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Qualitative Research on Marine Environmental Impact on Fisheries: A Case Study of Hong Kong's 10-Year Commercial Fishing Ban

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Abstract

This research examines Hong Kong's fishing ban from a holistic and chronological perspective. It presents the reasons and causes for the implementation of the ban and examines the impacts and consequences following the implementation of the ban. Finally, it will investigate and present management techniques utilized by other countries and regions to address the same issue of fish ecology destruction.

The research findings indicate that fish ecology destruction has been a serious issue in Hong Kong in recent years, and the fishing ban has addressed that issue to some degree. However, the ban's top-down approach and lack of stakeholders' involvement obstruct it from achieving all aims while minimizing the effects on stakeholders.

1. Introduction

The aim of this research is to investigate and assess Hong Kong's fishing ban, which was implemented in 2013 after a prolonged period of fish ecology destruction. The main focus of this study will be on the causes of fish ecology destruction and the effectiveness of Hong Kong's fishing ban in addressing this issue. This chapter will demonstrate the rationale behind this study and also briefly outline the chronological order we will be following throughout this study.

1.1 Rationale

Decades of overfishing and harmful human activities have given rise to the serious issue of fish ecology destruction in the South China Sea and in Hong Kong waters. The well-being of fish ecosystems is essential, as they serve as a major source of income and food resource to many coastal communities, especially in the South China Sea, an area historically focused on fishing. The central objective of this research is to comprehend the various causes of fish ecology destruction and assess Hong Kong's fishing ban to examine its effectiveness. Seafood has served as an important source of income for many Hong Kong fishers and a major source of food in Hong Kong dishes. It can be said that seafood plays a pivotal role in Hong Kong's food security and employment. Furthermore, there is very limited research to date in Hong Kong assessing its fishing ban. Therefore, this study aims to gather information and data and present it in a comprehensive manner to the public. This research will develop the following research objectives:

- Causes of fish ecology destruction
- Impacts of fish ecology destruction
- To analyze documented ecological changes since the fishing ban.
- To assess the livelihood transitions of affected fishers.
- To evaluate policy enforcement and compliance.

1.2 Outline of the Research

This research is built according to the chronological order of Hong Kong's fishing ban. The study consists of 3 major sectors: pre-ban, during-ban, and post-ban, and will examine the timeline in chronological order. By implementing this order, the study could better comprehend the causes of fish ecology destruction alongside the environment, and the socio-economic impacts of Hong Kong's fishing ban.

The recovery of marine environments is a major focus of this study. By looking at changes in fish stocks and biodiversity, we try to tell whether the ban has restored marine life, contributing to healthier ecosystems. By analysing these ecological changes we could assess the effectiveness of the policies in restoring marine biodiversity.

In addition to ecological impacts, this research looks at the socio-economic consequences of the fishing ban on fishing communities. As traditional fisheries are disturbed, it is important to look at how these communities have adapted to the new regulated environment. This includes examining changes in employment, income, and community in response to the ban.

Finally, this study looks at similar policies from other countries in addressing the same issue, and compares them to Hong Kong's policies to identify down-sides and potential improvements for Hong Kong's policy.

2. Literature Review

2.1 Introduction

This chapter aims to survey the available literature on fish ecology research in the South China Sea, analyzing how human activities in marine environments and climate change play a pivotal role, along with their social and economic consequences. In addition, it will examine Hong Kong's solution to this issue - Hong Kong's 10-year commercial fishing ban and regulations. Finally, it will explore how the fishing ban has impacted people's livelihoods and also its enforcement. Literature review will be categorized into three sections: pre, during, and post ban, in order to examine the causes, impacts, and solutions to fish ecology destruction in a chronological order.

