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Illegal Chinese Fishing in West African Waters

A study on Chinese IUU Activities and its Consequences
to Socio-Ecological Systems

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A centre with:



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Abstract

West African fisheries, considered as one of the most productive in the world, have been subjected to stress by distant fishing fleets since the 1950's. The introduction of Exclusive Economic Zones by the United Nations in the 1970's made it possible for these fleets to fish only under fishing agreements signed with a hosting land, provided that they will harvest the surplus left by the local fishing fleet. In the last two decades, China has emerged as an important fishing nation in West Africa. Although there is clear evidence that Chinese vessels operate in the area, information on Chinese fishing agreements with West African countries is often missing. The implications on local fisheries are considerable. Lack of data regarding fish landings in the region may result in an increase of unsustainable fishing. The results of this study show considerable involvement of Chinese fishing vessels in illegal fishing in West Africa. In addition to the substantial loss of revenues to local nations, the negative impacts of illegal fishing on the marine ecosystem are likely to affect human populations that rely on these ecosystems. As the vulnerability of these people, many of them living in poor rural communities, is already high, unsustainable fisheries and a potential shift in the state of the marine ecosystem is likely to worsen their situation even more. Most West African countries lack capital resources to invest in monitoring, control and surveillance authorities, making illegal fishing relatively effortless. A better capacity to deter this type of activities is likely to have a significant improvement on West African fisheries. In addition, Chinese authorities, committed to the United Nations Law of the Sea, have the responsibility to take action against Chinese vessels that perform illegal activities in other parts of the world. A decrease in Chinese illegal fishing activities in West Africa, assessed to be considerable based on the studies' results, will improve the possibility for achieving sustainable fisheries in the region.

On the cover:

Chinese vessel *Lian Run 14* prior its arrest due to illegal fishing in Guinean territorial water. ©Greenpeace 2006

Abbreviations

CECAF – Fishery Committee for the Eastern Central Atlantic

CNFC – China National Fisheries Corporation

DWF – Distant Water Fleet

EEZ – Exclusive Economic Zone

EJF – Environmental Justice Fund

EU – European Union

FAO – Food and Agriculture Organization

FOC – Flags of Convenience

FPA – Fishing Partnership Agreement

GDP – Gross Domestic Product

GIWA – Global International Waters Assessment

IPOA-IUU – International Plan of Action to prevent, deter and eliminate Illegal, Unreported and Unregulated fishing

IUU – Illegal, Unregulated and Unreported fishing

MCS – Monitoring, Control and Surveillance

MEA – Millennium Ecosystem Assessment

MFMR – The Namibian Ministry of Fisheries and Marine Resources

MRAG – Marine Resources Assessment Group

NGO – Non Governmental Organization

SADC - The Southern African Development Community

SES – Socio-Ecological System

SRFC - The West African sub-regional fisheries committee

TAC – Total Allowable Catches

UN – United Nations

UNCLOS – United Nations Convention on the Law of the Seas

UNEP – United Nations Environment Programme

WWF – World Wildlife Fund

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1. Introduction

Fisheries around the world are an important natural resource providing people with both food and livelihood. It is estimated that around one billion people are dependent, to various degrees, on fish as a protein source (Tidwell and Allan 2001). Poor people that rely on locally available sources of food seem to be more dependent on fish than others (Kent 2003). The dependency on fish makes these people particularly vulnerable to changes in fish supply, mostly due to the lack of alternative protein source and the financial means to obtain it. During the last few decades fish supply in the developing world, including all West African countries, declined by three percents while at the same time an increase by 20% was seen in developed countries (Kent 2003). Global amounts of fish catches, previously continually increasing, have stagnated during the last two decades. The central explanation for this trend is the decrease in fish stocks around the world and the degradation of marine ecosystems (MEA 2005a). Illegal, Unregulated and Unreported (IUU) fishing has a severe detrimental effect on fisheries, but due to its illegitimate character there is limited information concerning this topic. The territorial waters of West African countries, usually lacking the capacity to control IUU fishing, are often targeted by foreign fishing vessels, attracted to the productive marine ecosystem typical to this region. During the last decade, the Chinese distant water fleet (DWF) has been increasing its activity in the area. Although some of the Chinese fishing activities may be legal and in accordance with fishing agreements, there is growing evidence that in many cases the Chinese DWF performs illegal fishing and contributes to the deterioration of local marine ecosystems. This, in turn, can affect people relying on the ecosystem services they provide such as food and livelihood.

1.1 Historical background

The fishing industry experienced dramatic changes over the last decades. From being relatively small-scale industry, providing mostly for the needs of fishing communities and coastal human populations in proximity to the fishing water, fisheries has become heavily industrialized since the beginning of the 1960's (Pauly et al 2005). Developments in technology such as larger and faster ships, the introduction of radars, sonar systems and refrigerated cargo ships contributed to better efficiency and increased global capture levels radically.

However, the increase in fishing capacity was not evenly distributed on a global scale. While richer nations, mostly located in the northern hemisphere, improved their fishing capacities, many developing countries stagnated and are still engaged in small-scale fish production (Kaczynski and Fluharty 2002). This state of affairs still occurs nowadays to a certain degree, as actors from the developed world own most of the world's industrial fishing fleet. While small scale fishermen use small boats with limited reach of up to 22km from the shore (Chuenpagdee et al 2006), industrial vessels can cover a much larger area of the continental shelf. The gear and techniques used by small scale fishermen are relatively simple, characterised by passive fishing methods such as small nets or handlines and no electronic fish finding and navigational devices (Teitze et al 2000). In spite of the relatively simple methods, small-scale fisheries in West Africa provide most of the landings made by local fishermen (Marquette et al 2002).

The efficiency of fishing fleets belonging to developed countries was becoming a central issue within fisheries management during the years of technological development. The increased fishing capacity was followed by a decline in fish stocks in the northern hemisphere where many of the industrialized countries are found. However, modern technology allowed these fleets to access areas previously unavailable due to the long distance from their local port. During the 1960's and until the end of the 1970's, foreign fishing fleets were engaged in the waters of many countries of the developing world, mainly in West Africa and the Pacific Ocean (Pauly et al 2005). Their activities in these regions were essentially uncontrolled and the only rule existing was that the higher the catches the more lucrative fishing is. Marine ecosystems were considered as a renewable natural resource with little, if any, consideration to ecology and sustainability.

The impacts of the globalisation process seen in fisheries were soon to be noticed on marine ecosystems around the world, in waters bordering both developing and developed countries. Captures were starting to decline in many of the worlds' seas and a notion that marine ecosystems were harvested in an unsustainable way was starting to emerge in both scientific communities and among fishermen and other stakeholders. In the light of that, a United Nations (UN) treaty, the United Nations Convention for the Law of the Seas (UNCLOS) signed in 1976 (UN 2007) declared that coastal nations will obtain control on an area within 200 nautical miles from its shore. This area, known as the Exclusive Economic Zone (EEZ)

can only be harvested by that coastal nation. However, the agreement also concluded that in cases where coastal countries cannot capture all fish and seafood within their EEZ they might sign an agreement with other countries to harvest the surplus. In UNCLOS, it is clearly stated that signing fishing agreements with foreign countries should only occur within the limits of sustainability, i.e. the total catches of local and foreign fishing fleets should not exceed the amount of fish accessible. This clausal was added to ensure a long-term sustainability of fisheries by limiting the harvest into the boundaries of sustainable yields.

1.2 The role of scientific knowledge and governance

In order to meet the terms of the clausal in UNCLOS regarding agreements with foreign DWFs, each coastal country had to estimate the quantities of fish captures that can be harvested within the limits of the maximum sustainable yield (UN 2007). Preparing accurate estimations about the status of marine ecosystems and making decisions regarding the maximum sustainable yields of fish demands a detailed scientific analysis. Other ecological factors, such as the taxonomic structure within the ecosystem and the role of key species should also be considered in order to maintain functionality.

While some countries have developed and well-functioning authorities that can investigate the issues named above, many developing countries do not have this capability. Even in developed countries knowledge was not always a guarantee to sustainable fisheries. In Canada, over fishing of certain species such as the Atlantic cod (*Gadus morhua*) led to a collapse of fisheries, and consequently to a serious economic setback (Hamilton and Butler 2001). Developing countries, often lacking both scientific knowledge and the economic resources to finance complicated estimations, are therefore facing uncertainties when making a decision on the sum of Total Allowable Catches (TACs).

In addition to the scientific knowledge needed to keep fisheries within the boundaries of sustainability, a sovereign country should have measures to ensure legal fishing that complies with its own laws and with international regulations. These are usually referred to as Monitoring, Control and Surveillance (MCS) authorities. The difference between having well-functioning MCS authorities, as in Namibia's case that will be described later, and not having them, as seen in many other West African countries, is a central factor. Apart from being an

important tool for deciding upon TACs, MCS authorities are also extremely essential for deterring and preventing IUU fishing activities.

1.3. IUU Fishing

Adequate fisheries regulations are not always a guarantee for sustainable fishing. TACs are often excessively high due to financial incentives (Kaczynski and Fluharty 2002). This might consequently influence bilateral fishing agreements with DWFs to be too generous, resulting in overfishing. In addition, the presence of an industrial DWF in combination with poor local MCS capacity often results in an intensification of IUU activities. Due to the growing involvement of China's DWF in West Africa, this paper will focus mainly on IUU activities performed by the Chinese DWF.

IUU fishing is conducted either by small-scale fishermen or by industrial large fishing vessels, in high seas or near the shore and it can even resemble legal activities to a certain degree. IUU activities can be divided into three sub-categories (MRAG 2005):

- Illegal fishing (poaching). The vessels engaged in this kind of activity operate within an EEZ without having a license to do so. This type of IUU is the most obvious one, but probably the hardest one to set a stop for without proper MCS capacity.
- Fishing not occurring by the terms set by a license, e.g. the type of gear used, the decided area and the amount of catches permitted.
- Failing to report the amount of catches and the species that were landed, or reporting only some of it, is also regarded as IUU activity.

Impacts of IUU fishing can have a detrimental effect on a series of issues that will be disclosed later. Assuming that the regulations in a certain part of the sea, whether within an EEZ or on high seas, are adequate and following a model maintaining sustainability, IUU fishing can still risk the existing state of the ecosystem.

1.4. Impacts IUU fishing

The extent of IUU activities, particularly in developing countries, is alarming. Even countries with adequate control and regulations are subjected to overfishing and, consequently, to a series of related harmful impacts that can slow down their development. Estimations show that substantial amounts of catches are made without any control and outside the set of regulations decided upon. According to Agnew et al (2009), up to 26 million tonnes of fish are caught illegally around the world, at a maximum value of more than \$23 billion per year. The area most affected by IUU is West Africa, where illegal catches are estimated to be 40% of the reported catches. In some countries, such as Guinea, catches from IUU vessels outweigh legal catches (MRAG 2005).

1.4.1 Impacts on marine ecosystems

An ecosystem is a “*dynamic complex of plant, animal and microorganism communities and the nonliving environment acting as a functional unit*” (MEA 2005a, p. 3). The components influencing the ecosystem might differ, as they often do due to gradual seasonal or environmental variations. However, abrupt changes, also known as catastrophic events, in the components of an ecosystem might shift it to a different stage. Scheffer et al (2001) state that fisheries are changing the dynamics of the marine food web, and can lead to a regime shift in marine ecosystems subjected to severe stress. This, in turn, can alter the functional state of an ecosystem and a number of factors related to it, e.g. productivity, nutrient cycling and the resilience to withstand abrupt environmental changes (Lureau et al 2001). A catastrophic event is most likely to result in a change of fish availability and the possibility of people to live off the services provided by the local marine ecosystem.

Coastal marine ecosystems, often located within EEZs, are in a particular risk zone due to the high extent of human activities (Solan et al 2004). These regions are usually heavily populated and therefore more subjected to persisting stress that affect its’ functionality, i.e. pollution, habitat destruction and fishing. The stress applied by human activities can lead to extinction of marine species (Dulvy et al 2003). Removal of large fish that represent higher trophic levels is an ongoing global trend in fisheries (Pauly et al. 2002). Fishing fleets currently target smaller fish due to exhaustion of fish stocks of high trophic level (MEAb 2005). This trend implies a serious threat to marine ecosystems. Without the presence of large

predating fish, ecosystems might shift to an alternative state due to the increase fish stocks of lower trophic level. The shift in species abundance due to fishing activities is documented in a variety of marine ecosystems (Scheffer et al 2001). Its implications will not only affect the ecosystem itself but also humans relying on the services the ecosystem provides.

Interestingly, other implications of decline in fish availability and supply are marked. As fish availability in Ghana declined during the last 30 years, there was an increase in hunting of big terrestrial mammals, most of them located in protected areas (Brashares et al 2004). The decline in marine fish biomass correlates well with the decline in large mammal biomass on land, and implies that the source for protein intake shifted from fish to bush meat. This exemplifies the socio-ecological complexity related to fisheries, and illustrates the impact that a collapse of the fisheries sector in West Africa can have on other ecosystems than the marine one.

1.4.2. Impacts on food security and livelihood

To ensure a proper and healthy diet, intake of protein is a critical factor for humans. In many developing countries protein availability for poor people is limited (Kent 2003). That makes fish protein, commonly available in many coastal countries, an important nutrient source. Sufficient quantities of protein on a daily diet are particularly important for children under the age of five (Kent 2003), and the lack of it leads to various diseases and to malnutrition. Omega-3, found largely in fish, is important to avoid many heart diseases and for the development of the brain (McMichael et al. 2005). Lack of iron, available mostly from poultry, meat and fish, can induce anaemia, a disease that affects mostly women in reproductive age and children under twelve years in developing countries (MEA 2005b).

In many coastal countries, and especially in fishing communities located in proximity to the sea, much of the protein intake originates from fish and fish products. Among the countries most dependent on fish proteins are some of the West African countries, e.g. Senegal, Ghana and Guinea (Kent 1998; FAO 2009). These countries' high dependency on fish as a nutrient source is making them increasingly vulnerable to fluctuations in fish availability and to changes in the marine ecosystem. As IUU fishing jeopardizes the functionality of the ecosystem and the goods it provides, i.e. fish and fish products, the vulnerability of these countries is increasing. Communities located near the coast are therefore experiencing an even

higher degree of vulnerability (Kent 2003). Small scale fishermen and their families are under a serious threat of malnutrition due to the growth of the industrial fishing fleet (MEA 2005b). In Senegal, the rural population suffers from protein deficit due to a growing export of fish and, consequently, a decrease in the availability of cheap fish sold locally (Alder and Sumaila 2004). IUU fishing, and certainly an increase in IUU activities, is therefore a considerable risk to the health of the local population.

