

ASSESSING THE IMPACT OF OVERFISHING ON AFRICA AND SUSTAINABLE FISHING PRACTICES

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ABSTRACT

In this study, we investigated the problem of overfishing along the African coastlines, using two entities of South Africa and Central Africa Republic for data analysis, concentrating on the causes of overfishing and potential preventative measures. In order to understand the current overfishing problem in Africa, we first looked at the high local and global demand for seafood, the financial incentives for overfishing, and the ineffective government regulations and enforcement of sustainable fishing techniques. Through our analysis, we were able to pinpoint several important elements that contribute to overfishing in Africa, such as ineffective fisheries management regulations, lax law enforcement, a lack of alternatives for fishing communities to earn a living, and a lack of knowledge of sustainable fishing methods.

We suggested several potential solutions to address these problems, such as implementing and enforcing sustainable fishing laws, encouraging alternative livelihoods for fishing communities, enhancing fisheries management through community-based methods, and raising awareness of sustainable fishing methods. Also, we offered pertinent academic references to back up our suggestions.

Introduction

Overfishing

A major problem now affecting the African coastline is overfishing. Millions of people rely on the large and diverse marine ecosystem of the continent for their food, income, and employment possibilities. Yet, this precious resource is in danger because to the unsustainable fishing methods used in the area.

One of the driving factors behind overfishing in Africa is the high demand for seafood both within the continent and globally. In many African countries, seafood is a staple food and a

significant source of protein for millions of people. Additionally, there is a growing demand for seafood in international markets, particularly in Asia, Europe, and North America. The increased demand for seafood has led to a rise in fishing activities in African waters, which has put a strain on the marine resources.

The lucrative nature of the fishing industry also contributes to overfishing in Africa. The sector is a major source of cash for nations, generating considerable revenues. Both the quantity of fish captured, and the number of fishing vessels have significantly increased as a result of the rising demand for seafood and technological advancements in fishing techniques. Yet, the depletion of fish supplies and other marine resources has been a price to pay for this improved profitability.

The African countries have a diverse response to overfishing. Several nations have taken action to control fishing activity and establish sustainable fishing methods, but others have lagged. Overfishing has frequently been permitted to continue unchecked because of inadequate governance and lax enforcement of fishing laws. Moreover, unethical fishing methods and poor resource management are results of corruption in the fishing business.

Overfishing in Africa is a complex issue that requires urgent action. In this research paper, we will examine the situation of the overfishing, exploring some datasets to find out the seafood production and consumption relationship and propose the potential policy solution to address the overfishing issue.

Sustainable Fishing

Sustainable fishing is a method of fishing that strives to protect fish populations and their habitats over the long term. It entails the employment of fishing techniques and tactics that are socially just, economically feasible, and environmentally responsible. Due to the quick depletion of fish reserves in many regions of the world, the idea of sustainable fishing has gained importance in recent years.

The conservation of fish populations and their habitats, as well as the defense of marine ecosystems from the detrimental effects of fishing, are given top priority in sustainable fishing techniques. This includes taking steps to restrict the number of fish that can be captured, lessen bycatch, and steer clear of destructive fishing techniques.