2.2 Pre-Ban (Before 2013)

2.2.1 Human Reasons for Fish Ecology Destruction

One primary way humans caused fish ecology destruction in the South China Sea is by overfishing. China has been the largest source of fish production since about 1989, for both marine wild catch and aquaculture. By 2022, China accounted for nearly 40% of global fish output. (Dialogue Earth, 2024) This high and increasing output of fish is a result of the growing population and growing demand for fish, creating profit incentives for fishing firms to catch more. As a result, fish species, especially commercial ones, are heavily exploited, causing fish stocks to drastically decrease

Another human activity that results in fish ecology destruction is urbanization, especially in fast-growing cities like Shenzhen. Shenzhen's population has grown from 30,000 in 1979 to over 17.6 million in 2023 after it was designated as China's first Special Economic Zone in 1980. In addition, with a GDP of over $475 billion, Shenzhen has become a global center for technology. Due to this rapid urbanization, built-up areas expanded by 50.15% between 2000 and 2020, displacing 40% of mangrove wetlands and destroying 80% of the country's natural shoreline through land reclamation. (Hugo Wai Leung MAK, 2025)

The Pearl River Delta is a major economic zone in Guangdong province, China, formed by the estuary of the Pearl River. It is the world's largest urban area in terms of both population (86,100,000) and land area (55,818km^2) (The World Bank Group, 2015). Without the Pearl River Delta, Shenzhen would lack the regional ecosystem that fuels its rapid growth as a global tech and financial hub. However, the Pearl River Delta has been dramatically reshaped in terms of fish ecology, habitat loss, pollution-driven die-offs, biodiversity decline, and affected local fisheries. Overall, urbanization led to economic growth, but at a high cost to the environment.

For example, surface water quality deterioration is a serious problem around the Pearl River Delta caused by rapid urbanization. Findings indicate that degraded water resources reached volumes of 204, 352, and 537 million m^3 in 2002, 2010, and 2020, respectively. In 2017, official monitoring revealed that 53.3% of Shenzhen's coastal waters failed to meet China's Grade IV water quality standards, rendering them unsuitable for any use. The western region was most severely affected, where the heavily polluted Pearl River discharges into the South China Sea. Additionally, 39% of the waters were classified as "unfit for human contact." (Li Jing, 2018) Greenpeace collected and analyzed 25 samples of wastewater discharges and sediments from five industrial sites located throughout the Pearl River Delta region, indicating a diverse range of hazardous chemicals were found, with high levels of heavy metals such as beryllium, copper, and manganese found. (John Novis, 2019)

Significant habitat damage along coastlines has also resulted from urbanisation, particularly as a result of coastal land reclamation. While increased industrialisation in western areas like Nanshan and Bao'an has led to an 80% degradation of mangroves, Shenzhen Bay has seen a

50% loss of mangrove trees. Underwater desertification is another issue that has been made worse by practices like collecting coral for aquariums and building materials. The significance of tackling these environmental issues is demonstrated by the sharp decline in seafloor coral coverage, which fell from 76% three decades ago to just 36% in 2017. Mak, Hugo (2025)

2.2.2 Climate-Related Causes

Climate change has impacted fish ecologies negatively. Climate change is essentially a process where the percentage of greenhouse gases in Earth's atmosphere increases, trapping more longwave radiation (felt as heat), causing temperatures to rise. According to research, sea surface temperature in the southern South China Sea is rising by 0.2°C per decade (Winfred Marshal, 2025). In Hong Kong, the annual average temperature rose by 0.12°C per decade from 1885 to 2017 (HKO, n.d). Furthermore, this increasing trend intensified in the latter half of the 20th century with a 0.18°C increase per decade from 1988 to 2017(HKO, n.d).

Another study by the Hong Kong Observatory demonstrated that there has been an increasing number of hot days and nights in the past century. In the past 100 years, the number of hot days (days with maximum temperature > 33°C) per year increased by 6 times, while the number of hot nights (days with minimum temperature > 28°C) increased by 35 times. Furthermore, the number of cold days (days with minimum temperature < 12°C) decreased drastically, from 27 cold days per year from 1898 to 1927 to only 16 per year on average from 1988 to 2017(HKO, n.d).

