

Illegal fishing and its impacts on marine life

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Abstract: Globally, fisheries and marine ecosystems are being exploited at a regular rate controlled by law. However, there is a dangerous activity by humans which contributes to the disruption of these systems. Illegal, unreported, and unregulated (IUU) fishing is one of the most serious threats to the health of the world's fisheries and oceans and to the security of the fishing trade. As demand increases and coastal fish stocks decline, ships are encouraged to take risks to pursue the ever-diminishing resources in the seas and oceans. The effects of this activity do not only reach a certain geographic area, but they also contribute to the decline of many different species. This affects marine ecosystems in general, spreading disruption throughout the connected systems quickly. The stability of these systems is achieved only by the interaction of each living organism with its environment, other species, and the non-living objects within the system. The risks of illegal fishing impact both individuals and countries as a whole. Statistics show that these negative activities contribute to the effects of food shortage, as well as directly impacting countries' economies. Fortunately, countries have become aware of the danger this activity poses to both human and marine life. Many have created firm measures to deter these violations, establishing cooperative agreements at the international level and implementing other solutions that will be discussed in this literary review.

Keywords: Illegal fishing, Marine life, Aquatic organisms, Environmental damage, Human damage.

1. INTRODUCTION

Bodies of water are home to large numbers of living organisms. Marine life has the most biological diversity on the planet (Baird, 2006) and is, therefore, an important source of food. Fisheries are defined as locations where living resources from water and its surfaces are obtained. These stocks are important for marine ecosystems and are naturally renewed through reproduction. Humans have used fish wealth from time immemorial as an important food supply (Baird, 2006).

However, Palma, Tsamenyi, and Edeson (2010) explain that illegal, unreported, and unregulated (IUU) fishing poses one of the greatest threats to marine ecosystems. It undermines the conservation of marine biodiversity and national and regional efforts to manage fisheries sustainably. IUU fishing has escalated over the past 20 years, particularly in high seas fisheries. However, its dynamic, adaptive, and confidential nature prevents direct assessment of its effects (Palma, Tsamenyi, and Edeson, 2010).

2. STATE OF THE PROBLEM WORLDWIDE

Illegal fishing means every fishing operation and all other marine items carried out by fishing vessels without a license, license or equivalent document, fishing not subject to the legal and regulatory provisions of the flag State or the regulations of the universally recognized fisheries management organizations, Or uncontrolled fishing of legal and regulatory texts applicable to marine waters, where these vessels carry out their activities in violation of the law, which is expressed in illegal fishing (Jennings and Kaiser, 1998).

2.1 Global Statistics of IUU

Agnew et.al (2009) state that illegal, unreported and unregulated fishing is harmful to the environment which contributes to the over-exploitation of fish stocks in marine life. It contributes significantly to the rapid decrease of fish in marine ecosystems. Through the authors' review and review of the situation in 54 countries and on the high seas, the minimum

and upper estimates of the total value of current illegal and unreported fishing losses worldwide were between \$ 10 billion and \$ 23.5 billion per year. The disadvantage of UUI and its negative impacts of it on the aquatic environment that hinder the large number of fish in nature, in addition to the economic losses of countries due to these illegal activities (Agnew et.al 2009). Thus, it is possible in the coming years that there will be a lack of food security in the world, especially fish resources and the instability of the economy among countries, due to the increasing population worldwide (Agnew et.al 2009). The rapid population growth contributes to inadequate food supplies for the population of various regions, threatening famine, directly affecting the overall health status of the population, declining physical strength, vulnerability, wasting and diseases associated with undernourishment; Such as anemia and rickets, and food shortages have hit many regions of the world (Moutopoulos et al 2017). Not only that, poor African countries and third world nations have the highest rate of growth in the world, placing them at increased risk of food crises in those regions (Doubouya et al 2017).