In addition to the direct impact on nutrition, overfishing related to IUU has other implications related to livelihood. These range from the single household scale to a state or even regional scales. Fishermen's revenues are due to decrease and so does the revenues of people involved in secondary processing factories and of fishmongers (Diaz-Bonilla et al. 2000). These occupational groups are relatively poor and vulnerable and a decrease in catches is likely to place them underneath the poverty line. As many fishmongers and workers in secondary processing of fish are women, the impact of decline in fish quantities is also increasing inequities related to gender (Bennet 2004). On a larger scale, the revenues generated by coastal countries are also decreasing. The revenues generated by fish trade and taxes are due to decline as some, or most, of the catches are not reported. This is an extremely important source of income for several West African countries. In 2005, export of fish from Gambia generated 18% of the country's total merchandise export, in Senegal it 17.1% and in Namibia 15% (FAO 2005).

Collapse of fisheries and the loss of livelihood can, in addition to the negative impact on local populations of humans, animals and plants, also destabilize the existing governing systems of sovereign countries. Food insecurity and loss of livelihood are significant stress factors. A state experiencing this kind of stress is more vulnerable to social insecurity (Adger 2000), which can easily be translated into political instability. Deterioration of political stability, in turn, will probably have a negative feedback on the issues mentioned earlier, i.e. hunger and livelihood.

1.5. Fisheries management

Governance issues regarding fisheries and IUU activities can be divided into intertwining sets of regulations used on scales from local through regional to global. Some of these regulations are described here.

1.5.1. *International regulations*

In 1982 the United Nations Convention on the Law of the Sea, referred here as UNCLOS, was concluded (UN 2007). The important aspects of it concerning IUU issues were:

- Establishment of EEZs stretching 200 nautical miles from the shore, thus giving the rights to each coastal country to exploit and manage all the resources within that area.
- Fish stocks within EEZs should not be over-exploited. Each coastal country should decide upon TACs for each fish species in its water.
- Fish surplus, i.e. fish that the country can not harvest itself, can be fished by DWFs from other countries in accordance to an agreement signed between the two states. This surplus is to be utilized only within the frames of sustainable fish stocks decided by the country that owns the EEZ.

The countries that signed and ratified UNCLOS are required to follow the array of regulations set by it. In case of disputes and violations of the binding regulations it is possible to take the issue to the International Tribunal for the Law of the Sea (UN 2007).

In addition to UNCLOS, which is a legally binding agreement, there are various other agreements that attempt to provide a global answer to the issue of sustainable fisheries management:

- The Food and Agriculture Organization's (FAO) *Code of Conduct for Responsible Fisheries* written at 1995 was adopted by more than 170 members of the UN by in 2001 (FAO 2001). The purpose of the Code of Conduct is to provide a "...framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment" (FAO 1995).

- In 2001 the FAO published the International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing (IPOA-IUU), an voluntary instrument built according to the framework set by the Code of Conduct for Responsible fisheries (FAO 2001b). The goal of the IPOA-IUU is to stop IUU due to the evident negative impacts it has on ecosystems and societies.

These international regulations, binding or not, are followed by observation activities of various Non Governmental Organisations (NGOs). Organizations like Greenpeace and the World Wildlife Fund (WWF) are active on a global scale, primarily in monitoring of fisheries and disputes regarding regulations (for examples see: Greenpeace, 2005; WWF 2008). They are also occasionally represented as experts in conventions organized by the UN, as Greenpeace did in the IPOA-IUU convention (FAO 2001b).

Currently, 158 countries have ratified UNCLOS, among them China and all the West African coastal countries (UN 2009). However, compliance levels for this agreement are not fully achieved (Alder et al 2001), partly due to the complexity of the agreement and the difficulty to apply regulations on such a large and varied assembly of national actors.

1.5.2. Regional regulations and authorities

Marine ecosystems are not confined to EEZs. Fish stocks and plankton, on which many fish species feed, migrate and move disregarding man-made national borders. This fact often demands a regional fisheries management plan where countries sharing the same natural resources can cooperate to achieve harmonization and collaboration. To address this issue, in 1995 the UN added a section to UNCLOS regarding the conservation and management of straddling and highly migratory fish stocks (UN 1995). This addition to UNCLOS states the importance of cooperation between countries sharing the same fish stocks and operates as a framework for action adopted by many regional fishing organizations.

Regional fisheries organizations are groups of states or organizations that collaborate on fisheries management issues. In West Africa, these bodies vary in size and definitions (FAO 2009b, see appendix 1). While some of these operate only within local EEZs, others have a larger jurisdiction area and cover the high seas bordering these EEZs. Another aspect that varies between the different organizations is the cooperation with countries that do not have

control over the geographic area but share an interest in the area. An example is the membership of Cuba, the European Community, the United States of America and Norway in the Fishery Committee for the Eastern Central Atlantic (CECAF), an extensive organization covering both the Canary and the Guinea current ecosystems. Involvement of other stakeholders than the countries sharing the geographic area is central to fisheries management and including the opinions and knowledge of all stakeholders is likely to increase the effectiveness of the plan. It is noteworthy that China, a significant actor in West African fisheries, is not a member of any regional organizations in the area. The regional and sub-regional organizations are functional and successful to a certain degree, but most of them lack regulatory authority. However, the recommendations they provide to member states, the scientific and statistic knowledge and the cooperation achieved by their existence is a valuable tool in the effort to achieve sustainability in West African fisheries.

1.5.3. National regulations and authorities

National regulations regarding fisheries management and the way each country deals with fishing agreements and IUU varies significantly. In the case of West Africa there are vast differences between the capability and resources invested in order to deal with this issue. Two cases that exemplify the differences in management and planning are Namibia and Ghana.

Prior to independency, Namibia's marine resources were severely overexploited (Nichols 2003). Directly after gaining independence, in the beginning of 1990, the government adopted a restrictive and detailed resource management plan for local fisheries. TACs were calculated based on scientific knowledge that was collected and an effective MCS system was implemented (Bergh and Davis 2004). The involvement of DWFs, previously the major fishing part in the area, was decreased and local initiatives were encouraged. Nowadays, even in case DWFs are involved in fishing within Namibia's EEZ, it is usually within a framework of Fishing Partnership Agreement (FPA). This type of bilateral agreements usually includes reassurances that the foreign part will invest in the fisheries sector of the hosting country, keeping some of the revenues within borders of the Namibia (Meyn 2005). Investments in secondary processing factories at shore are a frequent element in FPAs, and one that the Namibian authorities often attempt to implement. Many consider Namibia's fisheries policy to be a milestone in the development of functioning natural resource management in the developing world.

On the other side of the same scale is Ghana. Between the 18th century and the beginning of the 20th century Ghana was considered to be a major fishing nation, with Ghanaian fishing boats reaching from Senegal in the north to Nigeria in the south (Agbodeka 1992). However, after gaining independence in 1957, inadequate management of Ghana's fisheries led to a crisis involving both fishermen and the local marine ecosystem. UNCLOS forced the Ghanaian fishermen to concentrate on fishing within Ghana's EEZ, which inflicted hard pressure on the marine ecosystem due to overcapacity of the local fleet (Atta-Mills et al. 2004). Almost none of the local fishing vessels were equipped to fish off-shore, making the situation even more alarming as coastal ecosystems were utilized in an unsustainable way. In spite of attempts by the government, investments in modernization of the local fleet failed, presumably due to the rapidity of the transition and the lack of resources, both human and financial, needed to cope with this shift. Between 1980 and 2001, landings from both industrial and semi-industrial vessels have decreased, indicating declining fish stocks.

In general, several countries in West Africa lack adequate regulations and authorities to manage their fisheries in a sustainable way (Atta-Mills et al. 2004) and resemble more the Ghanaian example. In that context, Namibia can be seen as an exception, but the experience gained there can imply that good national governance is effective and fruitful. It is apparent that detailed management plans and investments in research and control can lead to a higher degree of sustainability in fisheries.

1.6. Implications of poor management on fisheries

Poor governance can impact fisheries, as it can impact various other industries. In general, countries in West Africa score very low on the Individual Governance Indicator index published by the World Bank (Kaufmann et al. 2008). The index contains information regarding various aspects of governance such as governance effectiveness, rule of the law and control of corruption. One of the countries with relatively high governance indicator scores, on all aspects of the index, is Namibia. This correlates well with the success Namibian authorities and MCS had in managing fisheries (Berg and Davies 2004; MRAG 2005). Other countries, such as Guinea and Guinea-Bissau, are showing low levels of good governance, which correlates well with serious overfishing problems within their national waters (Kaczynski and Fluharty 2002).

1.7. Transparency in bilateral fishing agreements

Transparency of fishing agreements is a central aspect for achieving sustainability in fisheries. The FAO Code of Conduct asserts that international trade in fish should be transparent (FAO 1995, paragraph 11.2.3) and in accordance with internationally agreed rules such as UNCLOS. The same level of transparency is required from national laws, regulations and administrative procedures (FAO 1995, paragraph 11.3.1). The importance of transparency in fishing agreements is essential especially when cooperation between various stakeholders is needed. As planning fisheries management usually involves many stakeholders, it is crucial that all agreements are open. Lack of transparency can lead to ineffective management contribute directly do the deterioration of fisheries.

Fishing agreements, as they are perceived by UNCLOS, are an important mean of income both for West African countries and foreign countries fishing fleets. It is, however, extremely important to be able to ensure that TACs and the landings are in line with the specific condition of the ecosystem in question. In that view, it is essential that fishing agreements are coherent and transparent (Agnew and Barnes 2004). The importance of agreement transparency is central due to a number of reasons. First, on an operational level, obscure agreements are a major problem for law enforcement and MCS authorities. Lack of details such as the species that are included in the agreement, the type of vessels allowed to operate within the EEZ and the gear that DWF vessels can use weakens the ability to enforce regulations. In this case, even a proper agreement with realistic TACs can not be followed. Second, cooperation between neighbouring countries, often sharing fish stocks, is vital when preparing management plans for large ecosystems. If one of the partners is unaware of an agreement signed by another, the level of cooperation is bound to be insufficient. Transparent agreements are needed to achieve such cooperation that regional or sub-regional fisheries management demands. Third, the scientific community, on which authorities depend for viable estimations of fish stocks and decisions regarding TACs, needs to be aware of all implications on the marine ecosystem. This knowledge consists of the activities of DWFs, including all details within the agreement. Insufficient knowledge about the harvested species is likely to be a source for inaccurate calculations regarding TACs.

The transparency in fishing agreements between West African countries and DWFs has improved during the last decades. While in the years before UNCLOS fishing was free and no

agreements needed to be signed, the creation of EEZs changed the way DWFs could utilize fisheries. However, for a long time bilateral agreements have been made with insufficient consideration to the state of the ecosystem and with emphasis on maximum utilization of fish stocks. Moreover, the money paid by DWFs was often only a fraction of the compensation scientists claimed that the hosting country was due to accept (Kaczynski and Fluharty 2002).

1.8. Aim of thesis

The constant pressure that West African marine ecosystems have been subjected to by fisheries is increasing due to IUU fishing activities. These activities, and the scale of the impact they have on ecosystems, are often complicated to detect and quantify due to their illegal character. It is, however, evident that they are detrimental to fisheries (MRAG 2005; Agnew et al 2009) and therefore also to people relying on fish as food or source of income. The emergence of the Chinese DWF as an important actor in West African fisheries during the last decades, and the lack of transparency under which this DWF operates, demands a better analysis of the situation in the region. The aim of the thesis is to assess the scale of activity performed by Chinese vessels in the region. Since details on legal activities are lacking, this evaluation will be based on a study of Chinese IUU activities, which are relatively more available.

1.9. Research questions

The issue of IUU in relation to fishing agreements between West African countries and DWFs is wide and involves various countries. However, during the last decade there has been a growing activity of Chinese DWF vessels in the region (Kaczynski and Fluharty 2002; MRAG 2005). During the preparation of this paper it became evident that information regarding Chinese fishing agreements in West Africa is, to say the least, scarce and missing in details. Even documentation of the presence of Chinese vessels in West Africa was extremely limited, although the involvement of this fleet is regularly mentioned in papers regarding West African fisheries.

The missing information raised a question that became the focal point of the paper, i.e. trying to understand the degree to which the Chinese DWF is involved in fishing activities along the coasts of West Africa. Lack of concrete evidence regarding fishing agreements between

China, or Chinese fishing corporations, and West African countries complicated the possibility of analyzing this kind of involvement. In order to surpass this obstacle, information regarding IUU activities by Chinese vessels was gathered. This data, although not comprehensive enough to analyze the exact degree of Chinese involvement, can outline a rough estimation of the topic. Since IUU fishing is clearly endangering marine ecosystems and the services they provide, it is important to understand why it occurs, to what extent and by whom it is performed.

2. Theoretical framework

Fisheries in general, and in West Africa in particular, are a natural resource that provides an important ecosystem service, i.e. the “combined actions of the species in an ecosystem that performs functions of value to society” (Walker and Salt 2006). Due to the high level of poverty in all West African countries (UNDP 2008), even minor negative impacts on the incomes of local populations can have a devastating effect on their capability to purchase food. The degradation of the marine ecosystem and the loss of biodiversity related to it is therefore a direct threat to lives of many people. IUU activities, in which the Chinese DWF is presumably involved, inflict an even higher degree of stress on ecosystems that are already heavily utilized. This stress on a socio-ecologic complex system is increasing the vulnerability of human populations and their capacity to withstand changes in the ecosystem is being gradually reduced as the stress continues.

The dependency on fish in West Africa is heavier than in many other parts of the world (Kent 2003). A major shift in the state of the marine ecosystem, e.g. a drastic decline of species diversity, can lead to a series of impacts on human societies. A fishing community, relying on fish for subsistence and income, is extremely vulnerable to this kind of change. The lack of financial resources to reduce the impacts of that type is only increasing the vulnerability of these communities.