Rising atmospheric temperatures cause seawater temperatures to increase, so oxygen levels drop as warmer water holds less dissolved oxygen, making it more difficult for fish to breathe (IFAW, 2025). In addition, rising temperatures can force fish to migrate to new places, disrupting existing ecosystems. Furthermore, as the concentration of greenhouse gases rises in the atmosphere, more carbon dioxide is dissolved into the seawater, resulting in the acidification of seawater. This process also makes it difficult for fish to breathe. Research also shows that as sea temperatures rise, corals will push out algae (the substance that gives them color & provides energy by photosynthesis), which results in coral bleaching and death. (US NOAA) Destroying fish ecologies as corals are habitats to numerous species of fish.

One secondary effect that rising temperatures bring is rising sea levels, as glaciers near the poles melt, creating more liquid water in the oceans. According to research, Hong Kong has been experiencing a rise in sea level of 2.9mm per year since the 1950s (Y. H. He, 2015), and in the past 50 years, the mean sea level in Victoria Harbor rose by 0.12m(Y. H. He, 2015). Rise in sea levels results in more coastal erosion, damaging and potentially destroying coastal wetlands like marshes and mangroves, which are essential fish breeding grounds and food sources. Hence, causing fish ecology destruction.

In addition, another secondary effect of rising temperatures is unstable salinity. Because as temperatures increase, more evaporation occurs, taking away more water from the sea, making the salt in the sea more concentrated, resulting in an increase in salinity. However, an increase in temperatures can also cause glaciers to melt, bringing more liquid water into the sea, thus diluting the concentration of salt, resulting in a decrease in salinity. But neither of these effects is good for fish, as for most species to properly grow, salinity should be stable (Boeuf, G., 2001). In most species, egg fertilization, incubation, yolk sac resorption, and various other early stages of growth are dependent on salinity (Boeuf, G., 2001). In addition, fish allocate energy to regulate internal salt balance; changes in salinity will require fish to allocate more energy to balancing, hence, less energy will be used for growth. As a result, both low and high salinity will result in smaller sizes, slower growth rate, and a decrease in

reproductive success for fish (Boeuf, G., 2001). Thus, it decreases the population of most fish species.

2.2.3 Government-Related Causes

Ineffective government management also contributed to fish ecology destruction. China has a large but poorly organized fishing population of 11.85 million, with hidden fishing capacity not in official stats (Shu Su, 2019). Before the economic reforms of 1978, China had remained a low-income country for decades. Even after the reforms, income levels did not approach those of developed nations. Low income levels were accompanied by generally low education levels, a situation that can be traced back to the disruptions of the Cultural Revolution during the 1960s and 1970s. These socio-economic conditions meant that many fishers placed limited priority on ecological concerns, and are not fully aware of the destruction to ecosystems, focusing instead on maximizing their revenue. Similarly, government policy at the time emphasized increasing fish catches, while fishing rights were not clearly defined, and China has historically focused on maximizing fish production. (Shu Su, 2019) Therefore, environmental considerations have only begun to receive greater attention in recent years. However, even when aiming to recover fish ecology and replenish fish stocks, China's uniform management style doesn't take into account local ecological conditions, causing management to be ineffective in a great portion of the country's coast.

In addition, island building in the South China Sea in recent years has also resulted in huge damage to the fish ecology. Countries around the South China Sea have been fighting for control in the South China Sea, which is a resource-rich area. China, one of the most aggressive countries, uses vessels & militarization of reefs to gain control, including landfilling to raise islands above water. This not only increases their political influence in the South China Sea, but also allows Chinese fishers to harvest giant clams. Island-building and harvesting of giant clams by China alone have destroyed at least 8,572 hectares (21,183 acres) of coral reef, according to the findings, an area roughly one-third the area of Malaysia's capital city, Kuala Lumpur. Vietnam is the second most environmentally destructive state, according to the report, around 567 hectares (1,402 acres) of reef have been destroyed, mostly through island-building. (Carolyn Cowan, 2024)