Table: Summary of regional estimates of illegal fishing, averaged over 2000–2003 (Agnew et al., 2009)

Region	Reported catch of case study species	Catch of case study species as a percentage of total regional catch	Lower estimate of illegal catch (t)	Upper estimate of illegal catch (t)	Lower estimate of value (US\$m)	Upper estimate of value (US\$m)
Northwest Atlantic	557,147	25%	22,325	82,266	20	74
Northeast Atlantic	6,677,607	60%	364,908	842,467	328	758
Western Central Atlantic	390,942	22%	21,745	58,514	20	53
Eastern Central Atlantic	1,154,586	32%	294,089	562,169	265	506
Southwest Atlantic	1,403,601	65%	227,865	673,712	205	606
Southeast Atlantic	1,351,635	79%	52,972	139,392	48	125
Western Indian	2,165,792	52%	229,285	559,942	206	504
Eastern Indian	2,263,158	44%	467,865	970,589	421	874
Northwest Pacific	7,358,470	32%	1,325,763	3,505,600	1,193	3,155
Northeast Pacific	196,587	7%	2,326	8,449	2	8
Western Central Pacific	3,740,192	36%	785,897	1,729,588	707	1,557
Eastern Central Pacific	1,374,062	73%	129,772	278,450	117	251
Southwest Pacific	451,677	61%	5,227	32,848	5	30
Southeast Pacific	9,799,047	73%	1,197,547	2,567,890	1,078	2,311
Antarctic	136654	100%	9593	9593	9	9
Total	39,021,155	46%	5,140,928	12,040,052	4,627	10,836

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Pronto (2016) states that IUU sea fisheries pose a direct threat to food security and socio-economic stability in many parts of the world, accounting for 20 percent (11-25 million metric tons) of the global catch. This indicates that IUU is a universal issue among nations, breaking fishery laws and falling outside the scope of regulations for personal profit, without any consideration of the negative impact on marine life (Pronto, 2016). Consequently, the practice causes damage to aquatic environments all over the world (Agnew et al., 2009).

2.2 The Environmental Impact of IUU on Marine Life

Illegal fishing has considerable direct and indirect impact on marine life and on the diversity, structure, and productivity of benthic ecosystems. These effects are easily recognized and last longer in areas with rare natural disorders. Fishing in an incomplete system leads to drastic changes in the structure of the fish community (Jennings and Kaiser, 1998). As fishing intensifies continuously, the natural decline in the abundance of fodder fish is accelerated and amplified, reducing the success of breeding and the abundance of marine birds and mammals and contributing to the disruption of marine ecosystems (Jennings and Kaiser, 1998). However, the authors explain that these donor-dominated dynamics are less pronounced in food webs where fish are the most important predators, as their nutrition strategies are more than those of most birds and mammals. Unregistered fishermen tend to target rare species of fish, and a large number of them are invested in the development of fisheries, leading to changes in the composition of marine communities over time (Jennings and Kaiser, 1998). In addition, all forms of fishing, and illegal fishing especially, have a negative impact on the function of marine ecosystems, whether by reducing the major predators, such as sharks, or fishing with equipment that destroys the habitat. The exploitation of fragile ecosystems irreparably destroys wildlife on the seabed. In particular, deep seabed fishing can eliminate sponges that take decades, if not centuries, to grow (Australian Marine Conservation Society).

2.3 Potential Causes of IUU

Moutopoulos et al. (2017) state that reducing illegal fishing is critical to the sustainability of fisheries worldwide. It is important that the nations focus on violations of fisheries by analysing official questionnaires answered by local fishermen to determine the real effectiveness of control efforts, which represent a concrete sample of fishermen in general. This is a valuable case study to identify illegal fishing practices, control status, and effectiveness of regulations (Moutopoulos et al 2017). The data indicate that the considerable contribution to registered violations is due to the lack of licenses for fishermen and ships. Fines are not commensurate with this type of illegal activity, as there are no strict deterrent decisions for fishermen (Pronto 2016). The number of recorded violations represents a very small percentage of the estimated number of fishing days by professional fishermen and persons without a fishing license or vessel (Pronto 2016). The results indicated that some States did not have adequate records and information, which weakens any possibility of assessing the status of fisheries and resources and severely impairs any definition of useful thresholds for sustainable management (Moutopoulos et al 2017).