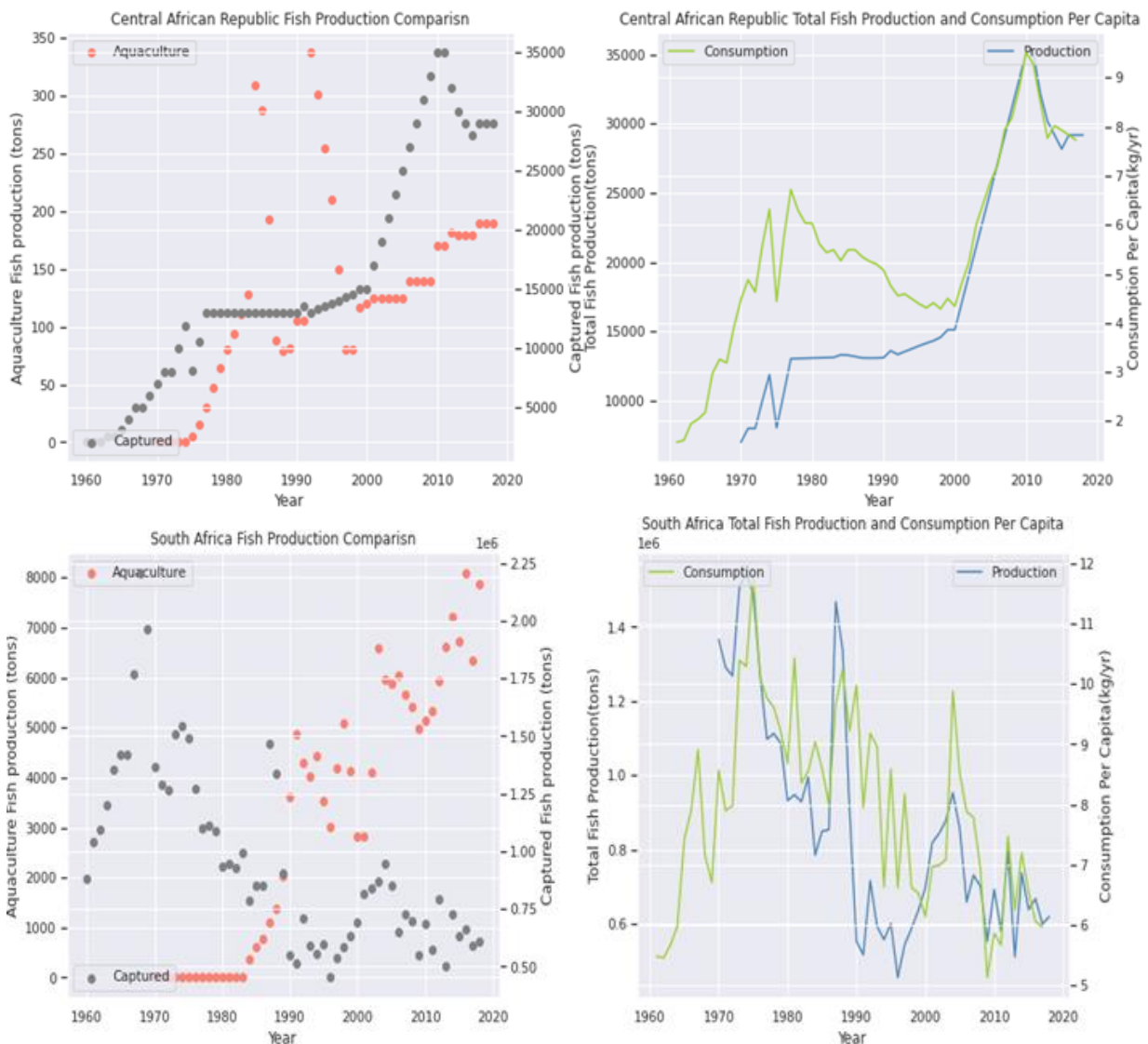
Sustainable fishing techniques take into account social and economic concerns in addition to environmental ones. This involves ensuring that fishing operations bring about just and equitable economic advantages and do not adversely affect the way of life of nearby communities. So, ensuring the long-term sustainability of our marine resources requires sustainable fishing. We can protect the health of our seas and make sure that future generations may continue to benefit

from the resources they supply by using sustainable fishing methods.

Exploration Data Analysis

We collected data of the historical fish production and fish consumption per capita among different entities. We will focus on the South Africa and Central African Republic for this research and do some comparison with other entities. The data set contains the fish production in both entity from captured fish and aquaculture fish ---- the two major sources of Africa seafood.

Production, Seafood Source and Consumption



The above four plots are respectively showing South Africa and Central African Republic fish production sources and the time series of production and consumption. Although the South Africa captured fish amount is decreasing due to the better aquaculture techniques, the Central African Republic captured fish amount grows sharply since 2000. Meanwhile, considering the consumption and total production relationship, we found that in both entity the consumption trends are aligned with the production trends, indicating the production amount can be closely related to the consumption amount.

South Africa is another significant seafood exporter in Africa, with a diverse range of seafood products, including hake, tuna, and rock lobster. The country exports seafood to various regions, including Asia, Europe, and North America. Thus, we believe that the consumption inside the country is only part of the total consumption of seafood in South Africa. According to the South African Department of Environment, Forestry and Fisheries, the country's seafood exports were valued at approximately ZAR 10.8 billion (around USD 732 million) in 2020. The top exported seafood products from South Africa in 2020 were hake, abalone, and rock lobster.

Hake accounted for the largest share of South Africa's seafood exports, with a value of ZAR 4.7 billion (around USD 319 million), followed by abalone with a value of ZAR 2.4 billion (around USD 163 million) and rock lobster with a value of ZAR 2.2 billion (around USD 150 million). The huge potential of profit provides more inclination for the country to overfish.