2.2.4 Impacts of Fish Ecology Destruction

2.2.4.1 Environmental Impacts

First and foremost, there is a significant loss of biodiversity in the South China Sea. Due to climate change and rising ocean temperatures, key commercial species are relocating to cooler or deeper waters as a form of adaptation (Yidan Xu, 2023). This results in a decrease in fish population and diversity in the South China Sea. The relocation of one species of fish could greatly disrupt the food web, as it is an interconnected chain of prey and predators. The absence or decrease of one species could cause other species to be endangered.

In terms of overfishing, species most able to withstand stress from climate change are also the most adaptable to overfishing (Xia Zhijian, 2024). These fish have a broad diet, strong reproductivity capacity, and a positive capacity for migration. This enables them more resilience and the ability to recover. However, less adaptable species with a less broad diet and less capacity to migrate and reproduce and extremely vulnerable to overfishing and climate change. Therefore, they face possible extinction. Once again, the extinction of one species will impact the ecosystem as a whole. Hence, leading to biodiversity loss.

In addition to biodiversity loss, fish stocks also show signs of depletion. A large portion of the total marine catch in the South China Sea consists of "trash fish," which includes juvenile and undersized fish not directly consumed by humans. The fishing of trash fish is extremely damaging to the marine ecosystem as it damages fish stock of juvenile commercial fish,

hindering their ability to mature and replenish populations. (Greenpeace East Asia) For example, a report from the Food and Agriculture Organization suggests that trash fish can constitute over 60% of the total marine production in the South China Sea, which roughly equals to about 3 million tons annually. This loss of juvenile fish makes it difficult for fish stocks to replenish in the future.

Fish stock decline has been a serious issue in the Greater Bay Area. Historically, the waters around Hong Kong used to support a huge and valuable fishery, providing job opportunities and food security to the local community. However, decades of overfishing and unregulated fishing have significantly damaged the fish stocks. Catch landed in Hong Kong has dropped from its peak of 90,000 metric tonnes in 1976 to only over 50,000 metric tonnes in 1996 (ERM 1998a) as a result of fewer fish in the sea. In addition to the decline in catches, fish stocks also show obvious signs of depletion. Information from 1940 indicates that large groupers and wrasses, which are prized table fish, were common at large sizes in Hong Kong waters. Today, these species, if present at all, are extremely rare. In a recent study for AFCD (ERM 1998a), detailed assessments of the exploitation status of 17 fish species commonly caught in Hong Kong waters found that 12 of the species are classified as heavily overexploited, while the remainder fall into the fully exploited category. In terms of biomass, in 1970, the Estimated Demersal Fish Biomass (kg per hectare) was around 120–150 kg/ha. However, this number plummeted to only around 12–15 kg/ha in 2010 (AFCD, 2010) due to the unregulated usage of bottom trawling.

2.2.4.2 Socio-Economic Impacts

As fish species migrate due to stress from both overfishing and climate change, traditional knowledge used by the fishers regarding fish species in the South China Sea becomes less effective (Yidan Xu, 2023). This, combined with the steep decline in fish stocks, causes marine catch to decrease significantly. Marine catch in Chinese waters declined from 14.4 million tonnes in 2015 to 11.8 million tonnes in 2022, a fall of nearly 18% (Xie Ruohan, 2024). However, fishing is the major source of income for many fishing communities. The South China Sea's fisheries combined employ around 3.7 million people and unofficially many more (Stephenson Ocean Security Project). Thus, these people face decreasing incomes and fewer opportunities.

Shenzhen's fishermen faced significant livelihood challenges as rapid urbanization transformed their traditional villages into a global technology hub, disrupting local fishing economies.

