from north to south listed below with the number in brackets showing the Human Development Index (HDI) (UNDP, 2022a, p. 277).

- ❖ Senegal (170)
- ❖ Cape Verde (128)
- ❖ The Gambia (174)
- ❖ Guinea-Bissau (177)
- ❖ Sierra Leone (181)
- ❖ Liberia (178)
- ❖ Ivory Coast (159)
- ❖ Ghana (133)
- ❖ Togo (162)
- ❖ Benin (166)
- ❖ Nigeria (163)
- ❖ Cameroon (151)
- ❖ Equatorial Guinea (154)
- ❖ Sao Tome and Principe (138)

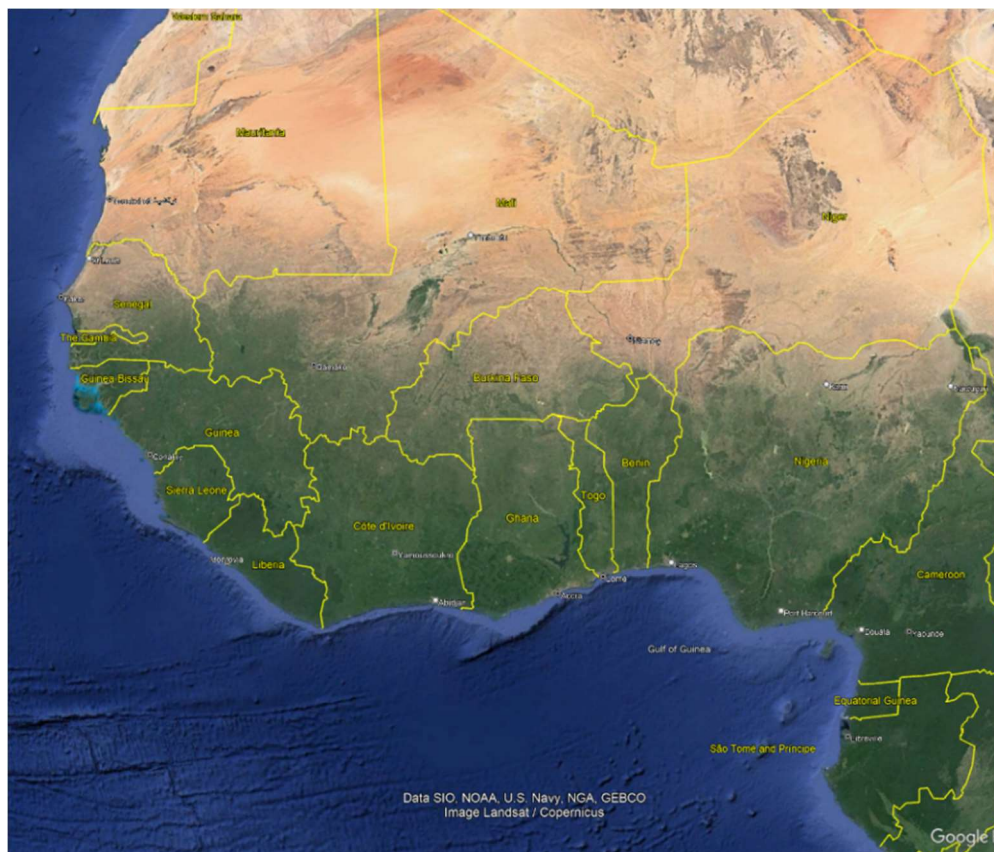


Figure 1 Map of West Africa with Gulf of Guinea to the south (<https://earth.google.com>)

Landlocked countries like Chad, Niger, Mali, or Burkina Faso are not directly affiliated with over- and IUU fishing on the Atlantic coast. Nevertheless, with overfishing and its complex relations to organized crime and other illegal activities landlocked and littoral countries are affected too. (UNSC Resolution 2634, 2022, p. 1)

3.1 DEMOGRAPHICS

Africa with a size of 30 million km² and a shoreline of 30490 km complies to 22 % (APA, 2020, p. 187) of the planet's landmass and is the second largest continent of the planet (Britannica, 2022). However economically, West Africa is among the poorest regions in the world (UNDP, 2022b, 273, 274). The agricultural sector is the most dominant, contributing 30-50 % to the GDP (gross domestic product) (IFAD, 2022). According to Belhabib et al. (2015c), fisheries can contribute up to 38 % of West Africa's GDP. (Dombouya et al., 2017, p. 2)

Africa has furthermore the youngest population in the world (DSW, 2022) and the catchment area West Africa, where around 419 million people (2021) live has the fastest

growing population and economy on the whole continent. For West Africa, according to the Human Development Index (HDI), calculated by different factors, only very few countries hardly reach medium human development, while states such as Sierra Leone and Guinea- Bissau remain in the last third of the low human development column. The HDI includes 191 countries. (UNDP, 2022b, 273 pp)

3.2 MARITIME ENVIRONMENT

The coastline of West Africa is a nutrition rich region (Binet, 1997, p. 178) and bears one of the largest fisheries in the world (Goffinet, 1992, p. 106). For understanding the vital fishing waters, someone needs to recognize basics of geology, climatology and oceanography.

Africa lies completely on the African Plate (TOU, 2007, p. 26) and the West African shelf, which is relatively wide has a low coastal topography. Strong river inflows from twelve major rivers as part of a big estuarine system transport huge amounts of sediments into the Gulf of Guinea (Ukwe, 2003, p. 220).

The Coriolis Effect exists in a rotating object. This object, the rotating earth, also creates gyres, a complexity of oceanic currents. In the northern hemisphere they occur clockwise while in the southern hemisphere ocean currents tend to move anticlockwise. Planetary vorticity, horizontal and vertical friction decide the circulatory patterns by wind stress curl (TOU, 2007, p. 98).

These movements alongside thermocline shoalings induce upwellings. The nutricline layer is uplifted in the photic layer and thus strong primary production is possible. Thermocline shoalings or upwellings such as the Benguela and Canary upwellings, which occur in both hemispheres are induced mostly by wind. Surface waters of the upwellings flow to the Equator. (Binet, 1997, p. 178)

The Canary Current and the Benguela Current are within the most productive Large Marine Ecosystems (LME's) of the world (Rosenberg et al., 2014, p. 68). The Canary current in the northern hemisphere flows clockwise and the Benguela current in the southern hemisphere flows counterclockwise. Both the Canary and Benguela upwellings are considered parts of the intertropical anticyclonic gyres in both hemispheres, making them components of the oceanic boundary systems. (Binet, 1997, p. 178)

The unique considerable shelf, (Sheridan et al., 1969, p. 2514) together with the Canary Current intersection located in the north, the Benguela Current in the south and the more eastward along the coast flowing Guinea current form this important hydrographic boundary. (GCLME, 2006, p. 11) This, paired with local currents makes countries such as Sierra Leone one of the planets most productive marine ecosystem (Heymans & Vakily, 2002). The main areas for marine fishing in Western Africa lay in the Guinea, Canary and Benguela currents (Binet, 1997, p. 178).

4 FISHING

In this chapter overfishing and IUU fishing will be described using different literature. Secondly, the current situation regarding West Africa will be delineated. Often the state of Sierra Leone and other neighbouring countries in West Africa serve as example for describing issues.

Fishing areas of the world oceans and seas are divided by the United Nations Food and Agriculture Organization (FAO) in several sectors. FAO Area 34 or Eastern Central Atlantic is the area through the West African coast. (FAO, 2022)

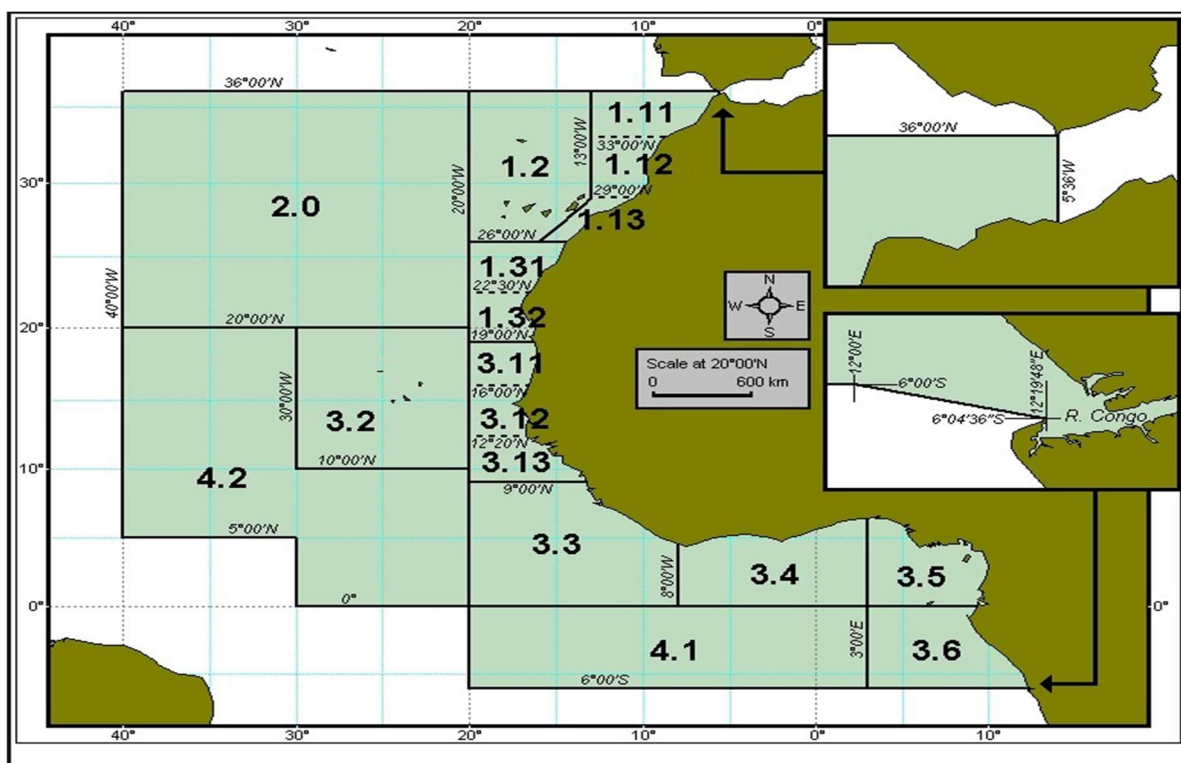


Figure 2: Fishing Area 34 (FAO, 2022)

4.1 OVERFISHING

Overfishing is the excessive removal of fish by various fishing techniques. Overfishing happens if more fish are fished than can reproduce naturally. (Headrick, 2021, p. 433)

Bach et al. estimates that of global stocks, around one-third is overfished. (Bach et al., 2022, p. 574) The Sustainable Development Goals (SDG) Report of 2022 (DESA) published congruent figures saying that of global stocks in 2019, more than 35 % were overfished.

This is even a rise in recent years since the SDG was introduced. (DESA, 2022, p. 55)

Almost half of FAO's estimated fish population in the Central Eastern Atlantic is overfished. (The Maritime Executive, SEP 2, 2019)

Globally, fishing increased in the last century insanely fast. For instance 120 years ago total catches were around 4 million tons (t) In the 1940 this rose to 20 million t and up to 90 million t in the 1980s (Headrick, 2021, p. 422).