Additionally, many fishermen noted that IUU fishing is intriguing due to its ability to avoid taxes and fees while increasing their income. In many regions around the world, it can often be practiced with impunity because it occurs at sea, a naturally vast area. Irregularities also occur in fishing without punishment because of poor control in developing countries. Studies indicate that IUU fishing is practiced mainly in countries with typical symptoms of faulty governance: widespread corruption, contradictory legislation, lack of will or capacity to enforce existing national legislation (The World Ocean Review 2013).

2.4 Community Issues

Lampert (2017) stresses that seafood markets worldwide have a common problem; often, the product listed is not actually what is being offered. This phenomenon - known as cheating in seafood - is associated with IUU fishing practices and threatens the continuity of the oceans, poses health risks to consumers, and forces customers to pay a heavy price for a cheap product. Previous domestic and international efforts to combat this issue have failed for a number of reasons, including the global nature of the industry, the Byzantine supply chain, the large number of entities responsible for combating this issue, the lack of resources provided to these entities, and the difficulty of identifying and distinguishing species of seafood (Lampert 2017). Recent efforts, such as the Action Plan of the Presidential Task Force on Combating Illegal, Unreported, and Unregulated Fraud and Seafood Fraud, are promising to reduce this issue, but they are not enough (Lampert 2017).

It is urgent to stop the sale of any illegal seafood in markets. Lampert argues that illegal seafood makes economic gains by illegal fishing without punishment (Mariani et al 2014). Many fishermen practice illegal fishing for extra income without regard to marine life. When fishermen try to illegally obtain a scarce, endangered species, ignoring all laws that prohibit such activity, it adversely affects the marine environment, contributing to the extinction of various aquatic life. Such actions should be punishable by law (Mariani et al 2014).

3. THE IUU CRISIS ACROSS THE GLOBE

Illegal, unreported and unregulated (IUU) fishing poses a serious threat to the conservation of fish populations in the Caspian Sea and puts them on the brink of extinction (Aghilinejhad, et al 2018). This is because of overfishing in the area, which fishermen practice overfishing in various forms and degrees in coastal waters, or on the high seas in the Caspian region, which the lobbies operating in this unorganized sector, which generates hundreds of thousands of dollars annually to private accounts that do not the nations benefit from them.. It also reflects on the social conditions of seafarers, as many of them are frustrated by these illegal activities that contribute to the exclusion of honest competition for fish trade. (Aghilinejhad, et al 2018).

In spite of the legal procedures, legislative measures, implementation mechanisms and monitoring produced by the Antarctic region in recent years to address illegal, unregulated and unauthorized fishing, the phenomenon is still active in a number of areas in crooked ways, making a significant contribution to the depletion of fisheries and the forced infringement of laws (Bacalso and Wolf 2014). The estimate of illegal fishing for the area covered by the Convention for the Conservation of Antarctic Marine Living Resources was 938 tons for 2008-09 (Baird, 2006). This is less than the illegal catch in 2007-08 1,169 tons, and substantially less than that caught in 2006-07 3,615 tons and 2005-06 3,420 tones (Baird, 2006). From the coldest Antarctica to Philippines, Bacalso and Wolff (2014) the mixed trophic impacts MTI has

provided an analyzes that related to the role of illegal and destructive fishing operations in influencing ecosystem structure and dynamics of marine life. Moreover, the estimated annual estimated annual harvest of illegal fisheries is equivalent to approximately a quarter of the total municipal fisheries in the region. Thus, the numbers of illegal fisheries constitute a dangerous proportion, which threatens to benefit from the future fisheries

The illegal fishing crisis goes beyond the problematic decreasing of fish populations, having far deeper effects on marine life in many areas, such as Cuba. Alzugaray et al. (2018) note that spinal lobster is the main source of fish feed for Cuba and show a significant decline the lobsters' numbers due to illegal fishing. This contributes significantly to the decreasing fish population in the area, as the main feed resource becomes scarcer. The region has seen a decline in this type of habitat, which has made fish numbers fall dramatically. All this contributes to the ecosystem's dysfunction.