Firstly, fishermen in Shenzhen are significantly impacted by rapid urbanization and redevelopment policies, which lead to the demolition of urban villages that provide affordable housing and essential living conditions for the floating population (rural-urban migrants without local household registration). This displacement threatens their livelihoods by removing access to low-cost housing and disrupting economic activities, while existing compensation measures may not fully address their financial losses or ongoing need for stability. As a result, the challenges posed by these policies hinder their ability to rebuild their lives in the city, ultimately depriving Shenzhen of the low-cost labor that has been crucial to its economic growth. (Stefano Zaccaria, 2020)

Secondly, those fishermen who persisted in their trade despite industrial transformation also face significant challenges due to urbanization. The increase in unit sewage discharge has been found to significantly reduce fishermen's output growth by 0.215–0.766%, likely due to environmental pollution increasing the risk of fish fry diseases, thereby decreasing aquaculture productivity. Moreover, the effects of pollution are both cumulative and irreversible, meaning that once a region suffers a pollution shock, the resulting damage to

fisheries can persist long-term, placing affected areas at a permanent economic disadvantage. These findings underscore the critical need for stricter pollution controls and sustainable water management to safeguard both aquatic ecosystems and the livelihoods of fishing communities.

2.3 During-Ban (2013-2023)

2.3.1 Hong Kong's Fishing Ban

Hong Kong has implemented a comprehensive fisheries management framework aimed at restoring marine ecosystems while supporting affected fishermen, achieving significant progress through a combination of regulatory measures and financial support. The 2012 territory-wide trawl ban, which prohibited destructive bottom trawling, has led to measurable seabed recovery and increased biodiversity, while the phased commercial fishing ban in marine parks such as Hoi Ha Wan, Yan Chau Tong, Tung Ping Chau, and Sha Chau & Lung Kwu Chau (fully implemented by 2022) further protects critical habitats. To mitigate impacts on livelihoods, the government has provided substantial support, including HK$953 million in trawl ban compensation, a HK$500 million Sustainable Fisheries Development Fund, and retraining programs for alternative livelihoods like aquaculture. Complementary measures such as artificial reef deployment, fish restocking, and enhanced patrols have strengthened enforcement and habitat rehabilitation. Collectively, these efforts demonstrate a science-based approach that balances ecological recovery with socioeconomic considerations, serving as a model for regional marine conservation. Moving forward, expanding marine protected areas and monitoring climate resilience will be crucial for sustaining these gains.

2.3.2 Top-Down Approach

Although aiming to promote fish ecology recovery, Hong Kong's fishing ban is often described and criticized as having a top-down approach: a government-led, centralized policy that does not emerge from bottom-up stakeholder initiatives. The policy, which banned all forms of trawling in Hong Kong waters, was enacted by the legislative council and enforced by the Agriculture, Fisheries and Conservation Department(AFCD), with negligible direct participation of local fishing communities in the decision-making process (AFCD, 2013). Furthermore, this policy's top-down approach can be seen in both its implementation and execution: the government unilaterally imposed the ban and introduced a suite of mitigation measures, including ex gratia payments, buy-out programs for trawler owners, and retraining schemes for displaced fishermen (AFCD, 2013). Even though non-governmental organizations such as WWF Hong Kong promoted the ecological benefits of a fishing ban, the ultimate authority and implementation strategy remained firmly centralized.

In terms of its effectiveness, post-ban ecological monitoring proved it effective, as studies found significant increases in benthic species richness and abundance in areas previously degraded by trawling activity (Wong et al., 2021). However, this recovery varies by region. Furthermore, continued reports of illegal fishing underscore the limits of enforcement inherent in a top-down approach (Cheung et al., 2021). Overall, the Hong Kong trawl ban illustrates how state-led interventions can catalyze marine conservation, while also revealing the importance of long-term compliance and community engagement in achieving sustainable outcomes.