The cod overfishing

An example of massive overfishing is the cod (*Gadus morhua*) overfishing (Sobel, 1996) in the North Atlantic in the 1990s when 30000 employees lost their job as stocks collapsed (Headrick, 2021, p. 433) Stocks have not recovered yet and this will take until 2026 but there are doubts because the whole ecosystem has changed, (Greenberg, 2010, pp. 148–149). The spawning environment is also fundamentally damaged, mainly because of the bottom trawlers (Headrick, 2021, p. 435). The size of the cod has also decreased (due to fishing); reproductive age fish individuals are few. For the cod population that is reproducing earlier now due to the overfishing in the 1990s the evolutionary change of reproducing earlier is irreversible. Although stocks have begun to recover, reproducing habits have not returned to how they were before the crash. (Nilsson-Örtman & Rowe, 2021, p. 5)

Overfishing can cause species to develop fundamental evolutionary changes. Cod fish are reproducing smaller in size and earlier than it has been before the population crash in southeastern Canada in the 1990s (Nilsson-Örtman & Rowe, 2021, p. 5). However, Pinsky et al. (2021) examined the genome of the Atlantic cod (*Gadus morhua*) and concluded that the collapse has not left evolutionary scars. An explanation for the younger reproductive age could be the non-abundance of bigger mature male fish. Thus, young individuals are not threatened by big males anymore. (Pinsky et al., 2021, p. 4)

In the second half of the last century the Polish fleet was highly active in Senegalese waters, fishing small pelagic species with the first peak in 1978 (400 000 t per year). In the 1990s when they left, a total decrease in catches could be monitored. Only 100 000 t year were caught. With the arrival of the Russian small pelagic fleet, the catches peaked around 620 000 t per year. Since then, legal catches are decreasing in the industrial sub-sector while illegal catches tend to increase. (Belhabib et al., 2014, p. 6)

4.2 ILLEGAL, UNREPORTED AND UNREGULATED FISHING (IUU)

“Because Fish populations have been overexploited around Europe, around Southeast Asia foreign industrial fishing vessels are coming from around the world and congregating in Africa, a place where there is still fish.”

Peter Hammarstedt, Director of Campaigns (Sea Shepherd, 2022)

IUU fishing is any fishing activity that disobeys or contravenes international and national laws. (EJF, 2009, p. 4) such as:

- Fishing without license,
- The use of forbidden gear,
- Fishing in prohibited areas such as Marine Protected Areas (MPA)
- Target species that are protected (EJF, 2009, p. 4)

With the Ebola outbreak in West Africa in 2014, significantly more foreign trawlers were detected, fishing in the coastal waters in the Gulf of Guinea (Doubouya et al., 2017, p. 1).

Fish, as of common understanding finfish, aquatic invertebrates, pelagic and demersal species are targeted by foreign, as well as domestic fishing fleets in the EEZ (exclusive economic zone) of a sovereign country. These catches, legally or illegally caught, mostly never enter the host country they were harvested from. Catches are mostly processed in industrial vessels for transshipment to the receiving countries overseas. This is a loss for local economies, depriving them of revenue, jobs income, and other economic impacts. (Sumaila et al., 2020, p. 1)

4.3 STATUS QUO, MODUS OPERANDI AND FIGURES

Over the years IUU fishing evolved. The fleets operating in West African waters as well as the techniques and gear. Nowadays technological advances bring advantages for the tremendous extraction of seafood from the world’s oceans. (Guiry et al., 2021, p. 1) For

instance, the small boats called pirogues, used by local fishermen also have gone through an evolution. While the boats in the 1950s (Anoux, 1961) and before that could transport between 600kg and 1200 kg of fish and were between 6 and 12 meters, boats nowadays are up to 30 meters long. (Belhabib et al., 2019, p. 2) (Binet et al., 2012) They are nearly fully motorized and have a much wider radius of operation (Belhabib et al., 2014, p. 8). Furthermore, depending on where fishermen operate, fishing inputs like canoes and fish nets, used by marine fleets are stronger and larger than the ones from continental fishermen. (Montcho et al., 2022, p. 9)

In Sierra Leone, foreign fishing plays a prominent role. It is difficult to discern between legal and illegal fisheries. The national Sierra Leone Fishing Company with its complex ownership structure, the shareholder of licenses and finally the beneficiaries of the countries own resources make it difficult to assess efforts and stocks in a transparent way. (Seto et al., 2017, p. 158) An investigation that took place around 2008 in Sierra Leone and Liberia with the cooperation between EJF and the Sierra Leone Armed Forces Maritime Wing showed that vessels often where detected fishing within two nautical miles of the shoreline and in the inshore exclusive zone (IEZ) that is reserved for artisanal fishermen. In other cases, markings on the hull are concealed by overpainting or putting tape over the name. Some vessels even appear under three different names. A vessel of Chinese origin was caught destroying fishing gear of locals while fishing illegally in the IEZ. Other IUU vessels have no license. (EJF, 2009, p. 5) The destruction of fishing gear such as nets by IUU vessels is also reported by other sources. (MARITIME EXECUTIVE, NOV 18, 2020) Illegal fishing in Sierra Leone can be linked directly with unlawful operators and European and Asian markets. (EJF, 2009, p. 4)

Figures and estimated catches

Aerial surveys found, that between a third and up to 50 % of vessels fishing activities in Western African waters were operating unlawful and a report of MRAG and the EJF have found, that more than 26 % of Sierra Leones total catch have been caught illegally. (EJF, 2009) MRAG Ltd is an independent fisheries and aquatic resource consulting company. In official data 46 % of African catches have never been reported and unlawful catches in North-West Africa make up to 20 % in globally lost IUU fishing values (Belhabib et al., 2019, p. 12).

According to a study by Sumaila in 2020, IUU catches contribute between 8 and 14 million tons of fish. (Sumaila et al., 2020) For comparison this would be the equivalent of up to 20 million individuals of cattle lost each year.

Data collection and transparent evaluation often can be challenging and efforts have to be made in the future to improve quality and transparency. (FAO, 2013, p. 5) Seto et al. (2015) postulates that the significant exploitation of marine resources does not show up in the figures. For Sierra Leone the United Nations Food and Agriculture Organization (FAO) FishStat data, globally the most widely used statistic data on catch landings, is not including IUU catches. FishStat estimated Sierra Leone's total catches by all marine fishing sectors for the period 1950-2010 using a catch reconstruction approach that integrates national data, published expert knowledge and grey and published literature. Seto et al. 2015s work show that a significant part of the marine resources assessment is not inclusive in the statistics and that the reconstructed catches are more than 2.6 times greater than the FishStat values reported by FAO. (Seto et al., 2015, p. 1) FishStat thus, does not include political regime transitions, budgetary changes, and switches in monitoring patterns. Although reporting has improved from the 1950s when reconstructed catches represented more than 13 times the amount of the FishStat data at that time, to 38 % of additional reconstructed data reports in the 2010s. Remarkable is, that very most of Sierra Leones industrial catches within the EEZ is accumulated by foreign fleets even though small-scale fisheries sector is responsible for most of the domestic catch. (Seto et al., 2015, p. 1)

5 IMPACTS OF OVERFISHING AND IUU FISHING

"Why are you yelling at me? I didn't take the fish from the goddamn water." John Crosbies, Canadas Fishery Minister reply to angry fishermen due to the Cod moratorium 1992 (CBC/Radio-Canada, July, 2nd 1992)

In this chapter, the impact and outcome of IUU fishing will be addressed. By splitting the topic in different parts such as a socio-economic, an economic and an ecological part, the attentive reader will recognize that all these topics are overlapping and interlocking. Thus, the interdependence of socio-ecological and economic factors within the system simply makes it impossible to have straight boundaries for the subchapters.

IUU fishing is a serious threat (Seto et al., 2015, p. 8) and contributes along with other illegal factors to a multifaceted repertoire of the destabilization of a whole region. (*UNSC Resolution 2634*, 2022, p. 2) Illicit trade with marine fish catch has huge impacts on ecosystems and societies (Sumaila et al., 2020, p. 4). These outcomes will be discussed in the following chapters.

5.1 SOCIO ECONOMIC IMPACT

These subchapters will try to enlighten the different outcomes of over- and IUU fishing by characterizing various socio-economic factors and highlighting the impacts on societies in the region.

The problem for West Africa is that industrial fishing fleets, by harvesting pelagic species pose threats to sustainable artisanal methods of fishing. Fisher folks, mongers and consumers are all affected, as with them thousands of people whose food security and livelihood depends on fish. (Montcho et al., 2022, p. 13) As artisanal fisheries we understand local, small-scale, usually subsistence fisheries which are generally practicing fishing to support communities and family. (EJF, 2009, p. 3) Out of all small-scale fishermen only three % come from non-developing countries. The vast majority faces poverty and opportunities for broader economic and social development. (DESA, 2022, p. 55)

5.1.1 Nutritional consideration

World population is constantly growing and by mid November 2022 probably reached 8 billion with sub-Saharan Africa being expected to contribute more than 50 % of worldwide population increase expected through 2050 (UN DESA, 2022, p. i).

The west coast of the Sahel and Sub-Saharan Africa is characterized by a significant coastal population that is heavily dependent on the exploitation of marine resources. This is facilitated by the upwelling phenomenon, which is driven by the irregular low-frequency oscillations in oceanic and atmospheric climate conditions. The upwelling brings forth an abundance of marine life, providing a vital source of livelihood for the local communities (Binet, 1997, p. 178) (Allison et al., 2009, p. 187).

With one of the world's highest populations growth in the region in the Gulf of Guinea, (Ukwe et al., 2003, p. 221) fish with its high amount of protein contributes to food security (Montcho et al., 2022, p. 13) and aquatic species provide a broad spectrum of

proteins, as well as zinc, iron, vitamins and omega-3 fatty acids (Farquhar Samantha D., p. 77) Ghana, Sierra Leone and The Gambia are 59-67 % dependent on animal protein provided by fish (Allison et al., 2009, p. 184). The global average for proteins origins from animal products is 15 %, while in Sierra Leone fish delivers 75 % of the diet (FAO, 2009). Other sources even speak from up to 80 % of the total animal protein needed is derived from fish (EJF, 2009, p. 5).

As mentioned above, there is a huge demand for protein rich food to feed the population. With knowing IUU fishing, besides other factors can threat food insecurity (Sumaila et al., 2020, p. 1) it is uplifting to know that recent cooperations and projects have been taken actions in West Africa to enforce the research and methods of feed for animals such as poultry and fish. (Hall, Fitches, & Smith, 2021, p. 2) Furthermore, FAO recommends to use insects for animal food as well as for human consumption (IFWA, 2022).

5.1.2 Poverty and livelihood

In Sierra Leone traditional fishing provides income for approximately 230 000 people and can help poverty alleviations (EJF, 2009, p. 5). Local fishing contributes to the actors in their regions. For the south of Benin for example fishing activities can create net daily benefit of up to €65 (Montcho et al., 2022, p. 13). More than 200 000 Gambians depend on local fishing activities. This includes also indirect dependency (The Maritime Executive, SEP 2, 2019). But fishing also need to be profitable and small-scale fishermen should not have to see fishing as the last resort (Belhabib et al., 2015, p. 72).

With illicit illegal trade of goods such as fish, food security is jeopardized and economical loss can lead to various outcomes (Sumaila et al., 2020, p. 1).