3.1 IUU in Australia

It is estimated that Australian fisheries are the best managed and most sustainable in the world traps (Flothmann et al 2010). However, this does not mean that all the fisheries are lawful, as many illegal traps are used in the area traps (Australian Marine Conservation Society 2018). Although Australia has the third largest marine economic zone exclusive to the ocean, its water is very low in nutrients and does not contain a large abundance of fish. Many illegal fisheries have spread in this area, reducing the region's fish diversity and creating a significant loss of fish wealth traps (Flothmann et al 2010). This indicates that Australian fisheries must maintain optimal locations and keep away from illegal traps (Australian Marine Conservation Society 2018).

AFMA (2016) states that Australia's clean waters and well-managed fisheries lure in foreign fishers who plan to utilize illegal practices for the purpose of doubling profit, targeting primarily high-value species, such as the sea cucumber (also known as the Beach of Mer or Tribang) The Giant Clams (AFMA 2016). One particularly notable case dealing with these creatures involved four illegal boats carrying hundreds of giant oysters and sea cucumbers in northern Australia, leading to disorder in the nearby marine ecosystems (AFMA 2016). Sea turtles are also particularly vulnerable, as both bycatch and illegal fishing are problematic for the endangered species in Australia. Worldwide, there are only seven species of sea turtle, and six of these live in Australian waters Australian Bureau of Statistics, 2013). Illegal fishing aims to catch the most valuable resources without any consideration of endangered species; such practices not only decrease the population, but may threaten it with extinction (Australian Bureau of Statistics, 2013).

These factors provide strong indications that illegal fishing is one of the most serious threats to the health of the world's fisheries and oceans. It has many negative impacts, such as sharply increased difficulty of maintaining fish stocks and managing fisheries at sea. It also greatly affects the ecosystem, particularly regarding the bycatch of vulnerable species like sea turtles, seabirds, and sharks (Australian Bureau of Statistics, 2013).

4. SOLUTIONS

Threats to fish wealth are not to be taken lightly. The loss of this resource may very well endanger our own existence and requires a firm stand on all activities that negatively impact marine ecosystems. Nations have laws that prohibit illegal fishing and impose sanctions on people who practice it, but as long as overfishing still exists, all nations should create firmer, clearer, and more rigorous legislation in terms of penalties, regardless of who the culprit may be.

4.1 Cooperative Solutions at the International Level

Young (2016) states that it is important for measures relating to illegal and unregulated fishing to be in conformity with international law, including WTO agreements such as the General Agreement on Tariffs and Trade (GATT) and the Convention on Technical Barriers to Trade (Busch & Reinhardt 2003) . The law states that these measures shall be non-discriminatory and shall be comprehensive for every individual and every State in the effort to reduce illegal fishing. These measures combat IUU fishing by aiming to restrict access to markets. They include improved marine tracking systems, knowledge of legal or illegal fishing, obstruction and landing of illegal vessels to ports, the identification and assessment of vessels operating in IUU fishing, and prohibition of unauthorized fish products (Young, 2016). For example, many coastal States, such as Australia, have implemented increasingly severe penalties designed to deter illegal fishers. One of these measures includes the operation of the automatic confiscation system whereby the ship, gear, and catch held by the commonwealth is confiscated. This system works in the absence of any judgment on the merits (Baird, 2008).