Production/Consumption Ratio Time Series Comparison

Next, let's take a look at the comparison of the ratio of production and consumption. The ratio is simply defined by:

$$Ratio = \frac{Total\ Production}{Consumption\ Per\ Capita}$$

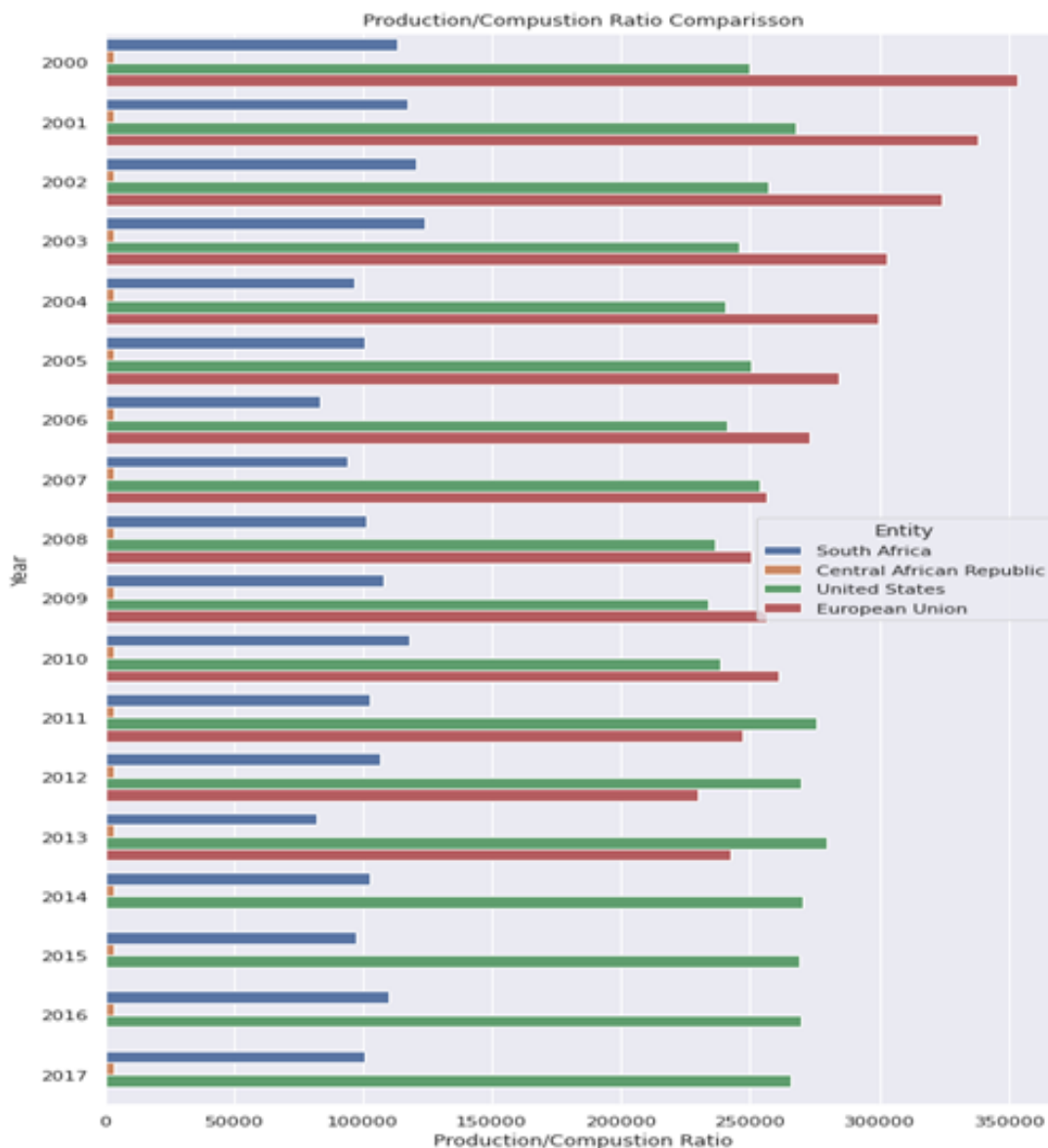
It can be used as a measurement of how abundant of the seafood resource in terms of the seafood consumption. The higher the ratio, the more likely the country has acquired enough fish sources, the less likelihood they will try to overfish.

Here we compare four entity's production/consumption ratio:

- South Africa
- Central African Republic
- United States

- European Unions

The bar plot shows the ratio comparison of four entity from 2000 to 2017. Among the whole horizon we shew, two Africa entity South Africa and Central African Republic are both having much less ratio compared to United States and European, indicating that the Africa area may suffering from the overfishing due to the insufficient seafood production. Moreover, the ratio stays basically the same for South Africa and Central African Republic while the ratio of United States is having a slight increase starting from year of 2010.