West Africa and especially the Sahel region have experienced that. In the big droughts in the 1970s and the mid-1980s in the semi-arid areas such as northern Ivory Coast and Mali (Brottem, 2016, p. 549) many trees were felled to produce firewood. Tree logging as an alternative for income can be tempting. Of course, in the short term, the sold wood can feed families, but in the long term, it can lead to erosion, making fields hold less water and less resilient to climate change. Many years now several projects or management plans like the green wall, agroforestry and others have been trying to reduce deforestation or afforest the Sahel region. Some more, others less effective. The Farmer Managed Natural Regeneration (FMNR) method of Tony Rinaudo, an Australian

agronomist, that is based on the reviving tree stumps from cut down trees is highly effective and revolutionized afforestation. (Dieterich, 2018, p. 21)

With the marginalization of the subsistence and artisanal fisheries (Belhabib et al., 2019, p. 12) sector as part of an important socio-economic development, poverty is more likely to rise. (Béné, 2003, p. 967)

5.1.3 Piracy

IUU fishing increased quickly in Somalia in the 1990s. The result was a loss of biodiversity, overfishing and thus catch declined for locals. (Glaser et al., 2015, p. 21) 2003 foreign IUU vessels caught reportedly 337.2 million t of fish. That's more than 10 times the catch that local fishermen caught. With the noncompetitive IUU vessels and a loss of yearly 300 million USD in average, local fishermen turned consequently into piracy. (Farquhar, 2017, pp. 71-72)

Could this correlation between economic loss and piracy also be estimated for West Africa? Also repercussions of the Covid-19 pandemic enabled piracy to be on the rise. (UNSC Resolution 2634, 2022, p. 2)

5.2 ECONOMIC IMPACT

Besides the socio-economic factors, the whole economic zone of West and Central Africa faces big several huge challenges to get along. Fishing plays a pivotal role for the local economy, not only in terms of food security. (Montcho et al., 2022, p. 13) One must understand that IUU and overfishing has a devastating economical outcome especially regionally on the coast of west Africa.

- Economies and food security are threatened seriously by overexploitation. (Belhabib et al., 2014, p. 8)
- The Ebola Crisis (Doumbouya et al., 2017, p. 7) and the Covid-19 pandemic made it worse for fishers due to related restrictions and markets collapses (DESA, 2022, p. 55)
- The flow of commercial goods, including marine resource products is restricted due to high piracy activity in the Gulf of Guinea. (UNSC Resolution 2634, 2022, p. 2)

Taking a look into Sierra Leones economy approximately 500,000 people are employed in the fisheries sector, which nets the country over 142,000 t of fish annually (Interim Guinea Current Commission 2010; MFMR 2008). On the other side Sierra Leones waters IUU catches reach into the 100000 t each year (MRAG) Furthermore, the significance of coastal and marine resources to Sierra Leone is demonstrated in the fact that 11 % of Sierra Leone's GDP is derived from marine resources (FAO 2011). While estimation for legal fishing catches through foreign fleets lays between 20.000 to 200.000 t-per year, Seto et al. (2017) estimated that foreign IUU fishing lays between 5000 t und 100.000 t yearly. (Seto et al., 2017, p. 158)

In most countries of western and central Africa agriculture contributes between 70 and 80 % of the populations livelihood and income. (IFAD, 2022) Whether it is livelihood and/or food, itis even estimated that 6.7 million people out of 22 West African countries depend directly on fishing (Belhabib et al., 2015, p. 72). In relation to that high dependency Montcho et al. established that in the first decade of the 21st century EU and Chinese fleets in West Africa caught fish worth 8.3 billion euros. (Montcho et al., 2022, p. 13)

Between 2010 and 2015 countries in West Africa lost a total of 24.6 billion USD. About 50 % of that was accumulated by trawlers operating unauthorized in territorial waters (Dombouya et al., 2017, p. 7).

Although since efforts to help small-scale fishers have expanded in many areas there is still a long way to go (DESA, 2022, p. 55) and United Nations Sustainable Development Goal (SDG) concluded that several subsidies regarding the fishing sector have to be overthought and prohibited. As an example, an estimated 19 % of the subsidiaries for the fishing sector in 2018 was used for the small scale fishing sector whilst over 80 % were used for industrialized large scale fishing sector. The subsidiaries budget was 35.4 billion USD. Of these 80 % 18.3 billion alone contributing to enhance capacity. (Schuhbauer et al., 2020, p. 1) Alone 7.2 billion USD are fuel subsidies and are harmful to the environment by keeping inefficient fuel technologies alive (Sumaila et al., 2008, p. 832).

However, beyond the negative impact on the marine environment induced by fuel-inefficient technologies, the next chapter will describe further which outcome over- and IUU fishing have on the natural environment.

5.3 ECOLOGICAL IMPACT

This subchapter will focus on the loss of biodiversity, especially emphasize the extinction and nearly extinction of marine wildlife.

Commercial fish and other marine life are threatened by IUU-fishing, they need to reproduce, and stocks have to be replenished (EJF, 2009, p. 5) but foreign fishing fleets catch more than domestic fleets and in some years are estimated to surpass whole fishable biomass in the EEZ of Sierra Leone. (Ssentongo et al., 1986) (Seto et al., 2017, p. 158)

Furthermore, the abundance of fish depends on seasons and climate. In the waters of Benin, for instance, between May and July when the transition from wet to dry season happens the production of fish and in, foremost small marine pelagic fish is diminishing. (Montcho et al., 2022, p. 9)

In Senegal, the groupers (*Epinephelus aeneus*), (Belhabib et al., 2014, p. 2) high-value fish were driven almost to extinction (Thiao, Chaboud, Samba, Laloë, & Cury, 2012) This species, nearly threatened according to the IUCN Red List of Threatened Species (Pollard, Francour, & Fennessy S., 2018) also called false cod or African cod has a high trophic level of 4.0 which puts it in a relatively place among other marine species. (Ref. 69278) (fishbase.org, 2022) This species could serve ecosystem resilience and integrity as a role model. With the collapse of *Epinephelus aeneus* stocks, it could be interpreted as a barometer in global unsustainability that fisheries in Senegal demonstrate. (Thiao et al., 2012, p. 311)

Also the bluefish (*Pomatomus saltatrix*), once a dominating species out of more than 250 taxonomic groups, was commercially extinct. (Belhabib et al., 2014, p. 5) Of the dominant fish assemblages, the species average lengths and species diversity have declined. (Ukwe et al., 2003, p. 222) The marine mammals in the Gulf of Guinea waters such as whales, dolphins, and manatees are often endangered. Furthermore four marine turtle species lay their eggs along the Gulf of Guinea coast. (Ukwe et al., 2003, p. 221)

Bycatch

Out of the discarded fish approximately, 75 % are dead. (EJF, 2009, p. 5) Depending on the hydrological season and the fishing strategy, more or less bycatch is discarded. (FAO, 2013, p. 8)

Peter Hammarstedt, Director of Campaigns of Sea Shepherd claims that the
 “... the industrial fishing industry is responsible for the deaths of 300 000 whales and dolphins every year” (Sea Shepherd, 2022)

Sharks and rays for example have become more and more valuable for medicinal prosperities, celebratory reasons, and meat. Especially for the Asian market (Kindsvater, Pacoureaux, & Dulvy, 2021, p. 2). With the following case about sharks and rays, the reader might understand easier how biodiversity is suffering under IUU fishing and fishing methods that are affecting species that are not necessarily preliminary targeted by commercial vessels.

Example sharks and rays

The Aichi biodiversity targets cover overfishing with their `strategic goal B` which commits to reduce direct pressures on biodiversity and to promote sustainable use. The relevant content of the strategic goal B, target number 6 demands to manage fish sustainably to avoid overfishing and to operate and handle fisheries issues within a safe ecological limit failed for 2020. (Convention on Biological Diversity, 2020) For oceanic sharks the SDG for 2020 failed miserably as well as specific Aichi biodiversity targets (Pacoureaux et al., 2021, p. 571). However, this is a paradox, because among vertebrate species, sharks and rays have been living in the oceans much longer than others. Many of these majestic creatures are on the brink of extinction (Kindsvater et al., 2021, p. 2). Regarding overexploitation oceanic sharks for instance are threatened exceptionally (Pacoureaux et al., 2021, p. 571). Oceanic ecosystems have changed by altering from substitute apex predators such as sharks to fishing fleets. In the 20th century sharks and rays were usually caught as burdensome bycatch on the hunt for tunas. In recent years catch paradigms of sharks and rays have switched from unintentional catch to on purpose long line catch especially for the Asian market. (Kindsvater et al., 2021, p. 2)

Undulate ray

The elasmobranch species undulate ray (*Raja undulata*) are slow growing, reach maturity late and have a maximum lifespan of over 20 years. (Coelho & Erzini, 2006) The endangered rays can be found on the seabed down till the Gulf of Guinea. Usually they are a bit more north in the Mediterranean Sea, the North Atlantic in Portuguese and Spanish waters, (IUCN Red List of Threatened Species, 2015, p. 2) to the south coast of the British Isles, the Bay of Biscay, Algarve, Mauritania, Canary Islands and southwards.

(Vilcinskis, 2000, p. 50) The main threat is that rays were caught with trawl nets and had been often discarded as bycatch, because they are primarily found where other commercial fish are abundant too. In the North Atlantic it is one of the most vulnerable, endangered species. (Bardey, 2020, p. 398)

Another factor why the elasmobranch species, *undulate ray* are endangered (Coelho & Erzini, 2006, p. 84) because legislation and techniques regarding fishing still are regulated so poorly, so many fish are caught as bycatch. (Bardey, 2020, p. 398) Thus overfishing, but also habitat destruction plays a major role in the decline of stocks (Rossell, 2018, p. 1) with 60 % to 80 % between 1981 and 2003. (Coelho & Erzini, 2006) Others even postulate that between 1981 and 2005, 80 % of undulate rays were recorded lost (Ellis et al., 2012). From the late 1980s to the mid-2000s 29 % of these rays have decreased in southern Portugal (IUCN Red List of Threatened Species, 2015, p. 1).

5.4 HOLISTIC GLOBAL IMPACT

The SDG No. 14 contributes to life below water. (UNSDG No.14) (Bach et al., 2022, p. 574). However, due to over- and IUU fishing, fish stocks globally are threatened (Sumaila et al., 2020, p. 1) (DESA, 2022, p. 55) and it can be said that the goal to end overfishing by 2020 has not been reached. (Bach et al., 2022, p. 574)

In the Gulf of Guinea, there is a complex relation between organized crime, cargo and oil theft, human arms, drug trafficking, smuggling, piracy including armed robbery at sea, and IUU fishing. These relations are destabilizing Central and West Africa and the UNSC is concerned about them. (*UNSC Resolution 2634*, 2022, p. 2)

Furthermore, the deforestation of the mangrove forests, for construction purposes and fuel wood is dangerous and thus supports erosion and coastal degradation (Ukwe et al., 2003, p. 222). This erosion resulting from overgrazing and deforestation, primarily caused by improper agricultural techniques, leads to the destruction of livelihoods and can also drive migration (Dieterich J., 2018, p. 17). In the past decades famines, because of droughts and land scarcity were the environmental push factor for around 10 million people moving towards coastal neighbouring states and in other urban regions in the Sahel (Reuveny, 2007, p. 664).

Could it be that a social-economic aspect can be calculated? The peculiar situation might motivate former fishermen to migrate to another country or even continent.

Consequently, the neighbouring country is promptly impacted. The socio-economic and ecological issues of a nation do not conclude solely at its border, particularly when those borders lack a basis in social, cultural, or ecological distinctions, and are instead marked by arbitrariness. This, of course would be the subject of another thesis though. Fact is, that the Gulf of Guinea region faces big challenges. biodiversity loss and health and socio-economic implications. (Ukwe et al., 2003, p. 221)

Climate change

Climate change will also increase migration to the coastal zones (Reuveny, 2007, p. 664). Climate change vulnerability assessments mostly focus on the agricultural sector (Allison et al., 2009, p. 4) but will have a significant impact on our oceans, depending on how much will be done to reduce emissions. Regarding which scenario salinity transport could be disturbed and for the Atlantic, this would lead to lower surface salinity because the Meridional Overturning Circulation of the Atlantic could collapse. (Dufresne et al., 2013, p. 38)

Climate change makes societies in Coastal areas vulnerable (Cinner et al., 2012, p. 19) and the states most unsusceptible to it, regarding fisheries, are in the tropics. Global warming will especially warm higher latitudes, due to its adaptive capacity. Although climate exposure and the dependency on fisheries in Africa, together with parts of Asia and the northwest of South America are most vulnerable to climate change. (Allison et al., 2009, p. 187) For West Africa the IPCC (Intergovernmental Panel on Climate Change) estimates that coastal countries will be affected significantly negatively by climate change (Niang et al., 2014, p. 1220).