In addition to the direct threat of a shift in marine ecosystem and the implications it will have on food security; many West African countries have problems that relate to governance and law enforcement capacity. An analysis made by the World Bank shows that many countries

score extremely low on governance indicators in relation to the rest of the world (Kaufman et al 2008). The indicators for lack of political stability, ineffectiveness and corruption are high among some of the major fishing nations in the region, such as Angola, Côte d'Ivoire, Guinea and Sierra Leone (see appendix 1). This fact, combined with the dependency on fisheries mentioned before, can amplify the vulnerability of people in the region. Societies governed by insufficiently adequate authorities have to withstand even more stress than others.

All of the topics mentioned above can be considered as different components of a complex Socio-Ecological System (SES). SESs are composed of multiple levels and variables that interact and influence each other on complex network of various scales (Ostrom 2009). Each of these components acts seemingly separately, but the outcome of this independent action will affect other components of the SES. The study shown in chapter 1.4.1 concerning implications of reduced fish catches on bush meat consumption (Brashares et al 2004) is only one example for the complicated links between SES components. In the case of West African fisheries it can be assumed that linkages between Chinese activities in the region, particularly the ones related to IUU fishing, can affect various components of this SES. These components vary greatly in scale and character, from individual through community to state level. They might affect people and other organisms but also the ecosystem as a whole.

The globalization processes evident in world fisheries and the expansion of DWFs has a great impact on complex SESs. The mobility of these fleets, increasing dramatically since the 1950's, or since the mid 1980's in the Chinese case, allows them to target fish stocks where they are most abundant, often with relative low consideration to local authorities and regulations (Berkes et al 2006). This pattern of activity, sometimes referred to as the *Roving Bandits*, is enhanced by the low capacity of local authorities to enforce their regulations due to lack of monetary and human resources. Many of the West African EZZs can therefore be conceived as open-access areas for DWFs, with a minimal risk of getting caught and penalized for IUU activities.

3. Case Study

Marine ecosystems along the African west coast are one of the most productive ones in the world (Sea Around Us 2009). This is due to the upwelling cold ocean currents providing West Africa with nutritive water and excellent conditions for fisheries (Christopherson 2005). The region can be divided to three large marine ecosystems, the Benguela, Canary and Guinea Currents, all named after the large ocean currents in West Africa.

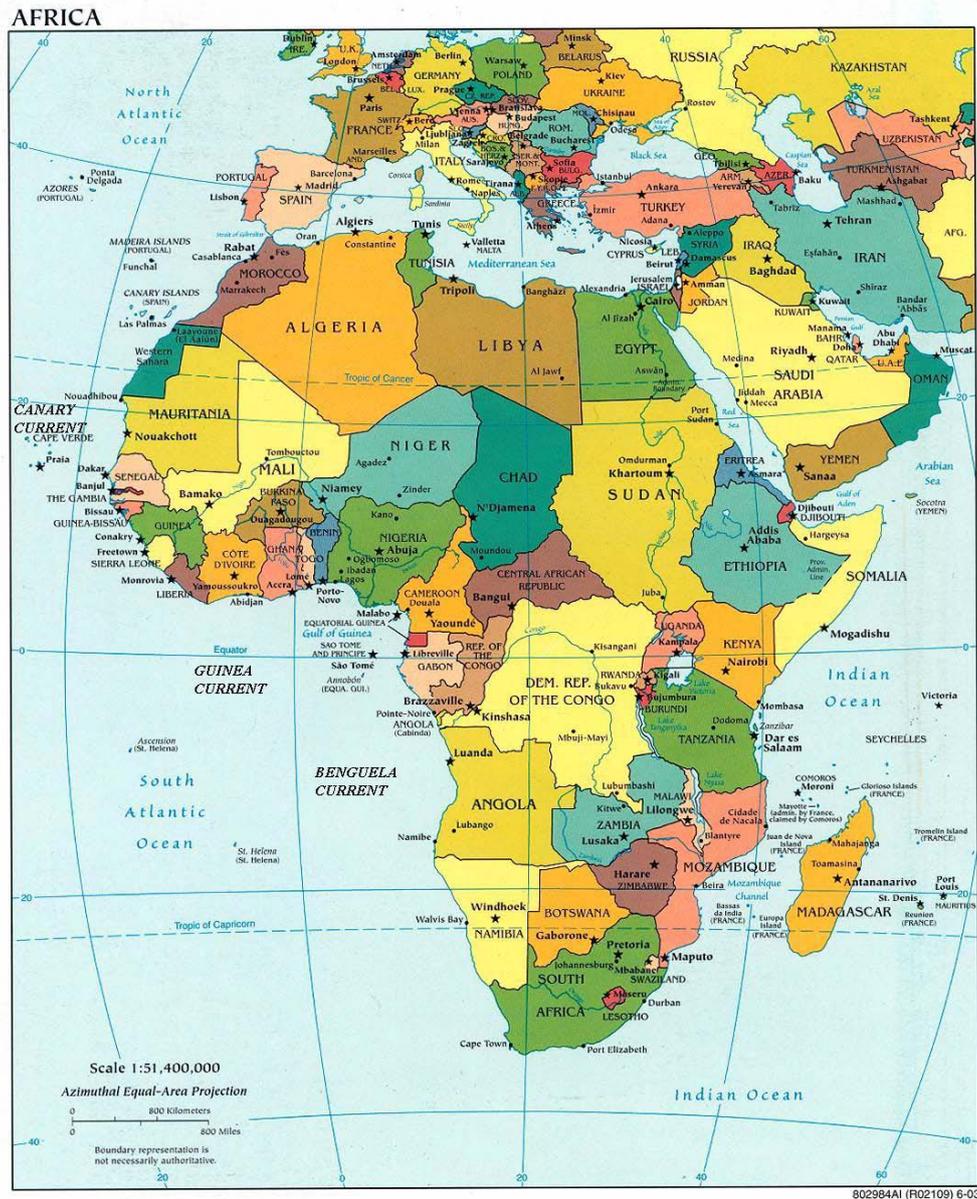


Figure 1. Political map of Africa (2003). The three large marine ecosystems: Benguela, Guinea and Canary currents are shown in the West coast. Adapted from www.maparchive.org.

Due to the high productivity of the marine ecosystem and the quantities of natural resources the area has become increasingly lucrative for DWFs. However, the domination of various DWFs in the region shifted since the industrialisation burst in the beginning of the 1960's (Alder and Sumaila 2004). Until the end of the 1980's the leading actor in West African fisheries was the former Soviet Block, responsible for 70-80% of the catches. After the collapse of the Soviet Block, fishing fleets from the EU became the major actor in the region, with 55% of the catches in the 1990's. Asian DWFs have been a minor actor, representing one percent of the catches in the 1990's. However, in the last decade, the Chinese fishing industry presence in the region increased to make this DWF one of the major actors in fisheries across the West African coast line (Kaczynski and Fluharty 2002; Alder and Sumaila 2004; MRAG 2005). Direct quantitative data on the extent of Chinese involvement in the region, i.e. the amount of catches or the size of the fleet, was not available while preparing this paper.

Fish catches by all fishing fleets, including local ones (figure 2) increased significantly from 1950 until reaching a peak at the middle of the 1970's. Since than, landings have slightly decreased to stabilize at around 8 million tonnes/year since the 1980's.

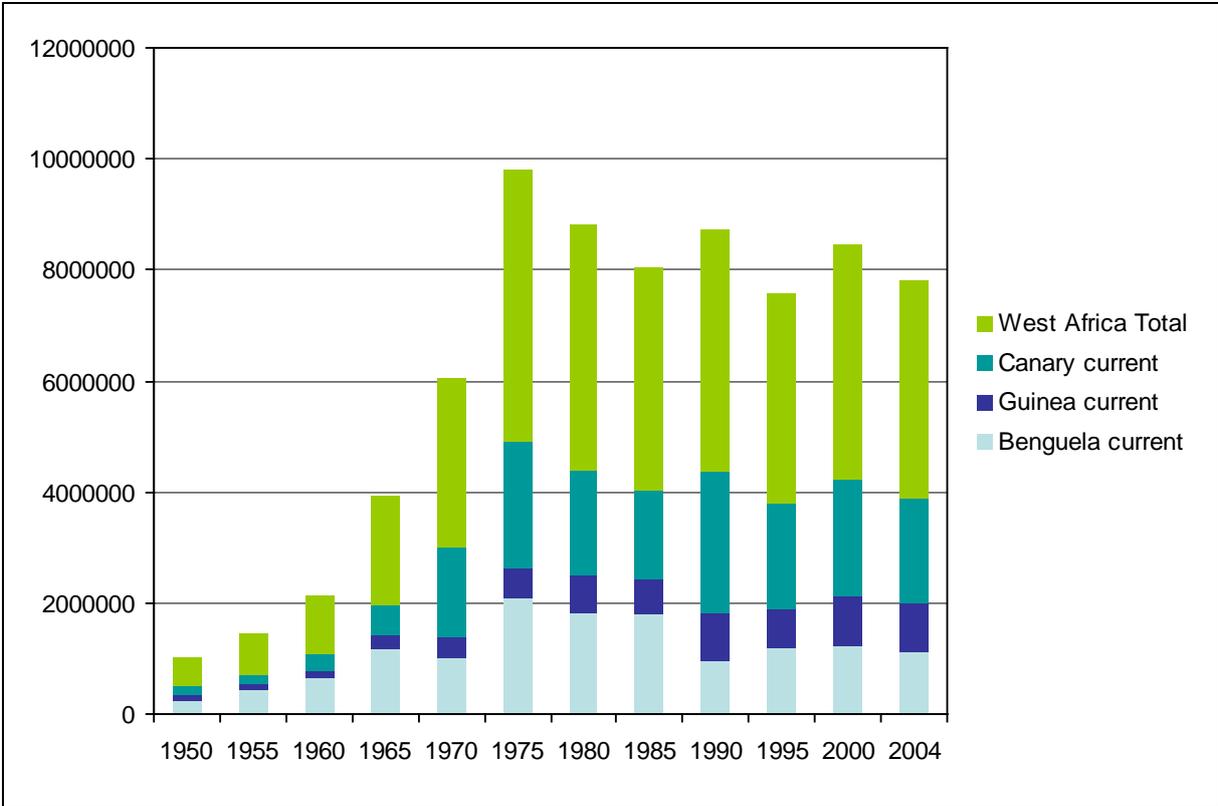


Figure 2. Fish catches in West Africa between 1950 and 2004, in tonnes (data from *searoundus.org*).

4. Methods

In order to assess the extent of the Chinese involvement in West African fisheries a variety of sources was examined while preparing this study. The first aspect of involvement that was approached was Chinese fishing agreements with West African countries. This approach was based on the fact that many scientific papers and NGO reports mention that these agreements have exist and that China is becoming an important actor in fisheries in the region (for example Kaczynski and Fluharty 2002; Alder and Sumaila 2004; EJF 2005; MRAG 2005; Greenpeace 2007). To obtain data on these agreements two methods were chosen. One was searching using the internet, in databases and official governmental sites of both China and West African countries. The only data that could be found concerning a fishing agreement regarded an agreement signed with Guinea-Bissau but no other details. This data appeared in two separate sources, the internet site of the Chinese Ministry of Foreign Affairs (FMPRC 2003) and an article published by the Center for Strategic and International Studies (Horta 2007). The other method to obtain data on fishing agreements was by establishing personal contact with officials and NGOs by e-mail. The governmental ministries responsible for fisheries in Guinea, Senegal and Namibia were contacted but did not reply. FAOs fisheries departments' in the regional office (Ghana), sub regional office for Central Africa (Gabon) and sub regional office for South Africa (Zimbabwe) were contacted with no success. The Chinese Council for International Cooperation on Environment and Development was contacted but had no relevant information. The NGOs that were contacted by e-mail were WWF Sweden (no reply), EJF (no reply) and the Coalition for Fair Fisheries Arrangements that replied with information of limited relevance to fishing agreements. As seen here, information regarding Chinese fishing agreements was scarce and other ways of obtaining knowledge on Chinese involvement in West African fisheries were needed.

The failure to obtain a sufficient amount of data regarding fishing agreements may be explained due to a number of different reasons. First, the contacted organisations and individuals did not think this topic is of any interest to them and simply did not answer. Second, revealing details on Chinese activities might be a politically sensitive issue. An administrator in the Swedish Board of Fisheries, when asked if he has contacts in West Africa, replied in an e-mail that FAO coordinators in West Africa might be "*sensitive to single out scapegoats*". Third, the organisations and individuals that were contacted did not

have any information on the topic and therefore chose not to answer. Fourth, there are simply no agreements to reveal.

The lack of success in finding information on Chinese involvement was contradictory to the literature on the topic that was regarding China as a growing factor in West Africa. However, other information concerning China was becoming evidently noticeable during the search for fishing agreements. Many papers, written by both NGOs and scientists, were mentioning the involvement of Chinese vessels in illegal fishing. If the aim of the thesis was to discover Chinese involvement in West African fisheries, specific incidents of Chinese IUU activities in the region could theoretically reveal the extent of the Chinese involvement. The sources specifying IUU incidents, seen in table 1, were obtained while searching for IUU activities in West Africa, without specifying Chinese participation. None of the sources used here was investigating Chinese IUU activities in particular.

Table 1. Sources specifying IUU activities.

Organisation	Year	Type of source	EZZ reported
Greenpeace	2001	NGO monitoring	Sierra Leone, Guinea, Guinea-Bissau
Greenpeace	2006	NGO monitoring	Guinea
EJF	2005	NGO review	Guinea
EJF	2009	NGO review	Sierra Leone
SOCU	2003/2004	Regional MCS operation report	Gambia Senegal, Guinea-Bissau, Guinea, Sierra Leone
SADC	2004a	Regional MCS operation report	Angola
SADC	2004b	Regional MCS operation report	Angola
Illegal Fishing Info (database)	2009b	Media report	Ghana

The data in the reports published by Greenpeace was primarily based on observations made in the EZZs of the West African countries mentioned in table 1. EJF, on the other hand, used material gathered by other sources, mostly local MCS authorities but also reports written by other NGOs such as Greenpeace. The data appearing in the EJF reports was then cross-checked with the data in Greenpeace reports to eliminate repetition.

The regional MCS reports seen in table 1 were all describing different MCS operations in various EEZs. Four reports were made by SOCU, an MSC authority belonging to the sub-regional fisheries organisation SRFC. These reports described operations made by sea patrols in the SRFC EEZs. Of the two reports made by SADC, one was describing air surveillance and the other a sea patrol, both in the Angolan EEZ.