Mfodwo et al (2010) explain that the Council of the European Union (EU) has established a law to prevent, deter, and eliminate IUU fishing. Essentially, the EU regulation is the only domestic legislative action in Europe adopted specifically to fight IUU fishing. It has four main elements. Firstly, there are Port State measures against third-world country vessels; ships cannot stop at the port if they do not have an official record that allows the use of the port without a permit, which reduces the presence of illegal vessels attempting to conduct their activities. Secondly, the catch documentation scheme is intended to show fishing areas where fisheries have been used to find location where they should not be present. As well as the illegal, unreported and unregulated fishing vessel and the inclusion of non-cooperative States to impose financial and political sanctions. These solutions analyse the EU Regulation (IUU) in the context of international fisheries law, in particular the international efforts to combat IUU fishing. These regulations constitute a barrier to those who seek to break the law (Mfodwo et al 2010). Similarly, Petrossian and Clarke (2014) state that fishery authorities should focus on ports of convenience and longline control, as well as exert pressure on known illegal fishing countries and educate consumers about endangered species.

In addition, Auld (2017) explains how the Port State Measures Agreement (PSMA) aims to combat IUU fishing by allowing countries to close their ports. This includes the use of trade and trade-related measures, such as import bans and transit bans, which may violate WTO law.

4.2 Applicable Solutions in Some Countries

Visser and Hanich (2018) indicate that the solution proposed and implemented in some areas is aimed at the development of global fisheries, aiding in fish control and striving to stop unsustainable fishing in the Pacific. The World Wildlife Fund (WWF) in Australia, Fiji, and New Zealand, in partnership with the US-based technology developer ConsenSys, the technical port of TraSeable and Tuna, launched a pilot project in the Pacific Islands tuna industry that will use blockchain technology to track the tuna trip from "bait to dish," which significantly impacts the struggle to stop illegal and unregulated fishing (Visser and Hanich 2018).

Akinbulire et al. (2017) agree that IUU fishing is a problem that causes local and global financial losses, increases the depletion of natural resources, and contributes to the non-renewal of our diverse ecosystem, which could cause catastrophic losses in marine life. One solution is to rely on learning-based techniques to generate a response once this type of fishing activity is detected. Fuzzy Actor Critic Learning is used to train one or more evaders after catching them. This method uses simulations for illegal fishing and its impact in the real world. This greatly increases awareness of these issues and emphasizes refraining from activities that harm the fisheries and environment (Akinbulire et al., 2017).

5. CONCLUSIONS AND RECOMMENDATIONS

In reviewing the literature, it is notable that the marine environment is identical to other systems, such as deserts and forests, in what it needs to thrive. The pivotal element of any sound ecosystem is balance. Maintaining this balance between its individual components leads to the continuation of that system as we know it. An imbalance in the system signifies the emergence of negative symptoms and its eventual deterioration. These problems can arise due to natural factors, such as climate change, or as a result of human intervention, creating effects that range from transitory to irreversible. These considerations contribute to the impact of illegal fishing on marine life, which has made States intervene and impose immediate solutions that lead to the sustainability of these marine ecosystems.

This literature covers the most important points regarding the illegal fishing impacts on Marine life. It is comprehensive, containing statistics from different geographical areas, lending the article an authority that makes it an important reference for other studies. The pivotal point made by different authors is that illegal fishing represents a legitimate disaster for the entire world. Moreover, the literature illustrates the impact of cheating in seafood markets, can lead to catastrophic outcomes on marine life. The literature recommends providing policy to countries can create a clearer picture of the consequences of violating fishing laws which can significantly mitigate the illegal fishing worldwide. One of the effective solutions to stop IUU by utilizing blockchain as advanced technique to follow any illegal activities from a specific individuals and groups .

Any violation of the law that should expose people to severe penalties. Additionally, further studies should be undertaken to examine pollutants released from illegal fishermen, such as the dumping of numerous nets into the sea, which may cause a considerable threat to the lives of birds and marine organisms.

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