Global warming and other factors need to be taken when tackling IUU fishing. The problem is complex and needs to be addressed with an holistic approach (Tessnow-von Wysocki et al., 2023, p. 241).

6 COUNTERMEASURES

This chapter will describe what can be done with the involvement of different stakeholders and entities on different levels to tackle over – and IUU fishing in Western Africa. As the same with the previous chapter measures can overlap and one action does not exclude another from contributing to a better.

6.1 INTERNATIONAL LAW OF THE SEAS

The United Nations Convention on the Law of the Sea (UNCLOS) adopted in 1982 is the most important international treaty on the Law of the Sea. It provides a comprehensive legal framework for the use and management of the world's oceans, including the rights and duties of coastal states, the rights of other states to navigate and fish in the waters of coastal states, and the rights of states to exploit the resources of the deep seabed. (UNCLOS 1982a)

The law of the sea has its origins in the early history of maritime navigation and trade when nations first began to establish their rights and jurisdiction over their coastal waters. However, the modern concept of the law of the sea as a distinct branch of international law began to take shape in the 19th and early 20th century.

The first major international conference on the law of the sea was held in Geneva in 1958, under the sponsorship of the United Nations. The resulting convention on the continental shelf established the rights of coastal states over the natural resources of the continental shelf, and laid the foundation for the development of a comprehensive system of law governing the use and management of the world's oceans. (Seidl-Hohenveldern & Stein, 2000, p. 219)

The Exclusive Economic Zone (EEZ) is an area that is attributed to a sovereign state with special rights in a specific area. This zone lays between 12 and 200 nautical miles from the baseline. (UNCLOS, 1982, Part V, Art. 56) One nautical mile is equivalent to 1,852 meters (Herdson, 1988, p. 237) (Encyclopedia Britannica, 2013). The EEZ has its origins in the cod wars between the late 1950s and mid-1970s, when conflicts mainly occurred between Iceland and the United Kingdom (Heidbrink, 2004).

The sovereign country within the EEZ has exclusive rights to explore and exploit resources such as energy production facilities, oil, gas, wind, and water. Furthermore, the use of marine resources is permitted, mainly fishing rights. The state is obligated to follow rules of natural conservation. (UNCLOS, 1982, Part V, Art. 56)

The baseline is a defined line that runs along the coast of a country to measure the seaward limits between territorial sea and the EEZ as well as other maritime jurisdiction zones. (UNCLOS, 1982b) Foreign fishing fleets are operating usually within a 200nm radius of the baseline of a sovereign country. (UNCLOS, 1982a)

In their last resolution regarding the situation in the Gulf of Guinea the UNSC reaffirms the importance of international law. It emphasizes that to achieve stability and peace in the long-term, democracy has to be strengthened by supporting sustainable development, enforcing the rule of law, claiming respect for human rights, addressing piracy and many more attributes. (UNSC Resolution 2634, 2022, p. 1)

Could an international UN-led operation at sea contribute to maritime safety, curb drug trafficking along the main routes from South America to Africa and Europe, and tackle IUU fishing? On the opposite, the international presence of multinational forces in Somalia waters showed that the pirate free zone where infested more with IUU fishing vessels. (Farquhar, 2017, p. 77) So could one conclude that piracy in some form discourages IUU fishing?

Role model Somalia

“The only viable long-term solution to the Somali pirate ship problem is to restore law and order in Somalia including in its waters.” Yuri Fedotov, the Executive Director United Nations Office on Drugs and Crime (UNODC) on the situation in Somalia (MaximsNewsNetwork, 2010)

By destroying the livelihood of local fishermen, (Sumaila & Bawumia, 2014) by IUU fishing and shipping toxic waste to dump it way cheaper in Somalia fish stocks depleted. These where the main drivers to turn more into piracy. (Singh P., 2012, p. 291)

Sumaila et al. has a similar opinion postulating that it is very likely that IUU fishing along with other factors can be seen as the root cause for the Somalia piracy problem (Sumaila & Bawumia, 2014)

Piracy is on the rise in the Gulf of Guinea. (UNSC Resolution 2634, 2022, p. 2) The pattern looks similar. The Gulf of Guinea is heavily polluted by industrial pollution. The lack of sufficient wastewater treatment facilities and the lack of waste abatement infrastructure leads to discharge of untreated effluents and wastewater. (Ukwe et al., 2003, p. 224)

In Somalia where all five permanent members of the UN security council ratified a resolution to combat piracy, (UNSC Resolution 1950, 2010, p. 1) the case for West Africa, and in particular the Gulf of Guinea shows parallels. (UNSC Resolution 2634, 2022, p. 2) In Somalia, a negative correlation between piracy activity and IUU fishing could be monitored. The more the waters were pirate free, the more IUU vessels where present. (Farquhar, 2017, p. 77)

6.2 REGIONAL

It is of utmost importance to manage fish stocks in a sustainable way to create economic growth as well as enabling fair future development. (DESA, 2022, p. 55) Necessary steps must be taken to tackle IUU fishing by developing transparent and sustainable management of fisheries regimes. The role of fisheries on artisanal fisheries and food security have to be highlighted as well as the factor of potential unperishable economic growth. (EJF, 2009, p. 23)

The UNSC encourages states in the Gulf of Guinea to initiate actions to combat armed robbery at sea and piracy. This could mean that congruent catch and border policy, as well as rules of engagement have to be implemented, consolidated, and enforced. (UNSC Resolution 2634, 2022, p. 2)

Although or because Sierra Leone is so poor 10 % of GDP is obtained by traditional fishing. (EJF, 2009, p. 5) For households relying on small-scale, artisanal fisheries, the loss of marine resources, there are little opportunities to make a livelihood. (Belhabib et al., 2015, p. 72) This means it is even more necessary to tackle IUU fishing, especially on a regional scale. Small states have the possibility to take countermeasures. Recently, there has been an increase of catch and size of fish perceived by fisherman in Sierra Leone. This was led back to the circumstances to the introduction of a vessel monitoring system (VMS) that was introduced in 2011. In 2012 the Inshore Exclusion zone (IEZ) was extended by 5nm (Seto et al., 2017, p. 158) (Thorpe et al., 2009, p. 399) The IEZ is reserved for fish nursing and breeding areas and for small scale artisanal fishermen. (EJF, 2009, p. 5) For countries that do not have a sufficient fishing infrastructure such as cooling storage and processing facilities, fishing agreements can be a source of income while that infrastructure is built up (Farquhar, 2017 p. 77).

The fishing sector has high value and states try to increase revenue. In Sierra Leone the number of foreign vessels increased after the civil 1991-2002war with 2015 reaching the highest number since the war started. (Seto et al., 2017, p. 156)

Tracking vessels and a good surveillance is likely to help, but the area is so huge, and tracking can be distorted or there can be other technological loopholes such in the case of recently detained vessel 'Kanbal III' the ship went dark, meaning it switched off or simply did not use the location transponders required (Sea Shepherd, 05 Sep, 2022).

6.3 INTER- AND NONGOVERNMENTAL

International fisheries management

For overfishing, Goffinet (1992) postulated that internationalization in the management of fisheries would be the only tool to tackle the structural problems in the sector. This was in a time when internationally many waters were overfished. The statement might be some few years old, but it has not lost importance (Goffinet, 1992).

This could be interpreted as if fisheries management of IUU issues might be even more difficult than only in areas that are legally overfished. However, also without IUU fishing not even in European waters such as the Baltic Sea the total allowable catch (TAC) is complied with. Scientists, predominantly the International Council for the Exploration of the Sea (ICES) advice on sustainable catch quota and on fisheries relevant populations. (Carpenter & Heise, 2019)

To manage demersal fisheries in Central-West Africa a permanent working group was installed by the FAO, the Fishery Committee for the Eastern Central Atlantic (CECAF) (FAO, 2013). The northern working group focusses on a zone between Cap Spartel and southern Senegal while the southern CECAF zone group targets the area between southern Senegal and the Congo (FAO, 2013). There is also the smaller Fisheries Committee for the West Central Gulf of Guinea (FCWC), which focus especially on the Gulf of Guinea.

This contributes to a variety of organizations also mentioned by the UNSC in their Resolution 2634 to tackle the massive security concerns in the Gulf of Guinea. Regarding the involvement, it is not clear how the organizations mentioned in the resolution are connected and how well their transfer of knowledge and communication is.

Higher investment in Monitoring, Control, and Surveillance (MCS) techniques could help to combat illegal fishing in their waters (Belhabib et al., 2014, p. 9). The implementation of MCS has already had a positive impact on artisanal fisheries in Sierra Leone, resulting in increased income and profitability as the cost of fishing decreases. (Belhabib et al., 2015, p. 79)

Several studies around West Africa such as Doumbouya et al. (2017), Belhabib et al. (2014, 2018), and Seto et al. (2017) show that data are not available from all sources and whether they are trustable or not. This let us conclude that the situation in the Gulf of Guinea with all the states in the region is not easy to manage from a Monitoring, Controlling and Surveillance (MCS) point of view. Furthermore, the figures in chapter 5.2

‘Economic Impact’ gives space for interpretation for some doubt that cooperations between organizations might not work too well. (Doumbouya et al., 2017, p. 2) Mostly, management actions recommend the limitation or reduction of catch and effort. Nonetheless, the success of management actions such as control, surveillance, and monitoring are moderate because governance is low, and corruption is high (Belhabib et al., 2019, p. 3) (Interpol, 2014, p. 57)

Another study found that Monitoring, Control and Surveillance (MCS) can help to improve the situation, but only marginally. While for instance 1.8 billion USD of total economic loss in 2010 only 1.1 million USD were recovered by fines. This is less than 0.1 %. In 2015 when fined IUU vessels paid 8.2 million, their yield hit 2.3 billion USD. This are 0.4 % recovered. (Doumbouya et al., 2017, p. 7)

Physical approach

The international environmental activist group Sea Shepherd has been working together in West Africa and was remarkably successful. The *Operation Gambian Coastal Defense* where law enforcement from The Gambia and Sea Shepherd were cooperating partners, they detained four trawlers fishing illegally in protected waters or and double bagging in November 2020 alone. That means the nets are doubled to reduce the size of the net. (Maritime Executive, Nov 18, 2020) Over and above that The Gambia authorities and Sea Shepherd could detain and lead to prosecution 12 more trawlers linked to IUU fishing activities (Sea Shepherd, Oct 17, 2019).

A list of offences that law enforcement in West Africa witnessed together in a cooperation with the organization Sea Shepherd between 2016 and 2022:

- Document forgery. Sailing without flag
- Evasion of Justice
- False catch declarations
- Finning of sharks and rays
- Fish smuggling
- Fishing for species not under license
- Fishing in IEZ
- failure to meeting hull marking requirements
- Fishing inside IEZ and
- without license
- Fishing inside special management areas

- Fishing with prohibited gear (gillnets)
- Fishing without license in marine protected area
- bribery and missing crewmembers
- Fraudulent ID and fishing without license
- Identities fraud, missing cargo manifest, transshipment
- Missing fishing log book and other documentation
- Safety and Labor violations
- Safety of Life at Sea
- Tax and customs violations, missing documentation and missing crewmembers

In this period over 60 vessels were caught by joint operations including local law enforcement and Sea Shepherd. They either violated national or international law in West Africa and over 20 of them were sailing under Chinese flag. (Sea Shepherd, 03 Jan, 2023)

Similar data from the years 2010-2016 from the Environmental Justice Foundation 2012, Interpol 2014 and Greenpeace 2016 show a high level of agreement to the statements of Sea Shepherd (Dombouya et al., 2017, p. 4).