The only medial source mentioning Chinese involvement in IUU activities was found using the Illegal Fishing Info database (www.illegal-fishing.info). Medial coverage of IUU incidents was often mentioning data that was already published in the NGO reports presented here and was therefore eliminated to avoid repetition.

In addition to data regarding IUU incidents in West Africa, various scientific articles were studied while preparing this paper. Estimations regarding the extent of IUU fishing in the region (MRAG 2005; Falaye 2008; Agnew 2009) were used to evaluate the extent of Chinese involvement in relation to all IUU activities. Since all the estimations mentioned in these articles regarded the fiscal value of IUU, the value of Chinese had to be translated to monetary terms too. This was done using Falayes estimation (2008) that every illegal fishing vessel catches fish at a value of \$3 million/year in average. This number was then multiplied by the total number of Chinese IUU vessels in the region. By doing so, a rough estimation of the extent of Chinese IUU could be made.

The evaluation of MCS capacity was based mainly on the detailed analysis made by MRAG in 2005. Not all national MCS authorities were included in this section due to lack of detailed knowledge regarding this issue. However, the data presented in this article represents the wide variation between MCS capacities in different countries in the region. Evaluations of the state of marine ecosystems in the region were based on various scientific papers and reports, among them a detailed analysis made by the Global International Water Assessment (GIWA).

5. Results

The results of this paper reconstruct the details found on IUU fishing within the EEZs of West African countries, particularly the involvement of Chinese DWFs in this kind of activities. In addition to that, the MCS ability of some countries in the region is presented in order to achieve better understanding of the ability and difficulties in enforcing regulations meant to protect the ecosystems and the services they provide.

5.1. Chinese involvement in Africa

During the last decade, China has increased its financial involvement in Africa dramatically. According to Tull (2007) this was done to serve two different purposes. While export from China to Africa is commercially driven, the import of goods from Africa is strategically aimed at the objective of continuous growth of the Chinese economy with the help of imported natural resources such as oil, timber, minerals and fish products. Trade between China and Africa increased from \$1 billion to \$40 billion from 2000 to 2006 (Alden and Sidiropoulos 2006), making China the third trading partner with the African continent after the United States and France. As the economic growth of China continues, this involvement is presumed to increase even more in the future. The Chinese government policy towards Africa supports this assumption. An official document issued by the Chinese Ministry of Foreign Affairs (FMPRC 2006) states that China will “*establish and develop a new type of strategic partnership with Africa, featuring political equality and mutual trust, economic win-win cooperation and cultural exchange*” and will “*work together with Africa in the exploration of the road of sustainable development*” (FMPRC 2006, Part III). Although fisheries are not specifically mentioned in this declaration, the paragraph regarding utilization of resources states that Chinese enterprises will work “*with a view to helping African countries to translate their advantages in resources to competitive strength, and realize sustainable development*” (FMPRC 2006, Part IV paragraph 6).

The official Chinese policy also mentions that African nations will be given economic assistance with “*no political strings attached*” (FMPRC 2006, Part IV paragraph 9). In the light of that, it is noteworthy to mention reports from Guinea-Bissau, the only country in West Africa known to have signed a fishing agreement with China (see chapter 5.2). A newspaper report (Washington Post 2007) claims that the newly constructed parliament building in

Guinea-Bissau was sponsored by China and there are plans to build a military hospital and a dam, also sponsored by China. The United States ambassador to Guinea-Bissau is quoted in the article saying that the Chinese investments are “*tokens in return for the fishing agreements which are extremely beneficial to the Chinese*” and that the local government is being “*systematically robbed*”.

While much of the trade between China and Africa is legitimate and legal, some aspects of the Chinese involvement in the region are more dubious. Illegal trade in a variety of products, such as timber, ivory, diamonds and fish products is taking place between China and Africa, side by side with other illegitimate activities such as trade in counterfeit goods and money laundering (Niquet 2006). While Western countries investing in Africa often stand under the scrutiny of NGOs and other involved stakeholders, China tends to ignore this type of critique (Niquet 2006; Tull 2007). The idea of “non-interference” in China’s African policy is an advantage when competing with Western countries on natural resources (Tull 2007). Politically unstable African regimes favour trade with China to avoid interference with internal issues.

5.2. Fishing agreements

DWF activity in West Africa has been going on for decades. As UNCLOS was signed and ratified, the only way DWFs could fish legally in African EEZs was by signing fishing agreements. While the European Union (EU) was, and still is, one of the major actors in West African fisheries, there is an increasing activity of other DWFs in the region, one of them being China (Alder and Sumaila 2004).

EU agreements with West African countries have been criticized by parts of the scientific community (Kaczynski and Fluharty 2002) and NGOs (Action Aid 2008). The criticism regarding these agreements is based on a number of topics. First, the price paid for fishing rights is too low in comparison with the profits. Kaczynski and Fluharty (2002) claim that the sums paid for fishing rights in West Africa are far too low for the revenues made by selling the fish in European countries. Second, the knowledge on marine ecosystems in West Africa is insufficient, which means that the demand that DWFs should harvest the surplus of fish left by the local fleet, as stated in UNCLOS, can not be fulfilled. Estimations of sustainable yields have often been considerably over the upper limit of what the ecosystem could tolerate (Pauly

et al 2005), which inevitably led to TACs that are too high to be regarded as sustainable. The EU was blamed for taking advantage of the situation without ensuring that local marine ecosystems are managed sustainably (Action Aid 2008).

However, in comparison to EU agreements with West African countries, the agreements allegedly signed by China are far more problematic. The most serious problem regarding the Chinese agreements is the fact that they are practically impossible to find, let alone reveal their details. There are only two concrete references to Chinese fishing agreements with West African countries, both of them possibly referring to agreements with Guinea-Bissau. Horta (2007) mentions a deep water fishing agreement for “*large numbers of Chinese fishing vessels*” signed 2006. According to that source there were six Chinese vessels operating in Guinea-Bissau in 2007. The Chinese Ministry of Foreign Affairs (FMPRC 2003) also refers to an agreement with Guinea-Bissau, but there is no information regarding the details of that agreement. It is, however, clear that the Chinese DWF is present in many other West African EEZs, as seen in table 2.

Besides bilateral fishing agreements between countries, agreements can sometimes be signed between a hosting country and foreign fishing companies. Even in this case, the level of transparency experienced regarding activities of Chinese fishing corporations is very low and few of these agreements are open to the public. Greenpeace (2007) asserts that state-owned Chinese corporations have access agreements to 38 countries, but information about the location of these is missing. The internet site of the state owned China National Fisheries Corporation (CNFC 2009), the largest fishing corporation in China, states that it has offices in eight West African countries – Morocco, Mauritania, Senegal, Gambia, Guinea-Bissau, Ghana, Guinea and Sierra Leone. It is, however, not clear in what ways CNFC is involved in West African fisheries and whether the company has fishing agreements with any of the mentioned countries. In 2006, two Chinese companies, *Afrik-Shandong Limited* and *Zhongha Fisheries Limited*, were reported to avoid paying taxes for fish exports from Ghana between 1994 and 1999 (Illegal Fishing Info 2009a). The fraud amounted to losses of more than \$15 million. These two companies are said to be owned by the Chinese state. Once again, apart from media coverage of the fraud incident, no evidence for agreements between Chinese fishing companies and West African countries was found.

5.3. IUU activity in West African EEZs

IUU fishing has been going on in West African waters since the establishment of EEZs. Although it is extremely difficult to quantify the amount of fish caught illegally, it is possible to find a lot of specific IUU incidents from various sources. As the focal point of this paper is Chinese IUU activity due to the large representation of Chinese vessels in this kind of incidents (Falaye 2008), the events described here will be related to Chinese activities in West Africa. However, vessels engaged in IUU activities are often not easy to identify. Vessel markings are absent or incomplete and the identification, especially by aerial surveillance, is not always possible. A report by Greenpeace (2001) states that almost all vessels engaged in IUU fishing witnessed in Guinea's EEZ were unidentifiable. It is likely that Chinese involvement in IUU activities is more extensive than the one seen in different reports.

The information in table 2 shows a clear picture of substantial IUU activity of Chinese vessels in Guinea. This can be the result of the intensive involvement of Greenpeace (2001; 2006) in monitoring activities inside Guineas EEZ. However, it is known that Guinea is one of the countries in West Africa that is most affected by IUU fishing. More than half of the catches in Guinea, at an approximate value of around \$105 million per year, are estimated to be harvested by IUU vessels (MRAG 2005). If that is the case, the extent of Chinese involvement in Guinea presented in this paper is reasonable. It is also compatible with the poor level of MCS capability of Guinea that will be described later.

Table 2. Chinese vessels engaged in IUU activities between 2000 and 2008.

Year	Place	Vessel Name	Vessel Type	Registration	Violation Type
2000	Gambia	CNFC 9310	Trawler	China	Fishing in prohibited zone ⁸
2000	Guinea	Long Way 010	Trawler	Belize*	Unlicensed fishing ¹
2000	Guinea	Lian Run 10	Trawler	China	Unlicensed fishing ¹⁰
2000	Guinea	Long Way 008	Trawler	Belize*	Unlicensed fishing ¹
2000	Guinea	Lian Run 1	Trawler	China	Unlicensed fishing ⁸
2001	Guinea	Long Way 007	Trawler	Belize*	Unlicensed fishing ¹
2001	Guinea	Long Way 009/Lian Run 7	Trawler	Belize*	Unlicensed fishing ²
2001	Guinea	Long Way 008/Lian Run 3 or 8	Trawler	Belize*	Unlicensed fishing ²
2001	Guinea	Lian Run 9 (?)	Trawler	China	Unlicensed fishing ²
2001	Guinea	Lian Run 12 ³	Trawler	China	Unlicensed fishing ²
2001	Guinea	Long Way 007	Trawler	Belize*	Unlicensed fishing ²

2001	Guinea	Hai Feng 830	Reefer	China	Unlicensed fishing ⁸
2002	Guinea	Min Yu 701	Trawler	China	Illegal mesh in trawl ⁸
2002	Guinea	Yue Yuan Yu 7	Trawler	China	Unlicensed fishing ⁸
2002	Guinea	Yue Yuan Yu 8	Trawler	China	Unlicensed fishing ⁸
2003	Guinea	Lian Run 7	Trawler	China	Unlicensed fishing, mesh size violation ¹⁰
2003	Guinea	Liao Yu 839	Trawler	China	Transshipment ¹⁰
2004	Guinea	Lian Run 12	Trawler	China	Unlicensed fishing, mesh size violation, false identification ¹⁰
2004	Angola	Liaopu 7815	Trawler	China	Illegal mesh in trawl, illegal fishing methods, avoiding arrest ⁷
2004	Angola	Liaopu 7816	Trawler	China	Illegal mesh in trawl, illegal fishing methods, avoiding arrest ⁷
2004	Guinea	Sankaran 4	Trawler	China	Mesh size violation ⁸
2004	Guinea	CNFC 9311	Trawler	China	Mesh size violation ⁸
2004	Angola	Yan Ming 6805	Trawler	China	Fishing in prohibited area, trawling though licensed for purse seine ¹³
2004	Angola	Yan Ming 6806	Trawler	China	Fishing in prohibited area, operate trawling though licensed for purse seine ¹³
2004	Angola	Yan Ming 6826	Trawler	China	Fishing in prohibited area ¹³
2004	Angola	Yan Ming 6825	Trawler	China	Fishing in prohibited area ¹³
2004	Angola	Yan Ming 6829	Trawler	China	Fishing in prohibited area ¹³
2004	Angola	Yan Ming 6830	Trawler	China	Fishing in prohibited area ¹³
2004	Angola	Yan Ming 6807	Trawler	China	operate trawling though licensed for purse seine ¹³
2004	Angola	Yan Ming 6808	Trawler	China	operate trawling though licensed for purse seine ¹³
2005	Guinea	Jiu Yuan 812	Trawler	China	Unlicensed fishing ⁸
2005	Guinea	Yan Yu 630	Trawler	China	Illegal mesh in trawl ⁸
2005	Guinea	Gou Ji 806/Taising 806	Trawler	China	Illegal mesh in trawl ⁵
2005	Guinea	Lian Run 13	Trawler	China	Unlicensed fishing ⁵
2005	Guinea	Lian Run 14	Trawler	China	Unlicensed fishing ⁵
2005	Guinea	Lian Run 15	Trawler	China	Unlicensed fishing ⁵
2005	Guinea	Lian Run 26	Trawler	China	Unlicensed fishing ⁵
2005	Guinea	Lian Run 21	Trawler	China	Unlicensed fishing ¹⁰
2005	Guinea	Baraka	Trawler	China	Illegal mesh in trawl ⁵
2005	Guinea	Min Yu 701	Trawler	China	Mesh size violation ⁸
2006	Guinea ⁴	Binar 4	Refrigerated cargo vessel	Panama	Transshipment
2006	Guinea ⁴	Lian Run 24	Trawler	China	Transshipment ¹⁰
2006	Guinea ⁴	Lian Run 25	Trawler	China	Transshipment ¹⁰
2006	Guinea ⁴	Lian Run 26	Trawler	China	Transshipment ¹⁰
2006	Guinea ⁴	Lian Run 27	Trawler	China	Transshipment ¹⁰

2006	Guinea ⁴	Lian Run 29	Trawler	China	Transshipment ¹⁰
2006	Guinea	Lian Run 14	Trawler	China	Unlicensed fishing ¹²
2006	Guinea	Lian Run 1	Trawler	China	Transshipment ⁸
2006	Guinea	Lian Run 14	Trawler	China	Unlicensed fishing ⁸
2006	Guinea	Chang Hai 3	Refrigerated cargo vessel	China	Transshipment
2006	Guinea-Bissau	Lian Run 24	Trawler	China	Transshipment ¹⁰
2006	Guinea-Bissau	Lian Run 29	Trawler	China	Transshipment ¹⁰
2006	Guinea	CNFC 21	Trawler	China	Transshipment ¹¹
2006	Guinea	CNFC 22	Trawler	China	Transshipment ¹¹
2006	Guinea	CNFC 24	Trawler	China	Transshipment ¹¹
2006	Guinea	CNFC 9310	Trawler	China	Transshipment ¹¹
2006	Guinea	Hai Feng 823	Refrigerated cargo vessel	China	Transshipment ¹⁰
2006	Guinea	Hai Feng 829	Refrigerated cargo vessel	China	Transshipment ¹⁰
2006	Guinea	Hai Feng 830	Refrigerated cargo vessel	China	Transshipment ¹⁰
2006	Guinea	Jiu Yuan 812	Trawler	China	Transshipment ¹⁰
2006	Guinea	Long Way 8	Trawler	China	Unlicensed fishing ¹⁰
2006	Guinea	Long Way 10	Trawler	China	Transshipment ¹⁰
2007	Sierra Leone	Lian Run 27	Trawler	China	Fishing in prohibited area ⁶
2008	Ghana	Maache 1	Trawler		Unlicensed fishing ⁹
2008	Ghana	Maache 2	Trawler		Unlicensed fishing ⁹
2008	Sierra Leone	Puyu 6002	Trawler	China	Unlicensed fishing, destroying fishing gear owned by local fishermen ¹⁰

Footnotes:

* Vessels registered in Belize, but evidently Chinese according to the report.