2.3.3 Impacts of Hong Kong's Fishing Ban

Before the ban, about 90% of seafood was caught locally in Hong Kong; now, it's closer to 10%, with the majority being imported because Hong Kong's capture fisheries have declined significantly due to the fishing ban and of the depleting marine rsources, with catches dropping from 170,000 tonnes in 2013 to 124,000 tonnes in 2018(USDA, 2025). Despite this, the city remains a major seafood consumer, with 66.5 kg of seafood consumed per person in

2017, which is more than three times the global average (WWF, n.d.) To meet demand and as the most important trading hub for agricultural products in Asia, Hong Kong relies heavily on imports to reexport, ranking as the 14th largest seafood importer by value in 2019, bringing in nearly US$3.5 billion worth of seafood—over 350,000 metric tonnes annually, including live, frozen, and processed products. In contrast, exports are much smaller; in 2023, Hong Kong exported around US$664 million worth of seafood, comprising US$378 million in live fish and US$286 million in dried, salted, or smoked fish. (ADMCF, 2024) This highlights the city's heavy dependence on imported seafood caused by fishing bans and declining catches to sustain its high consumption levels.

The fishing ban in Hong Kong has impacted consumers in several ways. As the government works to restore marine ecosystems through this ban, both the fishing industry and consumers face new challenges and opportunities. This ban has led to decreased fish availability, higher prices, alterations in restaurant menus, and the need for informed seafood selection among consumers.

Firstly, the decrease in supply and rise in price. The ban on trawling has severely impacted the availability of popular seafood in Hong Kong, particularly species like the golden threadfin bream and red tilefish. According to Mr. Lee Choi Wah, Chairman of the Hong Kong Chamber of Seafood Merchants Limited, the supply of these fish can drop by 50–70%, leading to price increases of approximately 30%. Additionally, crustaceans such as shrimp and crab have also seen a depletion in supply (Michelin Guide, 2017). This significant reduction in available seafood not only affects consumer options but also places financial strain on restaurants that rely on these popular ingredients.

Secondly, restaurants may not have rare fish species to make dishes as they cannot catch them. Therefore, restaurants across Hong Kong have had to adapt quickly to the changes brought about by the fishing ban. Michelin-recommended establishments like Yee Tung Heen have had to rethink menu items due to unstable supplies of key ingredients, removing dishes that feature affected seafood. However, some restaurateurs see this as an opportunity to diversify their offerings. For instance, Sam Chung from the Michelin-starred restaurant Loaf On encourages experimenting with less common fish varieties, suggesting that chefs can explore new culinary possibilities while maintaining sustainability (Michelin Guide, 2017).

To aid consumers in navigating the reduced seafood supply and making sustainable choices, initiatives like the Seafood Choice Guide launched by WWF Hong Kong have become crucial. This guide categorizes over 70 common seafood species into three categories: "Green – Recommended," "Yellow – Think Twice," and "Red – Avoid." By providing clear recommendations based on scientific evaluations, the guide empowers consumers to make informed decisions that support responsible fishing practices, ultimately promoting the health of marine ecosystems while still allowing for seafood consumption (WWF-Hong Kong, n.d.).

To alleviate the impact of the trawl ban on fishermen's livelihoods, the Hong Kong Government has introduced a one-off financial assistance scheme. This includes ex-gratia payments for affected trawler owners, voluntary buy-outs of inshore trawlers, and one-off assistance for local deckhands and fish collector owners. As a result of this assistance, some inshore trawler owners have transitioned to operate in Mainland waters, while others have shifted to different forms of fishery or exited the industry entirely. This support aims to mitigate the financial strain on fishermen, allowing them to adapt to the changing landscape while helping to sustain the fishing community (Legislative Council Secretariat, Research Office, 2019).

Income Stability: Fishing regulations, such as catch limits and seasonal closures, aim to prevent overfishing and ensure long-term sustainability. However, these restrictions can lead

to reduced fishing opportunities. For instance, the implementation of a trawling ban in 2013 significantly impacted the incomes of trawler operators, with reports indicating that many fishermen experienced income reductions of up to 50% (WWF-Hong Kong, n.d.).