Patrolling though requires budget, trained crew, and resources such as boats and especially fuel. Furthermore, IUU vessels are highly mobile, and they develop tedious methods and techniques to revoke surveillance, especially because monitoring in the region is limited in the spatial area. (Dombouya et al., 2017, p. 2)

According to Mar Casariego, a vessel captain of activist group Sea Shepherd, patrols at sea are important to ensure compliance and force commercial trawlers out of protected areas (The Maritime Executive, Nov 18, 2020). But West African states have significant problems to fund the purchase of security material such as weapons and other equipment to fulfil effective operations against piracy. (*UNSC Resolution 2634*, 2022, p. 2) Furthermore communication, databases regarding ship traffic and geographic information systems have to be improved between neighbouring states. Satellite and radar like the KSAT (Kongsberg Satellite Services) and Synthetic Aperture Radar (SAR) can help law enforcement to support patrol missions effectively (The Maritime Executive, Sep 2, 2019).

7 INTERVIEW AND METHODOLOGICAL BACKGROUND

This interview guide tries to explain the method used here to provide instructions and traceability to show how to get to the result. However, one should fore more consider that the research method is a qualitative and interpretation follows a logical, subjective pattern.

The interview is semi-structured, and the interview partner is a researcher in the field of Coastal Management in a University in Ghana with an experience of 15+ years. He is male and around 35 years old. The interview was held in English and recorded on 18 April 2023 via video call. The interviewee wants to stay anonymous. Thus, the name of the interview partner will not be revealed but is known to the interrogator.

Therefore, 7 questions have been asked to the interview partner. The questions were carefully selected to answer the research question by a natural pattern from 1 to 7 to keep a natural flow in the conversation. Then the recorded video which has a length of around 30 minutes was transcript. (see annex)

The written text with the video, formed tables in the validation. Taking the video into consideration made sense to take emotions into account. According to the 7 questions asked, I created six (6) tables to respond as well as possible to the research question. By analysing the interview 6 tables seem to be reasonable to provide a base for the validation. The key statements are then paraphrased, analysed, and shortened. For the evaluation the reduced statements of all tables are concluded, and a comprehensive summary is made. The summary is presented at the end of the result section. In chapter 9 Discussion, the results from the empirical part will briefly be compared with the findings of the literature part to see which subject areas were covered and to what extent the results overlap or differ.

7.1 QUESTIONS

The questions asked in chronological order:

1. How do you perceive the fisheries situation in the Gulf of Guinea now and how has the situation at sea affected your personal situation?
2. Is there an impact on the people around you and on society?

3. Do you think there is still the same number of fish in the area where you live?
Regarding fishermen's daily catch.
4. In case of shortage or higher prices, what would be a substitute product instead of fish?
5. What are the government(s) plans in the region to tackle the problem, and are you aware of them?
6. Can you talk about security concerns in the region regarding foreign vessels and your perception on piracy?
7. What can be done to improve the IUU fishing situation in the Gulf of Guinea?

Additional information:

For the area of interest spoken above, this means the Gulf of Guinea; however, because this interview was taken with a person within the West African state of Ghana, the statement might have a stronger prevalence within Ghanaian proximity.

7.2 TABLES

1. **Table 1 Status quo:** The interview partner is talking about the current situation in his country and area of knowledge about the current state of IUU fishing and common practice.
2. **Table 2 Nutritional perception:** The statements fitting these criteria are about how IUU fishing affects nutrition, food security and its outcomes.
3. **Table 3 Environmental concern and decline of fish:** How and if fish catches have changed, the reasons for a possible altering of stocks and environmental issues.
4. **Table 4 Countermeasures:** Aims at identifying if the interview partner is aware of current countermeasures and ongoing projects to tackle IUU fishing, as well if those actions are in line with neighbouring states.
5. **Table 5 Challenges for improvement:** In this table the main difficulties combating IUU fishing will be in focus. The statements of the interview partner fitting this criteria will be highlighted.
6. **Table 6 Security concerns:** This table aims at identifying the interview partners' perception on piracy as well as on national security and if IUU fishing is affecting the security situation direct or indirectly within the area of interest.

8 RESULTS

The following matrices are the legitimate approach to obtain raw data from the interview. Paraphrasing the original quotes from the interview partner is of importance to show that there is a cognitive understanding of the original quotes of the source. The idea is that content and ideas of the interview partner can be reproduced with one's own words.

Table 1 Status quo: Status quo: The interview partner is talking about the current situation in his country and area of knowledge about the current state of IUU fishing and common practice.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Page, Line
1	The fishery situation in the Gulf of Guinea is precarious. There has been a lot of studies that indicates that the fish stock is dwindling and I think as part of a project we ran between 2014 to 2020, all the things we did was to do extensive fish stock assessment we had a number of Masters and PhD students studying on some very important, commercial important fish species to see what the situation is its clear that fish stocks in the Gulf of Guinea and of some other areas beyond the Gulf of Guinea has dwindled drastically and so this, of course is affected by lot of factors.	Fisheries in the Gulf of Guinea are in a worrisome state. Studies reveal a significant decline in fish, especially commercially important species. Also, in neighbouring areas the decrease is observed.	Fisheries are declining.	I, 3-9
2	The impact is obvious, businesses are affected in that the whole, if you analyse the whole value chain of the fishing industry, we have input we have output, people make investments into boats, into nets and then there are sometimes no fish to catch...	If there is a shortage in fish to catch, the entire industry and businesses are adversely affected throughout the value chain.	The shortage of fish is affecting the entire industry.	I, 21-23
3	We have a lot, we call them distance water fishing vessels (..), we have a lot of countries coming flying under the flag of convenience with some of our locals fronting for them and fishing in our waters. Now those fishes that are being caught a?? brought in to the country for either consumption they are exported and many of them have n???caught them at the at the port of the port one that you point where this	Foreign fishing vessels operate in Ghanaian waters under the flag of convenience with locals acting as intermediaries. Either is the caught fish then domestically consumed or exported. The data on the catch are not accurately collected at the port. The more concerning	Foreign fishing vessels exploit coastal waters, degrade ecosystems, and engage in the practice of SAIKO.	I-II, 40-53

	<p>data must collected quantum of fish been harvested from our system. That is not the worst part. the worst part however, however some of these fishing vessels come into areas where not to fish in trawlers come into the inshore waters, below a certain depth which is supposed to be for the normal, artisanal, local fishermen, boats trawlers come in there and by their activities they degrade the ecosystem. And so, and as they fish from there they go a bit further in to the sea, repackage them that's what we call SAIKO (...) repackage them as SAIKO..</p>	<p>issue is that some of these fishing vessels encroach upon inshore waters, reserved for local artisanal fishermen, and degrade the ecosystem. SAIKO fishing is the practice where fish from big vessels is repackaged and sold to small scale fishermen.</p>		
4	<p>but then also from within in country where fishermen go to see especially in the case f of Ghana with DDT with unauthorized fishing sizes, fishing nets, dynamite, dynamite in fishing. (..) They are able to detect an aggregation of fish and then they just throw dynamite and catch them.</p>	<p>In Ghana and other countries, IUU fishing such as using unauthorized nets, dynamite, and DDT are still in use.</p>	<p>IUU fishing practices using forbidden gear and dynamite.</p>	<p>VI, 231-238</p>

Table 2 Nutritional perception: This Table highlights interviewer statements with regard to the nutritional difficulties if diets have changed and how IUU fishing affects food security.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Page, Line
1	<p>Given that the quantum of fish we have in the sea has reduced, means you have to pay more for little fish. They sometimes just catch small size of fish. they are fishing all year around. The number of boats keep increasing, number of fishing vessels keep increasing year in year out and so it has become a bit more expensive. I would like to eat fish any day, I prefer fish any day to meat as protein source but it's becoming more and more difficult to sustain the procurement of fish as a source of protein.</p>	<p>The decreasing fish population is responsible for higher prices. Vessels are increasing and fish are getting more expensive. To obtain a diet based on fish as a protein source is increasingly challenging to sustain.</p>	<p>With dwindling fish abundance and increasing vessels fish as a source of protein is more expensive and difficult to get.</p>	<p>I, 10-16</p>
2	<p>And so, I can scale this up. Even to the nation and for instance in Ghana we know that our fish protein intake is about 800 thousand + metric tons. That would have increased by now, and we import more than 500 thousand metric tons, we are a coastal country we have at least more than 300 + land an beaches total along the 550 km of quee (sic) of coastline and you would expect</p>	<p>Despite Ghana being a coastal country with a long coastline, the country struggles to produce sufficient fish and has to import more than half of its fish protein. This situation is disappointing.</p>	<p>Ghana must import significant amounts of fish although it is a coastal country.</p>	<p>I, 34-39</p>

	that we are able to produce enough fish but hey its not happening. Its bad.			
3	..in a Boat Because the fishermen go to fish with specific gears to catch specific fishes. So, if it's a big seine of course you see some other fishes in there. But once you see different, maybe in the shoal of an aggregation of fish you have maybe shrimps in there you have snappers you have sponbrits (sic). All mixed up with juveniles and adults you just know that that kind of fish came from what we call SAIKO fishing which is illegal unreported and unregulated kind of fishing. Where they come in, fish at location they are not supposed to fish go back up, repackage them. And technically this way fishes that supposed to be dumped because its not what they are supposed to catch, but then they repackage them and then sold back to fishermen who were supposed to personally, or they have the right.	Fishermen use specific gear to catch targeted fish species, but when different types of fish, along with juveniles and are found mixed together in a catch, it indicates illegal and unregulated fishing known as SAIKO. This involves fishing in unauthorized areas, repackaging the catch, and selling it to the local fishermen who would have the right to catch them personally in the first place.	Illegal SAIKO fishing is practiced, and fish is repackaged and sold.	II, 64-72

Table 3 Environmental concern and decline of fish: Environmental concern and Decline of fish: How and if fish catches have changed, the reasons for a possible altering of stocks and environmental issues.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Page, Line
1	There are sometimes no fish to catch, they come back with sometimes trash. And so there has been some other studies trying to quantify the amount of waste in big seines which is a kind of fishing method here in Ghana and so they come back more or less with trash they don't get fish, they are losing revenue or they are losing money. People are actually losing investment.	At times, fishermen return empty-handed or with trash instead of fish Revenue is lost and investment too. Studies try to quantify the amount of the waste caught.	Catches are decreasing and species are getting smaller. Studies are investigating.	I, 23-27
2	So yes, maybe for instance those species may not have been overfished but then a lot of common fish species that are consumed in Ghana have been overfished and the sizes we used to get, we no longer get. We get small sizes.	Compared to the past, many species are much smaller than they used to be. Overfishing is happening in Ghana, but not with all species.	Not all species are overfished Caught fish are smaller.	III, 98-100
3	I think this year closed the sea I think either with some few days ago they have closed the sea again and why is it necessary to close the sea because we expect that during or between May, June, July I guess	As a protection measure for spawning, the sea has been closed. In the cooler season the water provides a	Closed season helps the fish to reproduce.	III, 109-116

