

# ULUSLARARASI SOSYAL ARAŞTIRMALAR DERGİSİ THE JOURNAL OF INTERNATIONAL SOCIAL RESEARCH

Uluslararası Sosyal Araştırmalar Dergisi /The Journal of International Social Research

Cilt: 16 Sayı: 101 Haziran 2023 & Volume: 16 Issue: 101 June 2023

Received: June 02, 2023, Manuscript No. jisir-23-103313; Editor assigned: June 05, 2023, PreQC No. jisir-23-103313 (PQ); Reviewed: June 19, 2023, QC No. jisir-23-103313; Revised: June 26, 2023, Manuscript No. jisir-23-103313 (R); Published: June 30, 2023, DOI: 10.17719/jisir.2023.103313

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ISSN: 1307-9581

## **Ecosystem in Peril: COVID-19's Impact on the Aquatic Environment and its Significance for Aquatic Food Production**

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### **Abstract**

The COVID-19 pandemic has had profound effects on the aquatic environment, posing significant threats to aquatic biodiversity and the crucial food production systems it supports. This article examines the impacts of COVID-19 on the aquatic environment and highlights the importance of these disruptions for aquatic food production. The disruptions in fisheries and aquaculture due to lockdown measures and reduced demand have led to financial hardships for fishers and fish farmers, while fish stocks have experienced both positive and negative impacts. The increased usage of single-use plastics, personal protective equipment, and disinfectants during the pandemic has resulted in a surge of pollution and marine debris, endangering marine life and affecting the entire aquatic food chain. Furthermore, the improper disposal of wastewater and the use of disinfectants have compromised water quality, leading to habitat degradation and reduced productivity of fish and shellfish populations. The interplay between climate change and the pandemic exacerbates these challenges, weakening the resilience of aquatic ecosystems and compromising their ability to support sustainable and reliable fish and seafood production. Collaborative efforts are needed to prioritize sustainable management practices, enhance monitoring and enforcement, and transition towards a circular economy to mitigate the impacts and safeguard the health and sustainability of the aquatic environment and its vital role in aquatic food production.

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## **Introduction**

The COVID-19 pandemic has had far-reaching consequences on various aspects of our lives, including the environment. While much attention has been given to the human health and economic impacts, the aquatic environment has also experienced significant disruptions. The delicate balance of marine and freshwater ecosystems has been disrupted, posing a threat to aquatic biodiversity and the vital food production systems they support. In this article, we delve into the impacts of COVID-19 on the aquatic environment and highlight the significance of these disruptions for aquatic food production.

Aquatic ecosystems including lakes, rivers, and coastal waters rapidly responded to the reduced anthropogenic impacts. Braga noted the water transparency in the lagoon of Venice improved during the lockdown to control the spread of the SARS-CoV-2 infection, mainly due to the reduction of urban water traffic and other related human activities. The improvement of water quality and the increase in some aquatic wild stocks in the aquatic environment were reported in water bodies around the world as the results of reduced agricultural, industrial, and commercial activities.

## **Aquatic Ecosystem – Aquatic Foods Coupling**

Globally, aquatic ecosystems cover more than 70% of the earth's surface and serve not only to provide provisions such as foods, energy, and medicines but also to provide regulatory and ecological support services that are critical to keeping the world's ecological functions and processes stable and resilient. Thus, ecosystem health is a main factor in the equation of human health and survival. Aquatic ecosystems continuously act as major food suppliers to the human society and contribute to the food security of the world's population, mainly through fisheries and aquaculture industries. However, unsustainable anthropogenic activities, climate change, and unsuspected disasters such as the COVID-19 pandemic could affect this aquatic ecosystems-aquatic foods relationship. Mandal et al. reported that the unavailability of fish supply, a 40% decrease of household purchasing power, and a prolonged COVID-19 pandemic period would affect food security in Bangladesh due to the shortage in supply and the loss of income. In addition, SARS-CoV-2 transmission via contaminated aquatic food species could also affect the demand for aquatic products.

## **Disruptions in Fisheries and Aquaculture**

The pandemic has caused disruptions in fishing activities and aquaculture operations globally. Lockdown measures, travel restrictions, and reduced demand for seafood have led to decreased fishing efforts and disrupted supply chains. As a result, many fishers and fish farmers have faced financial hardship, while fish stocks have seen both positive and negative impacts. Some fishing areas have



experienced relief from overfishing due to reduced fishing pressure, but others have seen increased illegal fishing and unregulated practices. Moreover, reduced monitoring and enforcement have exacerbated the challenges of sustainable fisheries management.

### **Pollution and Marine Debris**

The increased use of single-use plastic items, personal protective equipment (PPE), and disinfectants during the pandemic has resulted in a surge in plastic waste and marine debris. Improper disposal and inadequate waste management systems have led to these pollutants entering water bodies, posing threats to marine and freshwater ecosystems. Plastic pollution not only harms marine life through ingestion and entanglement but also releases harmful chemicals into the water, impacting the entire aquatic food chain. The accumulation of pollution and debris further stresses the delicate balance of these ecosystems and affects the availability of clean water for aquaculture operations.

### **Water Quality and Habitat Degradation**

The pandemic has brought attention to the importance of clean water for hygiene practices. Increased usage of disinfectants and the improper disposal of wastewater have contributed to water pollution, compromising water quality and ecosystems. Discharges of untreated or poorly treated wastewater, particularly from healthcare facilities, have the potential to introduce pathogens and pollutants into water bodies. This can lead to harmful algal blooms, oxygen depletion, and habitat degradation, adversely affecting aquatic organisms and the productivity of fish and shellfish populations.

### **Climate Change and COVID-19**

The interplay between climate change and the COVID-19 pandemic has further compounded the challenges faced by the aquatic environment. Climate change-induced ocean warming, acidification, and altered precipitation patterns have long-term impacts on marine and freshwater ecosystems. These changes, combined with the disruptions caused by the pandemic, could weaken the resilience of aquatic ecosystems, making them more vulnerable to future shocks and stressors. The implications for aquatic food production are significant, as compromised ecosystems struggle to support sustainable and reliable fish and seafood production.

### **Economic Impacts**

In the months since the COVID-19 outbreak was first diagnosed, it has spread to about 220 countries in the world. The pandemic has had a substantial impact on global economic growth beyond anything experienced in nearly a century. In developing countries, the COVID-19 pandemic has had significant



effects on the countries' economies, leading to the decline of the countries' gross domestic product (GDP). The main causes of economic damage in developing countries are twofold: the first is the consequence from the impacts of the coronavirus around the globe; the second is generated domestically due to the newly imposed movement control order (MCO), or lock-down, by the respective government. In general, COVID-19 has affected not only the eating behaviors of consumers but has also had a massive effect on the capacity to produce and distribute fresh produce. These changes during MCO have slowed down agricultural services such as vegetables, fruits, and the fish and aquatic foods supply chain.

## Conclusion

The COVID-19 pandemic has left an indelible mark on the aquatic environment, with wide-ranging implications for aquatic food production. The disruptions in fisheries, aquaculture, pollution, water quality, and climate change interactions have posed significant challenges for the health and sustainability of aquatic ecosystems. To mitigate these impacts and safeguard aquatic food production, collaborative efforts are needed. Governments, international organizations, and local communities must prioritize sustainable management practices, enhance monitoring and enforcement measures, and promote the transition towards a circular economy. By recognizing the significance of the aquatic environment and taking appropriate action, we can work towards restoring and preserving these ecosystems, ensuring the availability of healthy and resilient aquatic food sources for present and future generations.

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