Compensation Mechanism: The Ex-Gratia Allowance (EGA) is designed to provide financial support to fishermen affected by marine works and regulations. Despite this, there are concerns about the adequacy of compensation. The EGA for permanent loss of fishing grounds is based on the notional value of fish catch for 11 years, which many fishermen argue does not reflect their actual long-term losses. For example, a Legislative Council report indicated that the average annual income for fishermen was around HKD 300,000, while the EGA may cover only a fraction of their overall loss (Legislative Council, 2019).

Employment Impact: Regulations can lead to job losses within the fishing industry. A government report noted that following the trawl ban, approximately 4,000 fishermen transitioned to alternative livelihoods, indicating a significant shift in employment dynamics (AFCD, n.d.).

Shift to Sustainable Practices: While regulations can initially threaten income stability, they also encourage fishermen to adopt sustainable practices. The Sustainable Fisheries Development Fund, which has approved around HKD 78 million in funding, aims to support fishermen in transitioning to more sustainable operations (AFCD, n.d.; WWF-Hong Kong, n.d.).

2.4 Post-Ban

2.4.1 Fish Stock Recovery

By 2021, at least in some regions of Hong Kong waters, biomass at survey sites reached the "low" class ceiling (~50 kg/ha)—indicating a recovery of approximately 300–400% from 2012 levels. From 2004 to 2016, total abundance, biomass and species richness of demersal fishes increased by 271%, 308% and 46% in the inner Tolo channel and by 356%, 316% and 73% in the outer pearl river estuary after the trawl ban. (Yanny K. Y. Mak. 2021) However, this increasing trend does not apply to all regions of Hong Kong water, the abundance, biomass, mean weight and species richness of the fishes in Southern Lamma island decreased by 44%, 69%, 37% and 27% from 2015 to 2016

2.4.2 Other Greater Bay Area Regulations

2.4.2.1 The HKZMB regulation

The Greater Bay Area fishing ban near Hong Kong ZhuHai Macau Bridge - one of the world's busiest shipping corridors with daily passenger flow exceeding 100,000 in 50 days in 2024, covers a water area extending 5 kilometers on both sides of the bridge's axis. This ban is aimed to prevent accidents and ensure safe passage for all vessels. It also serves to protect the bridge structure from potential damage caused by fishing activities. It implemented fisheries management measures to control fishing effort and protect fish spawning and nursery grounds. The fisheries management includes restrictions on fishing activities, designation of fisheries protection areas, and a registration system for local fishing vessels. (China Daily, 2025)

The ban enforces rules such as the followings:

1. fishing vessels must report departure and return times
2. fishing vessels must be equipped with Automatic Identification Systems and satellite tracking
3. unlicensed vessels are banned from participating in sea fishing event
4. prohibits illegal docking and night sailing.

2.4.2.2 Guangdong's Annual Summer Fishing Moratorium (Since 1999)

Guangdong's Annual Summer Fishing Ban, is aimed for long-term fishery sustainability, and is enforced under China's national fishery laws and provincial regulations, which prohibits all fishing methods (e.g., trawling, gillnets) except rod-and-line fishing across Guangdong's jurisdictional waters—including the Bohai, Yellow, East China, and South China Seas (north of 12°N latitude)—typically for 3.5–4.5 months (May–August/September). During this period, all commercial fishing vessels (e.g., Maoming's 2,444 boats) must dock in designated zones like Bohe Bay or Shuidong Bay under GPS monitoring, with penalties for violations including fines up to ¥100,000 RMB, license suspensions, and gear confiscation. While small-scale rod fishing is exempt, enforcement gaps persist as some boats evade tracking, particularly at night or via smaller unmonitored vessels. (YCNews, 2021)