<p>there about the fishes start spawning it's the time where the weather is relatively cold and so upwelling happens and then brings food ????. that has deposited at the bottom of the ocean bout the surface fishes are able to feed but would get fecund ?? or pregnant as we call it and the they give a so we don't allow fishing within this period and so this is maybe an indication that if numbers have not going done down we don't need to be instituting a management measure with for instance is the closed season.</p>	<p>favorable condition for reproduction between May and July. Management measures like the closed season help to ensure fish population is sustained.</p>		
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Table 4 Countermeasures: Tries to identify if the interview partner is aware of current countermeasures and ongoing projects to tackle IUU fishing. Furthermore, if those actions are in line with neighbouring states.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Line, Page
1	<p>(...) and so that is one of the reasons why the United States government gave my center almost 5 Mio dollars to build capacity which was meant for, we call fishes and coastal management capacity building program. The idea is to train the requisite people to provide data to indicate that fish stocks are dwindling. And then to provide the local communities the capacity to focus on other sources of livelihood rather than the small scales fisheries.</p>	<p>US government provided money to enable capacity building for research, training, and education in coastal management measures. It also empowers locals to pursue other livelihoods rather than artisanal fishing.</p>	<p>Foreign aid enables training locals for a livelihood diversification.</p>	<p>III, 92-96</p>
2	<p>we have been able to establish the cause for a closed season, so I think for the first time, I think somewhere in 2019 thereabout 2020 there was a fishing closed season for artisanal fishers. They have been closing it intimately?? for the industrial fishers like the tuna boats and then the bottom-line fishers ??? but then for the artisanal, for the first time they had close ...</p>	<p>The cause for establishing a closed season was identified and a closed season was established. For industrial fisheries such as bottom liners and tuna boats it already existed but recently it was also implemented for artisanal fishing.</p>	<p>A closed season was introduced for artisanal fishers for the first time following the existing practice for industrial vessels.</p>	<p>III, 105-108</p>
4	<p>We are having a training right now happening in Accra later this afternoon the will be coming done to Cape Coast to continue the training tomorrow till Friday and its on IUU. we're teaching them all the issues regarding IUU, climate science, everything, management, peer to peer ??? they've gone to a monitoring, control and surveillance system thermal harbor??? in Accra to see how the systems are</p>	<p>The US Embassy funds trainings and education at several places in Ghana where topics like climate science, management, monitoring control and surveillance, peer to peer is covered.</p>	<p>Efforts are made to educate and train stakeholders about IUU.</p>	<p>IV, 161-166</p>

	built up. So and that is funded it from the US State Department aa US Embassy to have this training across the region.			
5	..Its really a big consent and so what we are doing is to work with governments to probably set up a whole network of monitoring control and surveillance system MCS. where, because as I've mentioned a lot of these countries, Liberia for instance hardly produces any significant volume of fish but then, about 90% + a year of vessels fishing in their ecosystem are flying of flags of convenience from other countries. and this is a similar situation in Mauretania, and then even in Ghana so the idea is to set up this network of vessel monitoring control and surveillance, where activities on these boats or these vessels would be known, the catches can be adequately reported so people or governments can know the volume or quantum of fish in their waters and the quantum been fished the quantum been exported the quantum been reported and all of that.	A network of monitoring, control, and surveillance systems (MCS) in collaboration with governments is worked on. The network will enable to track and report fishing activities and make sure catch sizes and exports are reported transparently. Countries, such as Mauretania and Liberia have troubles with foreign vessels sailing under flags of convenience in their waters.	An MCS network, addressing IUU issues of foreign vessels will be implemented.	III, 190-199

Table 5 Challenges to the situation: Challenges for improvement: In this Table the main difficulties combating IUU fishing will be in focus. The statements of the interview partner fitting these criteria will be highlighted.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Page, Line
1	fishermen including ?? investors?? have started exploring other ways by which they can get fish because fish the ?? of program we ran in 2015 2016 and that was to introduce fisherfolks to supplementary livelihoods such as beekeeping snowfarming?? And even aquaculture and maybe other small things? but the fishermen are just like hunters, they want to go in to the sea, so they catch fish sell it, get their money do whatever they want to do they are not ready to you know nature anything to grow for them to harvest from so it's really tough on the lives of fisher folks by extension, coastal communities.	Programmes for fishermen exist to but they rather make a living with fishing than agriculture.	Programs for alternative livelihoods exist but fishermen rather prefer going to sea.	I, 28-34

2	<p>Many of our lawyers don't have an understanding of these laws that is a major challenge so issues of a maritime law is now coming up, especially within our region so really one of the university in Ghana has recently instituted a whole program I think masters or PhD in maritime law. My center is about to set up another unit to study maritime law to study maritime in the next couple of years</p> <p>Because, for instance, turtles are really protected species and so you don't expect people to catch turtles but then you hear of issues where fishermen have caught turtles to report the police. The police like: Oh its turtles, what do I have to do with it Is that also a crime?</p>	<p>There is a lack of lawyers understanding maritime laws. This is a big challenge, and some universities are introducing Master and PhD courses for it.</p>	<p>Lack of lawyer's experience is being tackled with university programs in maritime law.</p>	<p>III-VI, 219-225</p>
3	<p>and one of the things we have also done is develop fisheries mare fisheries management plan that is in place.</p>	<p>Government has implemented a fisheries management plan.</p>	<p>A management plan is in place.</p>	<p>IV, 167-168</p>
	<p>...another thing they are doing as the registration of fishing boats and so I think that was another ?? of one of the projects sustainable fishing management programs which also run between 2014 to 2019. And so what they have done is to try to register all the artisanal fishing boats because there are too many fishing boats in the industry. And so the idea is just to help reduce the number of fishing boats so we are trying to reduce the number of inputs in to the fishing industry.</p> <p>Quite a challenge however is that they have not yet been able to take away the fishing subsidy. Now they provide a premix which they give to the fisherman free of charge just to go fishing</p>	<p>The idea is to reduce the number of vessels to lower the input into the fishing industry, however, fishing subsidies such as provision of premix fuel for the fishermen is still a big issue.</p>	<p>Reducing the number of boats does not work because subsidies persist, affecting sustainability efforts.</p>	<p>III-IV, 129-136</p>

Table 6 Security concerns: This Table tries to identify the interview partners' perception on piracy as well as on national security and if IUU fishing is affecting the security situation direct or indirectly within the area of interest.

Nr	Original quote smoothed	Concluding Paraphrasing	Reduction	Line, Page
	<p>..we get a lot of insights from there, we have a lot of fishing vessels now in Ghana they don't even have nets in them, they only have generators they have coolers and they just go to sea without nets. Actually what are they going to catch? And then</p>	<p>Valuable insights from the current situation is that many vessels are not even equipped sufficiently to catch fish. Instead, they have only coolers and</p>	<p>Many vessels practice SAIKO.</p>	<p>II, 74-78</p>

	they go buy fish from all these people what is illegal trawlers you know. So that's the situation really, that is the situation.	generator on board. They buy from IUU vessels.		
	So, for this last year we didn't have closed season because of political reasons but then this year we had closed season and I think the year before we had closed season.	The closed season did not take place last year due to political reasons.	Environmental protection is political will.	III, 116-117
	So, as I was saying the government is very much aware of the challenges. (...) the fishing industry but then to be honest with you a lot of this is more of, is political. Often the political will is not there to drive the change we want to see and so that has been the pain of our problem ?? we know what to do; we are not ready to do it.	The government is aware of the issues and acknowledges the challenges. Political will prevents progress and hinders necessary measures from being made.	Environmental protection is political will.	IV, 166-171
	Well, if we are talking about the entire Gulf of Guinea, then of course piracy is an issue within the landscape and seascape in this context, and it's a ??? issue its happening every now and then in Mauretania and those are the countries. I would first speak about one project we are currently on which is also found by, I think US State Dep and that is to reduce the influence of distance water fishing vessels and piracy within the region and the idea we are working with Mauretania. We work with Mauretania, and then I think seven other African countries within the Gulf of Guinea together with their governments. It's a three-year project and that is more or less to try to check the issues of piracy. And so I am aware some interventions have been developed there are joined task forces between countries to address issues of piracy and within the region and all of this is, well...People have their own reason but what I see all of this ?? from some of these injustice ok?	Piracy in the Gulf of Guinea is a recurring issue. Currently a three-year project is running that is funded by the US state Department which aims to reduce the influence of IUU vessels with 8 other African states in the Gulf of Guinea. Furthermore, a joint task force and interventions are developed to address the issue of piracy in the region together with its underlying cause. The reason for piracy is injustice.	Piracy in Gulf of Guinea is tackled with cooperative justice and interventions.	V, 178-187
	... to improve this whole IUU fishing this is what we think we would do but then, as I mentioned the limitation has to do with governments, the political will to actually implement what we know to do.	To improve the situation IUU prevention has to be enhanced but the political will can limit the success due to confined commitment to implement the actions.	With limited commitment Governments hinder efforts to tackle IUU fishing.	V, 199-201
	...so even if you arrest a foreigner from another country for breaching the laws or the rules, often its treated on a lighter note. You know, so we wanted now notice	Foreigners that get arrested are often treated leniently when they disobey the law. Law and	Policymakers must be advised. Laws	V, 206-213

	that the whole idea of environmental justice or protection is something that many of our own people especially those who are the head of affairs in terms policy making are able to... I am sure they have very little understanding.... So every now and then we engage them, we engage parliamentarians, we engage policymakers especially on our conferences. We host special short courses just to give them an overview of the impact of some of these activities. So, it's hard and again the laws, the fishing or fisheries related laws of these countries must be revised you know?	policy makers are periodically engaged for environmental education and to raise awareness. Fisheries law need to be checked and also the penalties for violation have to be revised and violation should be enforced more decisive.	have to be stricter.	
	These are the issues that we have when it comes to issues of IUU. Many people, I mean the laws as I think are not biting enough, its not stringent enough to prevent people from doing what they are doing and that in any case there are several faces of IUU fishing. I have just spoken about it from an aspect where we have distant fishing fleet distance water fleets.	Laws are not having the desired effect and are failing to tackle multifaceted IUU fishing effectively.	Insufficient laws enable IUU fishing.	VI, 228-231

9 DISCUSSION

Interview summary

The following comprehensive summary is derived from the raw data of the tables above. The reduced statements of the six tables that cover all the aspects to answer the research question reflect the subjective perception of the interview partner.

Illegal fishing practices have led to a decline in global fisheries and are a threat to the entire fishing industry. In coastal regions the issue is pronounced particularly in coastal areas. Foreign fishing vessels are exploiting the waters and causing severe ecological degradation. They are engaging in a fishing practice called SAIKO fishing where industrial fish caught by big IUU vessels is sold clandestinely, to small artisanal fishermen. Although SAIKO is forbidden in Ghana the consequences for this are serious.

Fish is scarce and the industry is permeated, prices are soaring and public access to fish is limited. Ghana, with its long coastline is forced to import significant amounts of fish to

cover its population nutritional needs. The prevalence of SAIKO fishing is one of the core issues that contribute to the decline of local stocks. Shrinking species sizes and diminishing catches are the evident repercussions. Although not all species are overfished the harvested ones are smaller in size.

The efforts to tackle the IUU fishing crisis include combating the use of forbidden gear, such as too small nets or dynamite fishing, as well as implementing closed seasons so stocks can replenish and reproduce. With a closed season not only for industrial vessels but artisanal boats, it is tried to lower the input on the sea. This is not working too well because persistent subsidies in the form of providing fuel for boats hinder the decrease of them.

With raising awareness, training and education of stakeholders is the focus to combat IUU fishing. A comprehensive, border crossing Monitoring, Control and Surveillance (MCS) network being implemented with many states participating is currently going on.