Reason For Africa Overfishing

From the data visualization we noticed that overfishing is a significant challenge facing Africa's coastal waters, and there are several factors contributing to this issue. In this part of analysis, we will explore three main reasons for overfishing in Africa, including consumption and export for economic growth, aquaculture techniques, and government policy.

Demand and Supply

First off, the high demand for seafood for both internal consumption and export in order to spur economic growth is one of the main causes of overfishing in Africa. The population of the continent is expanding quickly, and millions of people depend heavily on seafood for nourishment and protein. Seafood is also in greater demand on the global market, particularly in Europe and Asia. Due to the increased demand for seafood, fishing operations have increased in African waters. Several nations rely on the fishing industry for economic development and employment generation.

Aquaculture Technical Support

Secondly, aquaculture methods may potentially be a factor in Africa's overfishing. Fish farming, or aquaculture, is a fast-expanding industry in Africa. Aquaculture involves raising fish and other aquatic organisms. Aquaculture has the potential to reduce the strain on wild fish stocks, but if it is not practiced properly, it can potentially contribute to overfishing. For instance, the use of antibiotics and other chemicals in aquaculture can result in pollution and environmental deterioration, endangering marine ecosystems and wild fish populations.

Once the demand of seafood is increasing and the production becomes more profitable, the growing techniques and capability to capture fish easily with vast amount will finally lead to the overfishing.

Government Policy

Thirdly, government rules and restrictions may potentially be a factor in Africa's overfishing. Overfishing may go unchecked due to inadequate governance and ineffective regulation enforcement of fishing activities. Moreover, unethical fishing methods and poor resource management may result from corruption in the fishing business. The livelihoods of fishing communities and the sustainability of the fishing industry may be threatened by the depletion of fish stocks and other marine resources as a result of ineffective management practices and regulations.

Potential Solution to Prevent Overfishing

Among some literature reviews, we investigated several potential solutions can be applied to prevent overfishing in Africa.

Sustainable Fishing Regulations

To combat overfishing, governments should implement and enforce sustainable fishing regulations that limit fishing seasons, set catch quotas, and regulate fishing gear. These actions can aid in preserving fish populations and marine habitats. For instance, a study by Lopes et al. (2019) demonstrated that Senegal's introduction of fishing quotas decreased the catch of overfished species, enabling the recovery of those species' populations.

Moreover, the education and campaigns to increase awareness and promote education can also help to encourage sustainable fishing regularizations in a long run. To inform fishing communities about sustainable fishing methods, such as the use of selective gear and a reduction in bycatch, governments and Organizations might organize training programs to encourage adoption of alternative gears. The effectiveness of education and awareness-raising programs in promoting sustainable fishing methods in Mozambique was shown by a study by Costa et al. (2019).

Encouraging Alternative Livelihoods

To lessen the strain on fish stocks, governments and non-governmental organizations (NGOs) should encourage alternative livelihoods for fishing communities. This can be accomplished through promoting ecotourism, sustainable aquaculture, and other sources of income. In order to lessen fishing pressure and advance sustainable resource use, a study by Sowman and Sunde (2018) stressed the significance of supporting alternative livelihoods for fishing communities in South Africa.

Enhancing Fisheries Management

Community-based methods to fisheries management should be developed by governments and NGOs as they can be more successful than centralized management systems. Community-based management programs can encourage sustainable resource usage, increase local community participation in decision-making, and raise regulatory compliance. For instance, a study by Obura et al. (2019) discovered that community-based management systems in Tanzania led to improved fish stocks and better compliance with fishing rules.

Conclusion

In order to identify the cause and context of Africa's overfishing, we examine the data set of fish consumption and production in Africa and compare the data analysis statistics with those of other

entities. We have also clarified the pressing problem of overfishing in Africa and the vital requirement for sustainable fishing methods. The research has demonstrated that overfishing poses a serious threat to not only the sustainability of African fisheries but also to the livelihoods of millions of people who depend on the oceans for their food and income by analyzing the various factors contributing to overfishing, including the high demand for seafood, insufficient government policies, and unsustainable fishing methods.

In general, we think that environmentally friendly fishing methods are essential for the health of our seas and the survival of the world. Our effort, we hope, has helped raise awareness about the value of sustainable fishing throughout the world and will spur more action to safeguard our marine resources for next generations.

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