1. SOCU 2003/2004.
2. Greenpeace 2001.
3. The name *Long Way 008* was still visible on the hull when the vessel was spotted
4. Greenpeace 2006. Transshipment occurred outside the Guinean EEZ, but the fishing vessels were previously engaged in fishing (with license) within the EEZ. According to Guineas legislation transshipment is allowed only at port.
5. EJF 2005.
6. Reuters 2007, based on information from the Sierra Leonean navy. Three more vessels, presumably Chinese, were observed together with the *Lian Run 27*, but these were not identified or arrested.
7. SADC 2004a. From a report of a surveillance voyage through Angolan water 2004.
8. Greenpeace 2006
9. Illegal Fishing Info 2009b. Although the registration port of the vessels is not clear, about a third of the crew was Chinese
10. EJF 2009.
11. Although the trawlers were licensed to fish in Guinean EEZ, transshipping was illegal (EJF 2009).
12. *Lian Run 14* had boxes labelled *Lian run 18*, *Lian Run 19* and *Lian Run 20*, possibly to disguise the origin of catches and the vessel engaged in fishing (EJF 2009).
13. SADC 2004b.

Between 2000 and 2008 a total of 66 IUU violations were performed by Chinese vessels in West Africa. MCS authorities and NGOs inspecting IUU fisheries report that on numerous occasions the identity of vessels was not clear. In many cases nationality is not visible as flags are not raised and names of vessels are often covered or non-existent. Even when vessel names are visible, there is evidence that boats were erasing their markings and changing the name to avoid recognition. The Greenpeace mission in 2001 shows great confusion as a result of this type of conduct. A trawler named *Lian Run 12* still had the old name of *Long way 008* on its hull when spotted fishing without a license. On the same day, another trawler bearing the name *Long way 008* was seen in another part of the Guinean EEZ. A total of 29 violations by either *Lian Run* or *Long Way* vessels, probably operated by the same owners, are recorded here. Most of these vessels have repeatedly performed violations such as fishing without license and transshipment of landings to refrigerated cargo vessels on high seas against local regulations. Due to the rapid change of name and the blurred national identity of IUU vessels it is extremely difficult to gather information on the vessels named here. The only IUU vessels that appear on registration databases nowadays are *Taising 806*, *Hai Feng 823* and *Hai Feng 829* (Equasis 2009). However, a number of *Lian Run* fishing vessels are registered in Las Palmas port database (Puertos de Las Palmas 2009) between 2005 and 2006. In that registry they are said to fly the Chinese flag.

There is another major difficulty in analyzing Chinese involvement in IUU. Many vessels disguise their identity to mask the identity of the owner and in that way avoids charge. Names of vessels can be difficult to detect or non-existent and flags are often missing (Greenpeace 2006; SADC 2008). Another problem is the FOCs issue. Registration ports of various vessels, including Chinese ones, are often not the ones they originate from. This fact makes it practically impossible for West African countries to press charges against IUU vessels when they manage to arrest them. Even if a vessel is listed as an IUU vessel, it can change its registration port and continue fishing (Rigg et al 2004). Although China is not considered as an open registry for illegal fishing vessels, the lack of measures taken by the Chinese authorities against IUU fishing makes the Chinese flag a lucrative one (SADC 2008). As an example, the refrigerated cargo vessel *Binar 4*, caught numerous times while transshipping fish at high sea near the Guinean EEZ, was raising an “unspecified Oceanic flag” until August 2004 (Puertos de Las Palmas 2009), which was then changed to Panamas flag. As for today, it is not clear what flag the *Binar 4* is using (Equasis 2009). This refrigerated cargo vessel was included in table 2 due to a number of transshipments it conducted in cooperation with Chinese

trawlers. Some of the *Long Way* fleet, which is likely to be related to the *Lian Run* fleet, is known to have raised another FOCs favourite, the Belizean flag, when caught in the Guinean EEZ in 2001 (Greenpeace 2001).

According to the results of this study, there were 62 Chinese vessels involved in IUU fishing between 2000 and 2006. Based on an estimation made by Falaye (2008) regarding the loss of income from every IUU vessel, the total loss of revenues caused by these vessels over a period of six years would be \$186 million, or \$31 million/year. According to Agnew et al (2009), the total estimated value loss in West African fisheries is between \$313 and \$631 million every year. This implies that Chinese vessels showed in this study were responsible for 4.9-9.9% of the total loss of revenues in West African waters. However, the loss estimation made by Agnew et al (2009) covers both the EEZs and the high seas areas (areas 34 and 47, FAO 2009c), while the vessels presented in table 2 operated only in local EEZs. It can therefore be assumed that Chinese vessels are involved to a higher degree than shown here. In addition, it can be assumed that more Chinese vessels were involved in IUU fishing in the region but avoided getting caught or observed. In 2006, 15 trawlers were observed engaged in IUU activities in Guinea. According to Falayes estimation, the losses by these vessels would be \$45 million. MRAG (2005) estimates the losses as a result of IUU fishing in Guinea to be worth \$105 million. Based on these estimations, the Chinese DWF is responsible for 42.9% of IUU fishing in Guinea's EEZ.

In theory, the most uncomplicated method to determine the share of Chinese vessels in IUU is to divide the number of Chinese vessels in the total of all IUU vessels. The difficulty to apply this method lies in the fact that data regarding total number of IUU vessels is unattainable due to the magnitude and the character of the phenomenon. The most complete list of IUU vessels in West Africa that does not focus only on Chinese vessels and gives a broader view on IUU by diverse DWFs is found in the Environmental Justice Funds' report (EJF 2009). That report specifies 57 different vessels that were linked to IUU in West African EEZs. Around 65% of these vessels were Chinese, the rest belonging to South Korea, Panama, Singapore, Belize and other West African countries. Due to the general focus of this report on IUU by all DWFs, this ratio can be perceived as relatively correct. If that is the case, the Chinese DWF is by far the major actor in IUU fishing in the region.

5.4. MCS capability

One of the most central elements in fisheries management is creating and maintaining effective MCS authorities. The lack of such not only indicates that IUU will persist and that the utilization of natural resources will go on uncontrolled, it also attracts illegal fishing activity due to the minor risk of getting caught and persecuted. Generally, few countries in West Africa have the required MCS capability needed to deter IUU fishing (Atta-Mills et al 2004). The main reason for the lack of functioning MCS programmes is the lack of financial and technical resources. However, there is a significant variation between different countries. A detailed report by MRAG (2005) analyzes the MCS capability of a number of West African countries, with the results shown here:

- **Guinea** – The Guinean MCS capacity is regarded as poor. However, Guinea did invest in building MCS authorities, with six coastal stations and a number of patrolling boats at a cost of around \$10 million in 2001. The same year 684 vessels were inspected at sea, resulting in 14 arrests. 188 inspections were performed at ports. In spite of that, estimations show that the levels of IUU in Guinea's EEZ are the highest in the area.
- **Liberia** – MCS capacity here is considered as “almost non-existent”. Until recently, Liberia had practically no MCS programme, most likely due to the civil war and ongoing political instability since the end of the 1980's. Up to 2005, the MCS authority of Liberia consisted of only five inspectors working with unsatisfactory legislation and no means for evaluating the state of fish stocks. Investments in building MCS capacity are virtually absent.
- **Sierra Leone** – With a political situation resembling the one in Liberia, MCS was not a top priority in Sierra Leone during a long period of time. In spite of the existence of some patrol boats, the capability of the local MCS is extremely poor, mostly due to lack of trained workforce.
- **Angola** – Although Angola has also been engaged in a long civil war from the middle of the 1970's until 2002, the level of MCS capacity is higher than all of the countries mentioned above. Revenues from signing fishing agreements with the EU were partially invested in equipment and education of staff. The improved MCS capacity is relatively recent. Until the beginning of the millennium Angola only had a small

number of patrol boats that were usually out of use. However, during the last years there are three large patrol boats and seven inshore vessels, and a satellite guided monitoring system has been put in order. Aerial surveillance is occasionally conducted and observers are stationed on every shrimp trawler (Angola Press Agency 2008). There are 241 workers in the Angolan MCS authorities and cooperation is established with two regional fisheries organizations.

- **Namibia** – Immediately after gaining independence in 1990 Namibia established the Ministry of Fisheries and Marine Resources (MFMR), a body in charge primarily of fisheries management and MCS. Namibian MCS is considered to be one of the most advanced of its kind in the world, and undoubtedly the most successful one in West Africa (Bergh and Davies 2004). With a workforce of 353 well educated employees, the MCS authorities in Namibia have three patrol boats, a light surveillance airplane and a satellite guided monitoring system on every licensed fishing vessel. Financing the Namibian MCS operations is done using revenues generated from fisheries management, mostly from quota fees. In 2000, 37% of the revenues made by MFMR were invested back in MCS.

In addition to national MCS programmes, there are also attempts to detect and deter IUU fishing on a larger scale. Cooperation between neighbouring MCS authorities does occur. In 2003/2004, the West African Sub-Regional Fisheries Committee (SRFC) executed a number of joint operations in different parts of the EEZs of its member states (SOCU 2003/2004). This series of operations had some success in both collecting information concerning the scale of IUU fishing and in stopping illegal activities. During the first two joint operations, involving patrol boats and aerial surveillance, 265 fishing vessels were spotted, 82 of them were boarded for inspection and 11 were arrested, including the Chinese vessel *Lian Run 12* in Guinea's EEZ. The third operation, in August 2004, was a complete failure due to various logistic problems such as lack of communication between patrol boats belonging to different countries, problems in refuelling the boats and difficulties in organizing collaboration between national MCS authorities. No arrests were done during this operation, although 32 vessels were inspected. In the paper concluding this operation it is stated that "*national authorities must put their act together; otherwise we will never meet our objective of the elimination of IUU fishing activities in the EEZs of the SRFC member states*" (SOCU 2003/2004, Operation Barracuda, p. 6). Later on, another joint operation was executed, this time with better results. Due to difficult weather condition only ten vessels were inspected, of

which two were arrested, both in the Guinean EEZ. These two boats, *Sankaran 4* and *CNFC 9311*, are Chinese vessels. A couple of joint MCS operations made by the Southern African Development Community (SADC) MCS authority (SADC 2004a; SADC 2004b) resulted in identification of ten Chinese vessels in Angola's EEZ. No IUU activities in Namibian water were recorded during the operations.

5.5. The state of marine ecosystems in West Africa

Correlations between IUU activities and the degradation of the marine ecosystem are complicated and difficult due to the fact that these illegal activities are hard to detect and quantify. Even in areas where extensive information about fishing activities exists, knowledge regarding the exact state of marine ecosystems is not always complete due to the complexity of the system and the difficulties to assess it due to inaccessibility. A shift in the state of a certain fish stock can also occur due to other factors than IUU fishing, such as over-exploitation by legal fishing fleets, pollution or natural environmental variations. However, it is apparent that marine ecosystems near West Africa are subjected to illegal fishing, and that illegal fishing does have a negative impact on ecosystems. This statement relies on few bases. Various scientific articles and reports (Kaczynski and Fluharty 2002; Alder and Sumaila 2004; MRAG 2005; EJV 2009) shows clearly that IUU is, to various degrees, a common phenomenon globally, and particularly in West African water. The availability of fish in this highly productive region is a valuable source of income not only for authorized and legal fishermen but also to IUU vessels. Another reason for the substantial IUU activity is the poor MCS capacity of most of the West African countries. Fishing illegally in highly productive seas with low risk of getting caught and prosecuted may be appealing to foreign DWFs. With this in mind, it is probable that a worsening in the state of marine ecosystems can be at least partially related to the activity of IUU vessels.

5.5.1. The Canary Current

This region comprises of Cape Verde, the Canary Islands, Mauritania, Senegal, The Gambia, the northern part of Guinea-Bissau's coast and the Atlantic coast of Morocco. A regional analysis prepared by the United Nations Environment Programme (UNEP, Tayaa et al 2005) states that a wide range of fish stocks are over-exploited due to activities of both local and foreign fleets. These stocks range from shrimps and cephalopods to demersal and pelagic fish.

Many countries experience an ongoing decline in catches from the middle of the 1970's. Christensen et al (2004) estimate that between 1960 and 2000 fish biomass in the area has decreased by a factor of 13, while at the same time fishing intensity increased dramatically (see figure 3). A report made by the Global International Waters Assessment (GIWA) considers the impact of over-exploitation of fish stocks in the area as *severe*. In another report (CCLME 2007), IUU activities are said to be one of the most significant factor for the decline in living marine resources.