The challenges are the lack of political will and commitment to drive the change to prioritize the safeguarding of marine ecosystems. With piracy being an issue in the Gulf of Guinea joint interventions and cooperative justice tries to tackle this problem. Stricter laws and sufficient legislation need to be implemented and must be effective enough to ensure deterrence. The state lacks experts, e.g., lawyers on maritime law and universities are addressing this by initiating and launching tailored courses to equip human resources with the knowledge to enforce law effectively. Another countermeasure is a management plan which is in place to target IUU fishing. With a combination of comprehensive education, stricter legislation, international cooperation and political will the global community is able to make strides in addressing IUU fishing and enabling a sustainable, resilient fisheries sector for the future.

The combination of the theoretical part with the practical second part gives an understanding of how science in terms of research-based outcomes can be compared within the current perception of an expert within the field of IUU fishing. It is interesting that the literature has such high congruency with the statements in the interview. Not only in Ghana but the situation is similar in many countries in West Africa.

Fish being caught by foreign IUU vessels in West Africa is processed, shipped, and sold either back to the local fishermen (SAIKO) or around the world. The phenomenon of SAIKO fishing also exists in literature although it was not explicitly mentioned in the

literature part. The literature describes in detail that stocks are diminishing and the result from the interview aligns with that. In terms of food safety, the results reveal that proteins shortage derived from local fishing have to be compensated with significant imports. Closed season, management plans paired with education and collaboration, substantial financial aid are uplifting countermeasures that are also described in the literature part. The challenges to win political commitment exists and remarkable is, that there could be an assumption that corruption and mismanagement is still ubiquitous in West African countries.

Thus, there are so many factors being linked to the situation in West Africa and the Gulf of Guinea and I tried to put as much as necessary into consideration.

The problem is that a country, not able to secure its own territory and sovereignty, can be easily targeted and/or exploited by one another. With other challenges such as climate change there will be a significant change of precipitation patterns. Rainy season will start later, end sooner and will be more intense. West African states are still paralyzed by the outcomes and economical loss induced by the Covid-19 pandemic.

The catchment area of population has a high density around the coastal areas. The non-abundance of canalizations, functioning sewage systems and less awareness of waste, pollution and environmentally sustainable friendly solutions harm the environment significantly. The rivers estuaries are full of microplastic and chemical residues. The loss of marine biodiversity is taking place. Human health, with poor sanitation contributes to a lower Human development (Ukwe et al., 2003, p. 222). Furthermore, Africa is having a severe fertilizer scarcity, not only created by artificial shortage but also due to the outcomes and sanctions due to the war in Ukraine (Shah, 2022).

On a regional level, local government has the problem to master these challenges. NGO's like Sea Shepherd and others are currently supporting different governments in West Africa to hunt illegal fish trawlers. With Sea shepherd providing the boats and the expertise in navigation, and proviant, law enforcement can rightfully enforce the law in their economic zone.

But is this the solution? It might be assumed that the UNSC could pave the way for a limited military operation, similar what we have seen in Somalia. West African states are very fragile and some of them are failed states. However, there is a bias. Instead of relying to former colonies as they might have still influence or to rely on development in

infrastructure by Asia, Africa in general might be advised better to find bottom-up solution to tackle food scarcity and security in the first place.

The last time the EU wanted to help Africa it was with milk powder which made the small scales substantial farmers in West Africa superfluous (Barbiere Cecile, 2018). African farmers sold their cows because there was cheaper milk powder available and couldn't compete with EUs milk exports that almost tripled over five years (Livingstone & Marks, 2020).

9.1 CONCLUSION

Based on my research to investigate the impact of Illegal, Unreported, and Unregulated (IUU) fishing on biodiversity and societies in West Africa my results show interesting findings. It can be said that there is an impact of IUU fishing on biodiversity and societies in Western Africa. Societies and biodiversity suffer from the negative impact happening at sea. Although, there has been only one interview it is likely many states in West Africa are affected by IUU fishing.

The situation of IUU fishing is real, and measures are happening or in plan. However, to combat IUU fishing it will also be important to develop multifaceted approaches because the measures can be estimated to have a low impact if the current political systems in Western Africa remain vastly vulnerable. The ongoing destabilization in the region due to different actors will hardly change for the better for IUU fishing issues.

My findings conclude further that there is more and more literature on IUU fishing. Literature varies and seeing the problem in how much we can trust the published numbers, how they are obtained and gathered has to be complemented by qualitative research. Especially when it comes to the impact of issues such as IUU fishing in society.

9.1.1 Recommendations

I had some difficulties conducting this thesis. Covid-19 was among them the one that made me reassess some of the work I had planned. Furthermore, for this kind of research and interview with more than one participant would probably lead to higher significance. An interesting method would have been a systematic literature review of IUU fishing literature in Western Africa. Nevertheless, I tried to summarize up the problem of IUU fishing and also proclaim a way out. My personal interest in international law and African studies helped me to dive deep into the multifaceted problems accompanying IUU

fishing. Another challenge was the transcription of the interview because of the accent of my opponent and the video call due to connection issues.

My point of view when it comes to IUU fishing is that coastal areas must be protected. It bears a fundamental mutual benefit. First to the artisanal fishermen by creating specific areas in western Africa that are primary reserved for small scale and subsistence fisheries. Furthermore, Community based MPA's should be implemented, monitored and their socio-economic outcomes documented. Secondly, catching devices, such as bottom trawlers and other gear should be completely forbidden. They harm the environment and damage the ecosystem. Once these areas are created, they can be extended, and their protection has to be enforced. In addition, the artisanal fisheries have to be supported and closely monitored to avoid overfishing and uncontrollable expansion.

Interesting related further research topics that opened when I wrote this thesis are:

- International relations: How can international actors, along with the governments improve the situation and help with support developing and implementing management plans?
- UNSC: What has to be done to tackle piracy effectively?
- From a demographic point: How can food security be ensured, and population increase managed sustainably?
- What can be done to protect marine wildlife and how to tackle invasive species in the region?
- Can aquaculture be part of the solution in West Africa?

Another thing that can be monitored is that it seems that the international community is willing to increase their effort. Not only to fight overfishing but also to tackle climate change in accordance with a growing population in a sustainable way, the countries in the region have to ensure stability as well as to develop new ways and approaches to feed the population.

We will see what comes. No doubt, this vital, beautiful region of the planet will surprise us once more with whatever may come.

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1 **Annex Interview transcript** T: 00:00 I: Alright, so Joshua, how do you perceive the fishery situation in
2 the Gulf of Guinea right now and how has the situation at sea affected your personal situation there?

3 T: 00:16: IP: Yeah, so thank you Andreas and I'm glad to be part of this interview. Yeah, the fishery
4 situation in the Gulf of Guinea is precarious. There has been a lot of studies that indicates that the
5 fish stock is dwindling and I think as part of a project we ran between 2014 to 2020, all the things we
6 did was to do extensive fish stock assessment we had a number of Masters and PhD students you
7 know studying on some very important, commercial important fish species to see what the situation
8 is and of course and its clear that fish stocks in the Gulf of Guinea and of course in some other areas
9 beyond the Gulf of Guinea has dwindled drastically and so this, of course is affected by lot of factors.

10 Improper or inappropriate fishing methods and all of that and so fishermen are resolved using also
11 the tactics and techniques to have as they can and wow, given that the quantum of fish we have in
12 the sea has reduced what it means you have to pay more for little fish you know they sometimes just
13 catch small size of fish they are fishing all year around the number of boats keep increasing number
14 of fishing vessels keep increasing year in year out and so its become a bit more expensive.
15 I would like to eat fish any day, I prefer fish any day to meat as protein source but then its becoming
16 more and more difficult to sustain the procurement of fish as a source of protein, so that would be
17 my response.

18 T: 02:09 I: Mmh, amazing, that so that would bring me right to the second question that you already
19 started answering actually, so Is there an impact on the people around you and on society and how
20 does that look?

21 T: 02:22 IP: Yeah, so definitely as I have stated it's, the impact is obvious, one, businesses are
22 affected in that the whole, if you analyze the whole value chain of the fishing industry, we have input
23 we have output you know, people make investments into boats, into nets and then there are
24 sometimes no fish to catch, they come back with sometimes trash, you know and so there has been
25 some other studies trying to quantify the amount of waste in big seines which is a kind of fishing
26 method here in Ghana and so they come back more or less with trash they don't get fish, they are
27 loosing revenue or they are losing money. People are actually loosing investment and so given the
28 situation as I started saying a lot of people, fishermen including ?? investors have started exploring
29 other ways by which they can get fish because fish you know the ?? of program we ran in 2015 2016
30 and that was to introduce fisherfolks to supplementary livelihoods such as beekeeping ???farming .
31 And even aquaculture and maybe other small things? but the fishermen are just like hunters, they
32 want to go in to the sea, so they catch fish sell it, get their money do whatever they want to do they
33 are not ready to you know nature anything to grow for them to harvest from so it's really tough on
34 the lives of fisher folks by extension, coastal communities. And so I can scale this up even to the
35 nation and for instance in Ghana we know that our protein intake, fish protein intake is about 800
36 thousand + metric tons that would have increased by know, and we import more than 500 thousand
37 metric tons you see, we are a coastal country we have at least more than 300 + land an beaches total
38 along the 550 km of quee of coastline and you would expect that we are able to produce enough fish
39 but hey its not happening its bad and of course we know its beautiful some as I mentioned earlier
40 poor fishing practices??? we have a lot we call them distance water fishing vessels coming in which is
41 largely, I don't want to mention any country now but then, we have a lot of countries coming flying
42 under the flag of convenience with some of our locals fronting for them and fishing in our waters.
43 Now those fishes that are being caught ?? brought in to the country for either consumption they are
44 exported and many of them have ??? caught them at the at the port of the port one that you point
45 where this data must collected quantum of fish been harvested from our system. That is not the
46 worst part. the worst part however, however some of these fishing vessels come into areas where
47 not to fish in. For instance trawlers come into the inshore waters, below a certain depth which is
48 supposed to be for the normal, artisanal, local fishermen this you know boats trawlers come in there

49 and by their activities they degrade the ecosystem. And so, its and as they fish from there they go a
50 bit further in to the sea, repackage them that's what we call SIKO I don't know if you've come across
51 that in your literature, in your reading repackage them as SIKO we call it SIKO fishing where they
52 repackage them and sell back to these fisherfolks, local fisherfolks and so, I think you may want to
53 may look up lots of reports and documentary from EJV environmental justice foundation.

54 T: 06:58 I: I checked that)

55 T 06:59 IP: Yeah, they've done a lot work on aa what would be called stolen at sea the amount of
56 revenue lost from stolen fish and all of that so you enable to estimate how much its in the billions of
57 dollars lost annually through illegal fishing processes. so if you image that this a quantum of revenue
58 being lost which, if appropriated will have come into the country fish that would have been available
59 to buy and so personally let me just go back to the first point, personally its been a long time I have
60 been a long time I Have been able to go to the shore to buy fish directly I rather would eat fish from
61 the freshwater ecosystems than eat fish brought in from the sea, because even if you go buy food
62 from restaurant or eateries you could see that the majority of the fish in there is not fish caught by
63 individual fishermen, but rather a product of what we call the SIKO fishing. You know, where you
64 have a lot of fish aggregated you have different fish species together, you know in a Boat Because
65 the fishermen go to fish with specific gears to catch specific fishes. So, if it's a big seine of course you
66 see some other fishes in there but. Once you see different, maybe in the shoal of an aggregation of
67 fish you have maybe shrimps in there you have snappers you have sponbrits? All mixed up with
68 juveniles and adults you just know that that kind of fish came from what we call SIKO fishing which is
69 illegal unreported and unregulated kind of fishing. Where they come in, fish at location they are not
70 supposed to fish go back up, repackage them. And technically this way fishes that supposed to be
71 dumped because its not what they are supposed to catch, but then they repackage them and then
72 sold back to fishermen who were supposed to personally, or they have the right to fish or catch this
73 fishes but then they go now go and buy these fishes, you know so, you have a lot of and I am
74 showing really the report we get a lot of insights from there, we have a lot of fishing vessels now in
75 Ghana they don't even have nets in them, they only have generators they have coolers and they just
76 go to sea without nets actually what are they going to catch? And then they go buy fish from all these
77 people what is illegal trawlers you know, (mmh) mmmh to so, so that's the situation really, that is the
78 situation

79 T: 09:38 I: Very, very interesting point here and yeah, I can totally a feel for you how the situation
80 must be, for real.