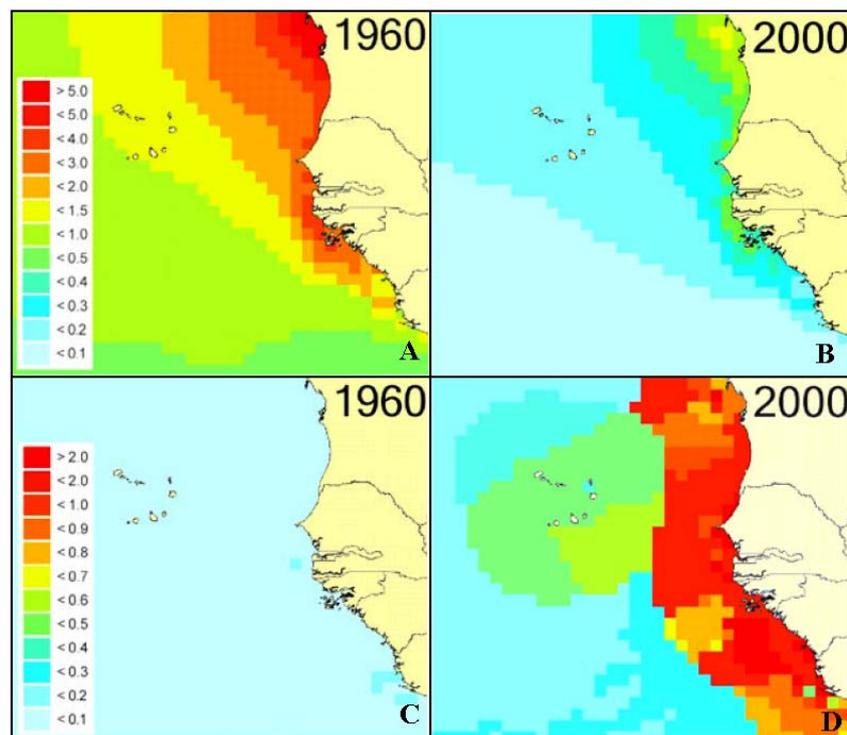


Figure 3. Fish biomass distribution in Northwest African waters in 1960 (A) and 2000 (B) for fish with trophic level of more than 3.0 and fishing intensity at the region for these fish (C and D). Adapted from Christensen et al 2004.

5.5.2 The Guinea Current

The countries included in this area are the southern part of Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin and São Tomé and Príncipe. UNEP's regional assessment for the Guinea Current Region states that fish stocks are severely over-exploited (Abe et al 2004) and that the exploitation, and the impact it will have on the region, is likely to increase in the future. All countries in the region experience over-exploitation of fish stocks and the straddling character of these is an issue that complicates fisheries

management. Both DWFs and the local fishing industry have been fishing in the region from the 1960's in a manner that pushes the ecosystem towards a total collapse. In a strategic action programme of the countries sharing this large marine ecosystem, IUU fishing is considered as a high priority issue influencing the loss of marine resources (GCLME 2008).

5.5.3. The Benguela Current

This large marine ecosystem consists of three countries, the Atlantic coast of South Africa, Namibia and most of the Angolan coast. The commercial catches in the region have dropped drastically since the 1960's, from more than three million tonnes to around one million tonnes in the 1990's (Hampton et al 1998). However, from 1985 there has been a decrease in the presence of DWFs in this region. In GIWA's assessment of this region, the state of fish stocks is considered as severe (Prochazka et al 2004). Moreover, the relation between IUU fishing and the decline in fish stocks are said to be a prioritized concern that needs to be dealt with when planning the management of the ecosystem. However, there is a perception that the state of the ecosystem is in a recovery phase, mostly due to improved management of the fisheries during the last decade.

6. Discussion

Studying the Chinese IUU activities in West Africa is evidently complicated. The illegal nature of these activities makes it difficult to assess the degree to which Chinese vessels perform, let alone the impact they have on marine ecosystems and on food security and livelihood. This topic becomes even more complex due to lack of scientific knowledge about the actual state of the marine ecosystems in the region. Scarce financial resources in most West African countries lead to insufficient MCS capability and damage the capacity to assess the state of marine ecosystems and calculate the amount of TACs that are within the limits of maximum sustainable yield.

However, the results presented in this paper demonstrate that there is a noticeable activity of Chinese vessels in the region. Although the amount of incidents reported here might seem minor, these IUU activities can be significant due to a number of reasons. It is estimated the

pure economic loss from IUU vessels in West Africa is roughly \$3 million per year and fishing boat (Falaye 2008). In countries that depend on fisheries as one of the main sources for the Gross Domestic Product (GDP) this loss of fish is enormous. This estimation made by Falaye is based on fish value alone, not taking into account the loss of income for people working in secondary processing factories and of local fishmongers. In addition, this estimation does not include the national loss revenues collected by fishery authorities such as quota fees, by-catch fees and license fees. In 2002, these revenues in Namibia summed up to more than \$16 millions (current value, MFMR 2007). Most of these revenues originate from foreign flagged vessels that are required to pay fees usually about three times higher than the ones paid by local fishermen. As shown before, the strong status of Namibian MCS is allowing an efficient collection of these fees and violators are often prosecuted. Other countries in the region, with a much less developed MCS infrastructure, often fail to do so.

Chinese IUU activities have a substantial impact on the amount of landings caught by local fishermen. The gear used by this occupational group is often less sophisticated and efficient than the one used by industrial Chinese vessels, making it even harder for them to fish a sufficient amount of fish to maintain a reasonable income. When Chinese vessels fish with gear that is prohibited by the EEZs governing authorities, as they repeatedly seem to do (see table 2), local fishermen are finding themselves in an even more marginalized position. Some of the Chinese trawlers operating in Guinea are also known to stay at sea for long periods of time, maintained and offloaded by other vessels without the need to approach land (Greenpeace 2001). This allows them to fish continually for longer periods of up to few years while local fishermen must return to the harbour.

Transshipment of fish at high seas from Chinese trawlers to refrigerated cargo vessels, an often occurring violation as seen in table 2, is a major problem in estimating the state of fish stocks in West African EEZs. Misreporting the type and quantity of these landings leads to inaccurate estimations of maximum sustainable yields and therefore to incorrect TACs. This, consecutively, can lead to over-exploitation and depletion of fish stocks. Transshipments at high seas should therefore be seen not only as illegal activities but also as a central problem for management plans for sustainable fisheries due to the loss of information they are responsible for. In addition to that, great losses in job opportunities for the local are lost in secondary processing facilities relying on fish caught in their country's EEZ. The detrimental

effect of transshipments, influencing many levels within the socio-ecological system, can be seen as an important factor in increasing vulnerability of fisheries and people in the region.

The amount of landings that Chinese trawlers can harvest can not be seen as negligible in relation to the impact it has on marine ecosystems. Although only 66 violations are recorded here, the extent of Chinese IUU fishing is presumably much higher. Chinese vessels are known to have changed names to avoid detection and prosecution by local MCS authorities. Vessels known to be Chinese are also reported for flying other FOCs, such as the Belizean one (as the *Long Way* vessels did in Guinea in 2000, see table 2), in order to avoid detection. It is likely that far more Chinese vessels are fishing in West African EEZs, and considering the amount of fishing violation seen here it can be assumed that at least some of them are involved in IUU fishing.

The presence of the Chinese DWF in West Africa is evident. Although various sources state that China has signed bilateral fishing agreements with countries in the region (MRAG 2005; The National 2009; YaleGlobal 2007) it is impossible to find any formal verification for this fact by either China or the countries allegedly signing this agreement. This lack of transparency is becoming even more evident when studying the way the EU is involved in West African fisheries. The EU might at times face harsh critique for the bilateral fishing agreements (Kaczynski and Fluharty 2002) and partnership agreements (Actionaid 2008) signed with West African countries. European fishing fleets, mainly from Spain, Portugal, Italy, France and Greece (European Commission 2008) are heavily subsidized by the EU. This enables them to continue fishing in foreign EEZs and compete with local fishermen that often lack the financial resources to manage this competition (Clark et al 2005). However, when considering the transparency aspect, which is a crucial one as far as fishing agreements are concerned, the EU has a clear policy. All agreements, including details about the areas in which fishing is approved, the sort of gear allowed, the exact duration of the agreement and the number and type of vessels are stated clearly and can be found easily (European Commission 2008). A high degree of transparency is a key factor in fisheries management for a number of reasons. It allows better planning of TACs and quotas, it benefits cooperation with neighbouring countries sharing the same fish stocks and it allows the public and diverse stakeholders access to information. Bilateral agreements with China, presuming that they exist, totally lack these vital components.

The most obvious indication of illegal Chinese activity is the vessels officially caught by MCS authorities or detected by other organizations (as seen in table 2). The two Chinese companies involved in fraud in Ghana during the 1990's (mentioned in chapter 5.1) show that, besides fishing, Chinese companies are also establishing themselves in West Africa and, as in this case, conduct IUU activities from there. The Chinese Ministry of Foreign Affairs (FMPRC 2003) does claim to have a relation to fisheries in various West African countries. For example, an "agreement for fishery cooperation" was signed between China and Guinea-Bissau in 2002. The details of this agreement are not available, and the duration of the agreement is missing. The same governmental Internet source also states that some relations within the fisheries sector were established with Gabon, Gambia and Sierra Leone. It is impossible to assess the nature of these relations or the time frame in which they were valid. It is, however, clear that China, an expanding economic global actor, is competing with other industrialized countries on the possibilities of using Africa's natural resources. Being the leading moneylender to African countries, some claim that these investments might negatively effect the terms of negotiations when discussing fishing agreements (Standing 2008).

Discussing Chinese policies in West Africa demands a closer look on the terms on which Chinese companies operate. The government owns many, if not all, of the Chinese fishing companies. The largest fishing corporate, CNFC, is owned by the Chinese state and is recorded as involved in six incidents of IUU activities in West Africa between 2000 and 2006 (see table 2). The two companies charged for fraud in Ghana are also claimed to be governmental. This raises a question concerning the ability, and the will, of Chinese authorities to control their DWF. Even if these companies were not owned by the Chinese state, vessels raising a Chinese flag are obliged to comply with the Chinese law. Since China has signed and ratified UNCLOS, those vessels involved in IUU do not meet the terms set by the government and should therefore be dealt with by the Chinese authorities. The lack of action taken against offenders places China in a list together with other renowned FOC countries (Hanafusa and Yagi 2004; Griggs and Lugten 2007) and Chinese vessels are consequently beyond the reach of the law. When considering the Chinese regulations concerning fisheries, this failure to act in accordance with the law is becoming even more notable. Article 30 in the Fisheries Law of the People's Republic of China (NPC 2004) states that "*It is banned to go fishing in the prohibited fishing areas or within the prohibited fishing periods... It is banned to go fishing with nets smaller than the smallest size of mesh*". The

penalties for not complying with the regulations include confiscation of the fishing vessel and withdrawal of the fishing license of the offender (article 38). The same penalty can be imposed when fishing without license in China's EEZ (article 41). Article 46 specifies the law regarding foreign fishing vessels, stating that unlicensed fishing or "*activities for investigation of fishery resources*" in China's EEZ can lead to confiscation of the vessel and prosecution. Thus, it is evident that the Chinese authorities are aware of the problems created by IUU fishing, but refrain taking the responsibility and apply these rules on their own DWF operating in West Africa. Considering the fact that at least some of the vessels in table 2 are state-owned, this lack of reaction is even more alarming.

An important aspect that is often ignored when West African countries sign fishing agreements with other countries is the weight of stakeholder involvement in the success of continuous cooperation with DWFs. Irritation and frustration experienced by local fishermen in West African countries has led to serious conflicts with both vessels belonging to China and with local authorities. Local inshore fishermen in Sierra Leone report incidents of violent intimidation and destruction of their gear by Chinese vessels (EJF 2009). Destruction of fishing boats and nets is reported in other countries, such as Nigeria (Falaye 2008) and Guinea (Greenpeace 2006). In some cases the damage is more serious than the material destruction. Guinean fishermen witnessed an incident of a foreign trawler colliding with a fishing canoe, killing five local fishermen (MRAG 2005). In another incident in Guinea, a fisheries inspector died during an encounter with an illegal trawler (ICSF 2005). IUU fishing can therefore also be seen as a threat to health and security of both local fishermen and fisheries inspectors (Agnew and Barnes 2004). Apart from the obvious damage to material and the loss of human lives, this kind of incidents decreases the degree of trust local fishermen have in the local authorities that allow foreign vessels to operate in their water. Fishermen in Ghana express frustration and anger directed to governing bodies for selling fishing rights to foreign, mostly Chinese, Korean and European DWFs (The National 2009). There is a risk that this loss of trust will enhance IUU fishing by the local fishermen themselves (Agnew and Barnes 2004) and create a negative feedback on the socio-ecological system.

The literature and data sources used in preparing this paper are, as mentioned before, of varying origin. Most of the data regarding IUU incidents comes from reports made by local MCS authorities and NGOs operating as observers, such as Greenpeace and EJF. The data originating in medial coverage was limited and often referred to reports published by the

NGOs and MCS mentioned above. During the recent years there has been an increase in the number of scientific estimations regarding the extent of IUU fishing, directed both globally or pinpointing various local fisheries (MRAG 2005; Falaye 2008; McCluskey and Lewison 2008; Agnew et al 2009). These estimations provide an opportunity to understand the scale of IUU activities and current trends concerning targeted fisheries. It is, however, also important to keep track of separate IUU incidents in order to get a deeper insight locally. A database for IUU activities, with information on the nationality of the offenders, the type of violation and the place where it took place, can be a useful tool for both the scientific community and, even more important, to local MCS authorities in West Africa. This database can be used to recognize patterns of IUU activities and increase regional cooperation aimed at deterring illegal fishing activities. Vessels that repeatedly disobey fishing regulations can be identified and banned from fishing in West African EEZs.

The data presented in this paper does not show a complete picture of Chinese involvement in IUU fishing in West Africa. As a result, the impacts of these activities on marine ecosystems can not be analyzed in detail. However, the lack of knowledge and information is a central problem in regard to marine ecosystems and IUU fishing. The precautionary principal states that *“where uncertainty and doubt make it impossible to be sure about a correct decision, any errors should favour the long-term sustainability of the environment”* (Underwood 1997, p. 137). Fishing agreements in West Africa are often based on incomplete assessments of the marine ecosystem, leading to incorrect TACs. Based on these TACs, fishing rights are sold to DWFs. Already there the precautionary principle should be applied. It might be understandable that a developing country, relying on revenues from such an agreement, has a strong incentive sell fishing rights within their EEZ. It is, however, less justifiable that richer countries use this situation for profit-making. China, becoming a serious economic actor in the global scene during the last decades, should also take the responsibility to maintain West African fisheries within the boundaries of sustainability. This demands not only a better transparency when signing fishing agreements and a better control over the Chinese DWF, but also an involvement in assisting African countries to build up their MCS capabilities. Only when these countries, with the support of interested actors from other parts of the world, have improved their ability to manage their fisheries can sustainable fishing continue. Not doing so would only aggravate the situation and might bring the ecosystem to a shift that will not benefit any of the stakeholders.

Correlating the direct impacts of Chinese IUU fishing on marine ecosystems and people in West Africa is not possible with the existing data, but there is abundant scientific literature connecting IUU activities to deterioration of marine ecosystems. Based on the knowledge that large human populations in West Africa depend on fish for survival, it can be said that illegal fishing is risking the lives of millions of people. The Chinese involvement seen in this study is a major obstacle for sustainable fisheries in the region due to the magnitude of the IUU activities its DWF performs. The lack of transparency in fishing agreements is worsening the situation even more by masking the agreements' details. The Chinese government, which owns many of the Chinese fishing corporations, is ought to have a better control on its fishing fleet. The limited MCS capacity of most West African countries can not be used by China as an excuse for escaping from responsibility, and as the actor with more financial resources China should aim to not only at stopping IUU fishing, but also assist West African countries in establishing well functioning MCS authorities. Not doing so can only be seen as raw exploitation of both the ecosystem and the people relying on it.

7. Conclusions

West African marine ecosystems and fisheries are subjected to severe stress by the fishing industry, much of it derived by DWFs. The Chinese fleet has been increasing its activities in the region during the last two decades, but due to low levels of transparency regarding fishing agreements between China and West African nations the exact impact of Chinese fishing activities is unclear. The results presented in this paper show an extensive involvement of Chinese fishing vessels in IUU activities in various EEZs in West Africa with 66 incidents during a period of eight years (2000-2008). The financial loss due to these incidents, roughly calculated based on estimation by Falaye (2008), is \$195 million, not including revenues from taxes and income generated from secondary processing of fish. In 2006, 15 Chinese trawlers were observed in the Guinean EEZ. The loss inflicted by these vessels, estimated at \$45 million, comprises almost 43% of the total Guinean loss of revenues resulting from IUU activities (based on estimation made by MRAG 2005). It is apparent that the Chinese IUU activities are extensive, with obvious influence on fisheries in West Africa.

Dependency on fish as a protein source and on revenues from fishing in many parts of Africa is extensive. Many of the communities relying on fisheries are poor and located in rural regions in proximity to the shore. The consequences of deterioration in services provided by the marine ecosystem are likely to increase the vulnerability of local populations. In the short term, the direct impact will be food insecurity and diseases related to it. In the long run, IUU activities might lead to a permanent shift in the state of the marine ecosystem in the region and a radical change in the availability of fish species. While DWFs can continue fishing in other regions, the local populations depending on fish will have neither the means to relocate nor the capital to obtain other food sources. The results of such a catastrophic event can affect millions of lives in West Africa.

The Chinese state is committed to UNCLOS and therefore responsible for the activities of their own fishing vessels. Chinese regulations concerning the Chinese EEZ are clear and strict, but the same standard is not met when Chinese vessels operate in West Africa. Instead, these vessels exploit the marine ecosystem without any significant restraints, neither from China nor from the insufficient local MCS authorities. Long-term planning of West African fisheries, in which China is currently not involved, should include investments in building MCS capacity in the region. There is a clear incentive for China to do so. Apart from ensuring a better future for people in the region, investments in sustainable fisheries in West Africa will allow the Chinese DWF to continue fishing in the region.

While preparing this paper it became evident that information on fishing agreements between West African countries and China is extremely difficult to detect, let alone the details in these agreements. Information on Chinese IUU activities, however, was more accessible. This paradox, in which illegal activities are easier to identify than official bilateral agreements, exemplifies the lack of transparency in fishing agreements. This transparency is crucial in order to be able to assess the quantities of fish catches and maintain the sustainability of the marine ecosystem. Without sufficient knowledge, the validity of fisheries management plans is questionable.

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9. References

Abe, J., J. Wellens-Mensah, O.S Diallo and C. Mbuyil Wa Mpoyi. 2004. GIWA, Regional assessment **42**, Guinea Current. UNEP, Nairobi, Kenya.

Action Aid. 2008. Selfish Europe. Johannesburg, South Africa. Online URL: http://www.actionaid.org/assets/pdf/08.06_SelFish-Europe_EN.pdf.

Adger, W. N. 2000. Social and Ecological Resilience: are they Related?. *Progress in Human Geography* **24**(3): 347–364.

Agnew, D. J. and C. T. Barnes. 2004. Economic Aspects and Drivers of IUU Fishing: Building a Framework. In: *Fish Piracy, Combating Illegal, Unreported and Unregulated Fishing*. OECD, Paris, France.

Agbodeka, F. 1992. An Economic History of Ghana: From the Earliest Times. Ghana University Press, Accra. ISBN 9964301987.

Agnew D. J., J. Pearce, G. Pramod, T. Peatman, R. Watson, R. Watson, J. R. Beddington and T. J. Pitcher. 2009. Estimating the Worldwide Extent of Illegal Fishing. *PLoS ONE* **4**(2): e4570.

Alden, C. and E. Sidiropoulos. 2006. China and Africa: Friendship and Revival in the New Century. *Beijing Review* **44**. Online URL: http://www.bjreview.com.cn/expert/txt/2006-12/15/content_50879.htm#. Last updated December 15 2006, last visited July 5 2009.

Alder, J., G. Lugten, R. Kay and B. Ferriss. 2001. Compliance with International Fisheries Instruments. In: *Fisheries Impacts on North Atlantic Ecosystems: Evaluations and Policy Exploration*, Pitcher, Sumaila and Pauly (eds.), Fisheries Centre Research Reports **9**(5), University of British Columbia, Vancouver.

Alder, J. and U. R. Sumaila. 2004. Western Africa: A Fish Basket of Europe Past and Present. *Journal of Environment & Development* **13**(2): 156-178.

Angola Press Agency. 2008. Government Formalises Fisheries Management Measures. Published in allafrika.com. Online URL: <http://allafrica.com/stories/200803100191.html>. Last updated March 9 2008, last visited June 15 2009.

Atta-Mills, J., J. Alder, and U. R. Sumaila. 2004. The Decline of a National Fishing Nation: The Case of Ghana and West Africa. *Natural Resources Forum* **28**: 13-21.

Bennet, E. 2004. Gender, Fisheries and Development. *Marine Policy* **29**(5): 451-459.

Bergh, P. E., and S. Davies. 2004. Against All Odds: Taking Control of the Namibian Fisheries. Chapter 15 In: *Namibia's Fisheries: Ecological, economic and social aspects*. Eds. Sumaila U. R., D. Boyer, M. D. Skogen and S. I. Stenshamn. Eburon Academic Publishers, Netherlands. ISBN 9059720172.

Berkes, F., T.P. Hughes, R.S. Steneck, J.A. Wilson, D.R. Bellwood, B. Crona, C. Folke, L.H. Gunderson, H.M. Leslie, J. Norberg, M. Nyström, P. Olsson, H. Österblom, M. Scheffer and B. Worm. 2006. Globalization, Roving Bandits, and Marine Resources. *Science* **311**: 1557-1558.

Brashares, J. S., P. Arcese, M. K. Sam, P. B. Coppolillo, A. R. E. Sinclair and A. Balmford. 2004. Bushmeat Hunting, Wildlife Declines, and Fish Supply in West Africa. *Science* **306**: 1180-1183.

CCLME. 2007. Canary Current Large Marine Ecosystem – Project Document. Global Environment Facility Project No. 6030-04-10. Online URL: [http://www.gefweb.org/uploadedFiles/Projects/Work_Programs/Project%20Document\(4\).pdf](http://www.gefweb.org/uploadedFiles/Projects/Work_Programs/Project%20Document(4).pdf).

Christensen, V., Amorim, P., Diallo, I. Diouf, T., Guénette, S. Heymans, J.J., Mendy, A.N., Mahfoudh Sidi, T., Palomares, M.L.D., Samb, B., Stobberup, K., Vakily, J.M., Vasconcellos, M., Watson, R., Pauly, D. 2004. Trends in fish biomass off Northwest Africa, 1960-2000. In: *West African marine ecosystems: models and fisheries impacts*, Palomares, M.L.D., Pauly, D. (eds.). Fisheries Centre Research Reports **12**(7), University of British Columbia, Vancouver.

Christopherson, R. W. 2005. Geosystems, An introduction to Physical Geography. 5th edition, Pearson Prentice Hall, New Jersey, United States of America. ISBN 0131327984.

Chuenpagdee, R., L. Liguori, M.L.D Palomeras and D. Pauly. 2006. Bottom-Up, Global Estimates of Small-Scale Marine Fisheries Catches. *Fisheries Centre Research Reports* **14**(8), University of British Columbia, Canada.

Clark, C. W., G. R. Munro and U. R. Sumaila. 2005. Subsidies, buybacks, and sustainable fisheries. *Journal of Environmental Economics and Management* **50**(1): 47–58.

Diaz-Bonilla, E., T. Marcelle, R. Sherman and A. Cattaneo. 2000. Food Security and Trade Negotiation in the World Trade Organization: A cluster Analysis of Country Groups. Trade and Macroeconomics Division, International Food Policy Research Institute, Washington D.C., USA.

Dulvy, N. K., Y. Sadovy and J. D. Reynolds. 2003. Extinction Vulnerability in Marine Populations. *Fish and Fisheries* **4**: 25-64.

EJF. 2005. Party to the Plunder – Illegal Fishing in Guinea and its links to the EU. Environmental Justice Foundation, London, United Kingdom.

EJF. 2009. Dirty Fish – How EU Hygiene Standards Facilitates Illegal Fishing in West Africa. Environmental Justice Foundation, London, United Kingdom.

Equasis. 2009. France Ministry of Transport. Online URL: <http://www.equasis.org/EquasisWeb/public/HomePage>.

European Commission. 2008. Bilateral fisheries partnership agreements between the EC and third countries. Online URL: http://ec.europa.eu/fisheries/cfp/external_relations/bilateral_agreements_en.htm. Last updated October 10 2008, last visited June 30 2009.

Falaye, A. E. 2008. Illegal Unreported Unregulated (IUU) Fishing in West Africa (Nigeria & Ghana). Report prepared for MRAG, London, United Kingdom.

FAO. 1995. Code of Conduct for Responsible Fisheries. *FAO's Fisheries and Aquaculture Department*. Online URL: <ftp://ftp.fao.org/docrep/fao/005/v9878e/v9878e00.pdf>.

FAO. 2001. What is the Code of Conduct for Responsible Fisheries?. *FAO's Fisheries and Aquaculture Department*. Online URL: <http://www.fao.org/docrep/003/x9066e/x9066e01.htm#b>.

FAO. 2001b. International Plan of Action to prevent, deter and eliminate illegal, unreported and unregulated fishing. *FAO's Fisheries and Aquaculture Department*. Online URL: <http://www.fao.org/DOCREP/003/y1224e/y1224e00.HTM>.

FAO. 2005. Yearbook of Fishery Statistics 2005. Online URL: ftp://ftp.fao.org/fi/stat/summary/summ_05/a7ybc.pdf. Last visited July 20 2009.

FAO. 2009. Food Balance Sheets. FAOSTAT. Online URL: <http://faostat.fao.org/site/368/default.aspx#ancor>

FAO. 2009b. Regional Fisheries Bodies, Fisheries and Aquaculture Department. Online URL: <http://www.fao.org/fishery/rfb/search/en>. Last visited June 17 2009.

FAO. 2009c. FAO Major Fishing Areas, Fisheries and Aquaculture Department. Online URL: <http://www.fao.org/fishery/area/search/en>. Last visited July 10 2009.

FMPRC. 2003. Ministry of Foreign Affairs, the People's Republic of China. Online URL: <http://www.fmprc.gov.cn/eng/gjhdq/>. Last updated October 12 2003, last visited June 30 2009.

FMPRC. 2006. China's African Policy. Ministry of Foreign Affairs, the People's Republic of China. Online URL: <http://www.fmprc.gov.cn/eng/zxxx/t230615.htm>. Last updated January 12 2006, last visited July 5 2009.

GCLME. 2008. Strategic Action Programme. Interim Guinea Current Commission Executive Secretariat, Accra, Ghana. Online URL: http://igcc.gclme.org/downloads/GCLME_SAP.pdf.

Greenpeace. 2001. Witnessing the Plunder. Greenpeace International, Amsterdam, Netherlands. Online URL: http://www.greenpeace.at/uploads/media/Witnessing_the_Plunder.pdf.

Greenpeace. 2005. Greenpeace Case Studies on IUU Vessels No. 2 "Chang Xing". Greenpeace International, Amsterdam, The Netherlands. Online URL: http://www.savethehighseas.org/publicdocs/Chang_Xing_June_2005.pdf.

- Greenpeace.** 2006. Witnessing the Plunder 2006. Greenpeace International, Amsterdam, Netherlands. Online URL: <http://www.greenpeace.org/raw/content/international/press/reports/plunder2006.pdf>.
- Greenpeace.** 2007. Taking Tuna Out of the Can: Rescue Plan for the World's Favourite Fish. Greenpeace International, Amsterdam, Netherlands. Online URL: <http://www.greenpeace.org/raw/content/international/press/reports/taking-tuna-out-of-the-can.pdf>.
- Griggs, L., and G. Lugten.** 2007. Veil over the Nets (Unravelling Corporate Liability for IUU Fishing Offences). *Marine Policy* **31**: 159-168.
- Hamilton, L. C. and M. J. Butler.** 2001. Outport Adaptations: Social Indicators through Newfoundland's Cod Crisis. *Human Ecology Review* **8**(2): 1-11.
- Hampton, I., D.C. Boyer, A.J. Penney, A.F. Pereira and M. Sardinha.** 1999. Integrated Overview of Fisheries of the Benguela Current Region. Thematic Report **1**, Synthesis and assessment of information on the BCLME. UNDP, Windhoek, Namibia.
- Hanafusa, K. and N. Yagi.** 2004. Efforts to Eliminate IUU Large-scale Tuna Longline Vessels. In: *Fish Piracy, Combating Illegal, Unreported and Unregulated Fishing*. OECD, Paris, France.
- Horta, L.** 2007. Guinea-Bissau: China Sees a Risk Worth Taking. Africa Policy Forum. Online URL: <http://forums.csis.org/africa/?p=63>. Last visited July 5 2009.
- ICSF.** 2005. Stealing Fish, Stealing Life. *SAMUDRA*, International Collective in Support of Fishworkers, Report **42**: 12-14. Online URL: http://icsf.net/icsf2006/uploads/publications/samudra/pdf/english/issue_42/art03.pdf.
- Illegal Fishing Info.** 2009a. Internet source for the article “€313bn Fraud Uncovered, 2 Chinese Companies Involved”, published in *Graphic Ghana* on March 20 2006. Online URL: http://www.illegal-fishing.info/item_single.php?item=news&item_id=133&approach_id=13.
- Illegal Fishing Info.** 2009b. Internet source for the article “\$48,000 Fine for Pair Trawling”, published in *Daily Graphic* on September 10 2008. Online URL: http://www.illegal-fishing.info/item_single.php?item=news&item_id=3492&approach_id=13.
- Kaczynski, V. and D. Fluharty.** 2002. European policies in West Africa: who benefits from fisheries agreements?. *Marine Policy* **26**: 75-93.
- Kaufmann, D., A. Kraay and M. Mastruzzi.** 2008. Governance Matters VII: Aggregate and Individual Governance Indicators 1996-2007. *Policy Research Working Paper 4654*. The World Bank, Development Research Group, Macroeconomics and Growth Team & World Bank Institute, Global Governance Program.
- Kent, G.** 1998. Fishes, Food Security, and the Poor. *Food policy* **22**(5): 393-404.
- Kent, G.** 2003. Fish Trade, Food Security and the Human Right to Adequate Food. *FAO Fisheries Report* **708**: 49-70.