81 IP yeah

82 I: So, my third question is already something that you answered partly so, just to re-ask do you think
83 that there is still the same number of fish in the area where you live regarding fishermen's daily
84 catch.

85 IP: No, no, as I have mentioned earlier

86 I: Ok, ok, alright

87 IP: catches are dwindling drastically over the years.

88 I: Can you, can you say which, when that happened in your personal perception or also from your
89 knowledge?

90

91 T: 10:35 IP: Woah, so I could I could date this back to a little over ten years or more, yeah a little over
92 ten years or more and so that is one of the reasons why the United States gov gave my center almost
93 5 Mio dollars to build capacity which was meant for, we call fishes and coastal management capacity
94 building program and the idea is to train the requisite people to provide data to indicate that fish
95 stocks are dwindling and then to provide the local communities the capacity to focus on other
96 sources of livelihood rather than the small scales fisheries. So, majority of fishers in Ghana are small
97 scale fishers. We call the artisanal fishers and so they don't going to fishes like the tuna and those
98 high level kind of fishes. So yes, maybe for instance those species may not have been overfished but
99 then a lot of common fish species that are consumed in Ghana have been overfished you know and
100 the sizes we used to get, we no longer get we get small sizes. And so, as a result of our capacity
101 building program we organized to bana?? Conference in 2017-2019 and through that we worked
102 with another project which would srgonrgo?? US and we had a lot of policy, papers, going out, in
103 person the minister of fishes and agriculture development as fall as a fishes commission and so
104 through the scientific and technical working group that has been establish out of these two projects
105 they had established the; we have been able to establish the cause for a closed season so I think for
106 the first time, I think somewhere in 2019 thereabout 2020 there was a fishing closed season for
107 artisanal fishers. They have been closing it intimately?? for the industrial fishers like the tuna boats
108 and then the bottom line fishers ??? but then for the artisanal, for the first time they had close ???
109 I think this year closed the sea I think either with some few days ago they have closed the sea again
110 and why is it necessary to close the sea because we expect that during or between May June July I
111 guess there about the fishes start spawning it's the time where the weather is relatively cold and so
112 upwelling happens and then brings food ????. that has deposited at The bottom of the ocean bout
113 the surface fishes are able to feed but would get fecund ?? or pregnant as we call it and the they give
114 a so we don't allow fishing within this period and so this is maybe an indication that if a numbers
115 have not going done down we don't need to be instituting a management measure with for instance
116 is the closed season so for this last year we didn't have closed season because of political reasons but
117 then this year we had closed season and I think the year before we had closed season.

118 T: 14:10 I: That would, perfect , perfect, that would bring me to my next question. So the
119 government is....What are the government and the governments plans of also other states regarding
120 working together to tackle the problem? And are you aware of them like you already mentioned the
121 one with the closing seasons?

122 T 14:41: IP: Yeah, I think I think I keep moving ahead of the question, yes?

123 that's so fine and I just want that you talk freely this is great, really!

124 Yeah, so as I have already mentioned of course the gov is aware of "just a moment"

125 (colleague of IP is interrupting)

126 T 15:30 IP: Sorry Andreas, sorry about that, I had someone coming..

127 I: Fine, fine

128 IP: So, as I've mentioned earlier, the government is really aware of the situation and one of the
129 measures they are putting in place is the closed season they have instituted. Another thing they are
130 doing is the registration of fishing boats and so I think that was another ?? of one of the projects
131 sustainable fishing management projects which also run between 2014 to 2019. And so what they
132 have done is to try to register all the artisanal fishing boats because there are too many fishing boats
133 in the industry and so the idea is just to help reduce the number of fishing boats so we are trying to
134 reduce the number of inputs in to the fishing industry.
135 Quite a challenge however is that they have not yet been able to take away the fishing subsidy. Now

136 they provide a premix which they give to the fisherman free of charge just to go fishing. Now you
137 cant go fishing if you don't have premix fuel.

138 T: 16:48 I: Sorry to interrupt you, premix fuel, I don't understand that.

139 IP: So, the artisanal boats go fishing using an outboard motor.

140 I: Mmm

141 IP: An outboard motor uses kind of fuel which is what we just call premix.

142 I: Ah it's a two stroke engine?

143 IP: Yes, yes.

144 I: So it mixes oil and gasoline?

145 IP: Yes

146 I: Check, check like I had on my Vespa.

147 IP: Right. So, these too provide the fishers kind of fuel and I think we have advocated, we have
148 advocated all this ?? and if you see one of our publication by Sumaila, Sumaila et al which we
149 submitted to the doubulty of ?? organization to remove subsidies cause subsidies it's a killer to the
150 fishers industry.

151 T: 17:45 I: Ah, Sumaila, what is the name of?? Of?

152 Rashid Sumaila.

153 And do you know I, cited a lot in my work. I sent then to you when everything is done, so you are
154 working together with her or him?

155 Him, yes Rashid Sumaila he is actually the international, the chairman of the international scientific
156 advisory board from my center.

157 Wow!

158 Yeah!

159 Wow, that's great, I, ok, ok, interesting.

160 T:18:19: IP: Yes so, we work with him on a lot of thing and as I've mentioned maybe Ill send you the
161 program that we are having this week We are having a training right now happening Accra later this
162 afternoon the will be coming done to Cape Coast to continue the training tomorrow till Friday and its
163 on IUU. We're teaching them all the issues regarding IUU, climate science, everything, management,
164 peer to peer. They've gone to aa monitoring, control and surveillance system ??? in Accra to see how
165 the systems are built up. So and that is funded from the US State Department aa US Embassy to have
166 this training done across the region, so as I was saying the government has is very much aware of the
167 challenges and one of the things we have also done is develop fisheries mare, fisheries management
168 plan that is in place just to indicate what are the steps to take to revamp the fishing industry but
169 then to be honest with you a lot of this is more of a, is political often the political will is not there to
170 drive the change we want to see and so that has been the pain of our problem ?? we know what to
171 do we are not ready to do it, you know, as I speak, boats are being built, canoes are being built right
172 along the beach to go fishing you know, so really, these are the issues on the ground.

173 T: 19:53 I: Mmh, mmh, amazing, very happy with your perception and your knowledge on that, I have
174 a, because we are talking about government and you, as you've being said the boats are being built

175 right know, can you just talk just shortly about security concerns in the region regarding foreign
176 vessels and your perception on piracy in that region? Could be, could an indicator be there or what
177 do you say to that?

178 Ah well, well if we are talking about the entire Gulf of Guinea, then of course piracy is an issue within
179 the landscape and seascape in this context, and it's a ??? issue its happening every now and then in
180 Mauretania and those other the countries. I would first speak about one project we are currently on
181 which is also found by, I think US State department and that is to reduce the influence of distance
182 water fishing vessels and piracy within the region. And the idea, we are working with Mauretania, we
183 work with Mauretania, and then I think seven other African countries within the Gulf of Guinea
184 together with their governments. It's a three year project and that is more or less to try to check the
185 issues of piracy and so I am aware some interventions have been developed there are joined task
186 forces between countries to address issues of piracy and within the region and all of this is, well:
187 People have their own reason but what I see all of this ?? from some of these injustice ok? Because I
188 feel, I mean looking at what is happening in Ghana as a case study some youth come to rise up and
189 go high jacking fishing vessels because they feel they don't have access to fish in their own, you know
190 water, and so its it's a really a big consent, its really a big consent and so what we are doing is to
191 work with governments to probably set up a whole network of monitoring control and surveillance
192 system MCS where, because as I've mentioned a lot of these countries, Liberia for instance hardly
193 produces any significant volume of fish but then, about 90% + a year of vessels fishing in their
194 ecosystem are flying of flags of convenience from other countries you know and this is a similar
195 situation in Mauretania, and then even in Ghana so the idea is to set up this network of vessel
196 monitoring control and surveillance, where activities on these boats or these vessels would be known
197 the catches can be adequately reported so people or governments can know the volume or quantum
198 of fish in their waters and the quantum been fished the quantum been exported the quantum been
199 reported and all of that, so its... I am going to move straight to the other question to improve this
200 whole IUU fishing this is what we think we would do but then, as I mentioned the limitation has to do
201 with governments, the political will to actually implement what we know to do.

202 T: 24:04 I: Exactly.

203 That is it. It's not that we ?? I mean, so aa it's the same issue in a way like we have on land haven't to
204 do with illegal mining. It's the same thing where some unfavourable trade policies are put in place.
205 Probably by a larger agreement between one country or another.

206 One country and the other so even if you arrest a foreigner from another country for breaching the
207 laws or the rules, often its treated on a lighter note. You know, so we... One thing I also notice the
208 whole idea of environmental justice or protection is something that many of our own people
209 especially those who are the head of affairs in terms policy making are able to... I am sure they have
210 very little understanding.... So every now and then we engage them, we engage parliamentarians we
211 engage policymakers especially on our conferences, we host special short courses just to give them
212 an overview of the impact of some of these activities. So, it's hard and again the laws, the laws, the
213 fishing or fisheries related laws of these countries must be revised you know? Looking at for instance:
214 what are the primitive actions for infraction, alright? infraction may be fishing within an
215 unauthorized fishing area or catching undersized fishing or having an illegal fishing net. What is it but
216 for instance in the case of Ghana I mean somebody we called in for infraction...and then police
217 receive a phone call: release this person and its done with it and its gone tuition you know and even
218 if the person is inprocessed and is sent to court what is the fine what is the sentence what is the
219 judgements. Many of our lawyers don't have an understanding of these laws that is a major
220 challenge so issues of a maritime law is now coming up, especially within our region so really one of
221 the university in Ghana has recently instituted a whole program I think masters or PhD in maritime

222 law. My center is about to set up another unit to study maritime law to study maritime in the next
223 couple of years, because, for instance you know, turtles are really protected species and so you don't
224 expect people to catch turtles but then you hear of issues where fishermen have caught turtles to
225 report the police the police like: Oh its turtles, what do I have to do with it Is that also a crime? You
226 know so..

227 T: 27:06 Really?

228 These are the issues that we have when it comes to issues of IUU many people I mean the laws as I
229 think are not biting enough is not stringent enough to prevent people from doing what they are
230 doing and that in any case there are several faces of IUU fishing. I have just spoken about it from an
231 aspect where we have distant fishing fleet distance water fleets. But then also from within in country
232 where fishermen go to see especially in the case f of Ghana with DDT with unauthorized fishing sizes,
233 fishing nets, dynamite, dynamite in fishing.

234 Ok?

235 Its, Oh yes.

236 OK.

237 They are able to detect an aggregation of fish and then they just throw dynamite and catch them. It's
238 bad.

239 So, one of the things we have done is to develop a diagnostic ??? or rather book to show the size of
240 fishes caught illegal fishing methods and I think that that is available to the public. We are running a
241 number of trainings on that to educate the public.

242 T: 28:24 I:Alright, well time is running out, very interesting perception , very interesting opinion and I
243 will really would like to thank you for the interview thanks so much for your time and I hope there
244 would be an improvement in the future and you will hear from me soon per mail and whenever we
245 have the chance for another talk or something I would be really up to. I don't know.

246 So, hit me any time at all.

247 Thank you so much.

248 alright then thank you and bye, bye.

249 Bye.