Loreau, M., S. Naeem, P. Inchausti, J. Bengtsson, J. P. Grime, A. Hector, D. U. Hooper, M. A. Huston, D. Raffaelli, B. Schmid, D. Tilman and D. A. Wardle. 2001. Biodiversity and Ecosystem Functioning: Current Knowledge and Future Challenges. *Science* **294**: 804-808.

Marquette, C.M., K.A. Koranteng, R. Overå and E. Bortei-Doku Aryeetey. 2002. Small-scale Fisheries, Population Dynamics, and Resource Use in Africa: The Case of Moree, Ghana. *Ambio* 31(4): 324-336.

McCluskey, S. M. and R. L. Lewison. 2008. Quantifying fishing effort: a synthesis of current methods and their applications. *Fish and Fisheries* **9**: 188–200.

McMichael, A. J. and C. D. Butler. 2005. Fish, Health, and Sustainability. *American Journal of Preventive Medicine* **29**(4): 322-323.

MEA. 2005a. A framework for Assessment, *The Millennium Ecosystem Assessment*, Island Press, Washington DC, United States of America.

MEA. 2005b. Current State and Trends Assessments, *The Millennium Ecosystem Assessment*, Island Press, Washington DC, United States of America.

Meyn, M. 2005. “Namibianisation”, Exports and Domestic Value Addition in the Namibian Fishing Industry - Chances and Risks of Including Fisheries into a Free Trade Agreement with the EU. *Research Report 33*, The Namibian Economic Policy Research Unit, Windhoek, Namibia.

MFMR. 2007. Ministry of Fisheries and Marine Resources, Republic of Namibia. Online URL: <http://www.mfmr.gov.na/>. Last visited June 29 2009.

MRAG. 2005. Review of Impacts of Illegal, Unreported and Unregulated Fishing on Developing Countries. Marine Resource Assessment Group Ltd, London, United Kingdom.

Nichols, P. 2003. A Developing Land Puts a Halt to Foreign Overfishing. *Ministry for Fisheries and Marine Resources*, Namibia. Online URL: http://iodeweb1.vliz.be/odin/bitstream/1834/637/1/Develop_Nichols.pdf.

NPC. 2004. Fisheries Law Of The People's Republic Of China (2004 Revision). Standing Committee of the National People's Congress, August 28th, 2004. Online URL: http://www.fdi.gov.cn/pub/FDI_EN/Laws/GeneralLawsandRegulations/BasicLaws/P020060620320441563935.pdf.

Ostrom, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science* **325**: 419-422.

Pauly, D., V. Christensen, S. Guénette, T. J. Pitcher, U. R. Sumaila, C. J. Walters, R. Watson and D. Zeller. 2002. Towards sustainability in world fisheries. *Nature* **418**: 689-695.

Pauly, D., R. Watson and J. Alder. 2005. Global trends in world fisheries: impacts on marine ecosystems and food security. *Philosophical Transactions of the Royal Society* **360**: 5–12.

Prochazka, K., B. Davies, C. Griffiths, M. Hara, N. Luyeye, M. O'Toole, J. Bodenstein, T. Probyn, B. Clark, A. Earle, C. Tapscott and R. Hasler. 2005. GIWA, Regional assessment **44**, Benguela Current. UNEP, Nairobi, Kenya.

Puertos de Las Palmas. 2009. Traffic of Vessels. Online URL: <http://www.palmasport.es/00000/paginas/html/default.htm>. Last updated July 6 2009, last visited July 6 2009.

Reuters. 2007. Sierra Leone navy shoot to catch Chinese fishermen. Online URL: <http://www.reuters.com/article/latestCrisis/idUSL23406811>. Last updated February 23 2007, last visited July 22 2009.

Rigg, K., R. Parmentier and D. Currie. 2004. Halting IUU Fishing: Enforcing International Fisheries Agreements. In: *Fish Piracy, Combating Illegal, Unreported and Unregulated Fishing*. OECD, Paris, France.

SADC. 2004a. Report of the Surveillance Voyage to Angolan Waters of the Namibian Fisheries Protection Vessel "Anna Kakurukaze Mungunda". Working Paper **31**, SADC Monitoring Control and Surveillance of Fisheries Activities Programme, Windhoek, Namibia. Online URL: <http://www.mcs-sadc.org/Publications/WP31%20NamAngBilateralMission.pdf>

SADC. 2004b. Review of Aerial Fisheries Patrols of Angolan Maritime Waters, SADC Monitoring Control and Surveillance of Fisheries Activities Programme, Windhoek, Namibia. Online URL: <http://www.mcs-sadc.org/Publications/WP29%20ReviewAirPatrols-Angola.pdf>.

SADC. 2008. Stop Illegal Fishing in Southern Africa. Stop Illegal Fishing, Gaborone, Botswana. Online URL: <http://www.illegal-fishing.info/uploads/sifbrochureeng.pdf>.

Scheffer, M., S. Carpenter, J. A. Foley, C. Folke and B. Walker. 2001. Catastrophic Shifts in Ecosystems. *Nature* **413**: 591-596.

Sea Around Us. 2009. The Sea Around Us Project, Fisheries and Biodiversity. Online URL: <http://www.searoundus.org/>. Last visited July 26 2009.

SEAFO. 2009. South East Atlantic Fisheries Organization. Online URL: <http://www.seafo.org/>. Last updated June 2009, last visited June 21 2009.

SOCU. 2003/2004. The Surveillance Operations Coordinating Unit, Sub-Regional Fisheries Commission (SRFC), Surveillance Operations Barracuda, Dolphin, Eugenio Pereria and Merou. Downloaded at Online URL: <http://www.accordsdepeche.com/en/licenses/infractions.php>.

Solan, M., B. J. Cardinale, A. L. Downing, K. A. M. Engelhardt, J. L. Ruesink, D. S. Srivastava. 2004. Extinction and Ecosystem Function in the Marine Benthos. *Science* **306**:

Standing, A. 2008. Corruption and Industrial Fishing in Africa. U4 Anti-Corruption Research Centre, Chr. Michelsen Institute, Bergen, Norway. Online URL: <http://www.cmi.no/publications/file/?3188=corruption-and-industrial-fishing-in-africa>.

Tayaa, M., A. Saine, G. Ndiaye and M. Deme. 2005. GIWA, Regional assessment **41**, Canary Current. UNEP, Nairobi, Kenya.

The National. 2009. 'Pirate' trawlers gutting Ghana's fishing industry. Online URL: <http://www.thenational.ae/article/20090525/FOREIGN/705249942/1041/rss>. Last updated May 25 2009, last visited June 31 2009.

Tidwell, J. H. and G. L. Allan. 2001. Fish as Food: Aquaculture's Contribution. *EMBO* 2(11): 958-963.

Tieze, U., G. Groenewold and A. Marcoux. 2000. Demographic Change in Coastal Fishing Communities and its Implications for the Coastal Environment. *FAO Fisheries Technical Paper* 403.

Tull, D. 2007. China's Engagement in Africa: Scope, Significance and Consequences. *Journal of Modern African Studies* 44(3): 459-479.

UN. 1995. 1177-1180. United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, Sixth session. New York, July 24 – August 4 1995. Online URL: <http://daccessdds.un.org/doc/UNDOC/GEN/N95/274/67/PDF/N9527467.pdf?OpenElement>.

UN. 2007. The United Nations Convention on the Law of the Sea - A historical perspective. Online URL: http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm#Setting%20Limits.

UN. 2009. Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements. Online URL: http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#The%20United%20Nations%20Convention%20on%20the%20Law%20of%20the%20Sea. Last updated May 4 2009, last visited May 12 2009.

Underwood, A. J. 1997. Environmental decision-making and the precautionary principle: what does this principle mean in environmental sampling practice?. *Landscape and Urban Planning* 37(3): 137-146.

UNDP. 2008. Human Development Report 2007/2008. United Nations Development Programme, New York, United States of America. Online URL: http://hdr.undp.org/en/media/HDR_20072008_EN_Complete.pdf.

Walker, B. and D. Salt. 2006. Resilience Thinking. Island Press, Washington DC, United States of America. ISBN 1597260924.

Washington Post. 2007. China Courts Africa with Aid Projects. Online URL: http://www.washingtonpost.com/wp-dyn/content/article/2007/01/04/AR2007010401031_pf.html. Last updated January 4 2007, last visited July 5 2009.

WWF. 2008. West African Marine Ecoregion (WAMER). Online URL: http://www.panda.org/what_we_do/where_we_work/wamer/area/. Last updated January 8 2008, last visited May 11 2009.

YaleGlobal. 2007. Global Fishing Trade Depletes African Waters. Online URL: <http://yaleglobal.yale.edu/display.article?id=9458>. Last visited July 5 2009.

Appendixes

Appendix 1:

Regional Fisheries Organizations in West Africa

- SEAFO – Covers the South East Atlantic, excluding national EEZs. Initiated by the Namibian authorities in 1995 and was originally composed of Namibia, Angola, South Africa and the United Kingdom (on behalf of St. Helena and its dependencies of Tristan da Cunha and Ascension Islands). SEAFO encourages other parties involved in fishing in the area to ratify their convention, and as for today the EU and Norway are also part of the organization (SEAFO 2009). The objective of the organization is ensuring sustainable fisheries and natural resource management according to the framework laid out by UNCLOS.
- COREP – Located at the Gulf of Guinea and includes the EEZs of Congo, the Democratic Republic of Congo, Gabon and Sao Tome and Principe. COREP was established 1984, but the convention has not yet entered into force. The main objectives of COREP are prioritizing needs of local fishing vessels, achieving better cooperation between the member countries and collecting scientific, technical and economic data on fishing operations.
- FCWC – Covers the national waters of Benin, Côte d’Ivoire, Ghana, Liberia, Nigeria and Togo in the west central Gulf of Guinea. This relatively new organization, established 2006, with the main objective of sustainable utilization of the natural resources within that area. Under the framework of UNCLOS, FCWC provides a forum for discussions between parties, improve livelihoods of small-scale fishermen and achieve enhanced cooperation in respect of relations with DWFs.
- SRFC – Located in the national waters of Cape-Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal and Sierra Leone, the SRFC (or CSRP in French) was established in 1985. The objective of this organization is harmonizing the long-term policies regarding preservation, conservation and exploitation of fisheries according to UNCLOS.
- CECAF – Covering the area from Gibraltar to the Congo River this organization was established in 1967. It consists of both West African states which have their EEZs within its boundaries and countries involved in fishing or research in the region. Apart from the African countries, the member countries are Cuba, the European Community, the USA and Norway. As the other organizations named here, CECAF also aims to achieve sustainable fisheries according to UNCLOS framework. It should be mentioned that although China is involved in fishing in the area, it is not a member of CECAF.

Appendix 2:

Governance indicators of West African Countries

	Voice & Accountability	Political Stability & Lack of Terror	Government Effectiveness	Regulatory Quality	Rule of Law	Corruption Control	Total average
Angola	-1,11	-0,46	-1,16	-1,00	-1,35	-1,12	-1,03
Benin	0,32	0,38	-0,57	-0,44	-0,56	-0,49	-0,23
Burkina Faso	-0,31	0,09	-0,84	-0,34	-0,48	-0,40	-0,38
Cameroon	-0,94	-0,39	-0,87	-0,71	-1,09	-0,93	-0,82
Cape Verde	0,89	1,01	0,36	-0,20	0,62	0,76	0,57
Congo	-1,11	-0,83	-1,34	-1,20	-1,26	-1,04	-1,13
Dem. Rep. Congo	-1,46	-2,26	-1,68	-1,35	-1,67	-1,27	-1,16
Equatorial Guinea	-1,89	-0,16	-1,37	-1,35	-1,16	-1,37	-1,22
Ivory Coast	-1,26	-2,12	-1,37	-0,98	-1,54	-1,09	-1,39
Gabon	-0,83	0,20	-0,66	-0,49	-0,60	-0,85	-0,54
Gambia	-0,96	-0,14	-0,71	-0,39	-0,21	-0,78	-0,53
Ghana	0,50	0,22	-0,04	0,00	-0,08	-0,17	0,07
Guinea	-1,23	-2,02	-1,47	-1,14	-1,47	-1,33	-1,44
Guinea Bissau	-0,51	-0,41	-1,21	-1,10	-1,36	-1,11	-0,95
Liberia	-0,35	-1,15	-1,18	-1,24	-1,06	-0,41	-0,90
Mauritania	-0,75	-0,33	-0,68	-0,36	-0,60	-0,50	-0,54
Morocco	-0,62	-0,52	-0,07	-0,11	-0,15	-0,24	-0,28
Namibia	0,58	0,90	0,17	0,02	0,12	0,19	0,33
Nigeria	-0,54	-2,07	-0,93	-0,89	-1,20	-1,01	-1,11
Sao Tome & Principe	0,44	0,28	-0,79	-0,76	-0,41	-0,48	-0,29
Senegal	-0,02	-0,18	-0,34	-0,35	-0,39	-0,51	-0,30
Sierra Leone	-0,33	-0,30	-1,08	-1,01	-1,13	-1,02	-0,81
Togo	-1,16	-0,52	-1,48	-0,98	-0,94	-0,98	-1,01
South Africa	0,74	0,18	0,72	0,48	0,15	0,32	0,43