This ban has brought significant ecological and economic impacts, such as fish stock density increased 5.65 times after the moratorium, species richness rose by 76% and the average species numbers in the post-seasonal ban was 1.76 times of that in the pre-seasonal ban. For example, in Daya Bay, (South China Sea on the south coast of Guangdong Province in China) the total catch of tail stock density was around 150000 density / km-2 in the pre-seasonal ban, whereas the total catch rose to 250000 density / km-2 in the post-seasonal ban based on trawl survey data. Despite the earlier beneifits, the outcome was not beneficial for fishermen. Only 9.8% of fishermans earned more than 5000 yuan per month during the moratorium, most of them earning around 1000 to 2000. (Yu, Jing. Qiwei Hu. Huarong Yuan. Fei Tong. Pimao Chen and Jiangmei Mao (2017)

2.4.2.3 Macau's Inner Harbour Safety Regulations

Macau, a coastal region in the Pearl River Delta, has implemented targeted policies to address acute pollution risks (PAHs, heavy metals). A stark example occurred on 25 April 2023, when a gas cylinder explosion aboard a boat in the Inner Harbour triggered six massive blasts, sinking five fishing vessels. The incident released toxic chemicals—including polycyclic aromatic hydrocarbons (PAHs)—into the water. A 2020 Marine Pollution Bulletin study revealed that PAH concentrations near accident sites in the Pearl River Delta spike 3–5 times above baseline, reaching 7,361.66–14,141.49 ng/g (far exceeding the 1,000 ng/g safety threshold), with effects persisting for months. When PAH entered the food chain, it threatens species like the Chinese white dolphin and commercially important fish, it also bind to sediments, creating long-term "toxic reservoirs" that persist for decades, harming bottom-dwelling species (e.g., crabs, worms). The sunken vessels also crushed seabed ecosystems (e.g., coral, seagrass) and leaked copper and zinc, further harming marine life. According to Macau's DSAMA 2022 report, derelict ships pose ongoing risks, such as entanglement hazards for marine animals. (themacao

In response, Macau enforces stricter safety regulations for Inner Harbour fishing vessels as follows with penalties - fines of MOP 500–10,000 for storing prohibited dangerous goods.

1. Pre-entry documentation: Owners must declare vessel licenses, contact details, berthing dates, and onboard fuel (diesel/LPG) quantities.

2. Enhanced patrols: DSAMA staff will increase inspections during the annual fishing moratorium.

2.4.2.4 Macau's Maritime Traffic and Habitat Protection Measures

The broader challenge stems from heavy maritime traffic, with 5,981 unique vessels operating daily, 90% of which are non-fishing vessels. Most traffic (80%) concentrates in shallow waters (<20 meters deep), critical habitats for marine species (e.g.Chinese white dolphin, Finless porpoise, Green sea turtle). This intense maritime traffic leads to shoreline erosion, sediment turbidity, underwater noise pollution, and collision risks with wildlife.

Shaw, Nadia (2025) In response, Macau enforces regulations as followings

1. Enforced speed limits and noise reduction measures.

2. Established restricted fishing zones near sensitive ecosystems (e.g., mangroves, coral reefs, Chinese white dolphin habitats).

2.4.2.5 Impacts on Other Countries

The ecological policies - HKZMB, GuangDong's moratorium, and Macau's vessel rules have impacted other countries and created ripple effects across the Great Bay Area and South China Sea

The GBA is a critical hub for global trade; therefore, the HKZMB fishing ban enhances maritime safety and prevents bridge damage, therefore it ensures smoother shipping traffic, benefiting international trade partners (e.g., the U.S., EU, ASEAN)

GuangDong's moratorium applies to part of the Gulf of Tonkin and the Paracel islands claimed by both China and Vietnam, which has led to protest - ongoing fighting for sovereignty and rights. "Vietnam requests China to respect Vietnam's sovereignty over the Paracel islands, sovereign rights and jurisdiction over its maritime zones when taking measures to conserve biological resources in the South China Sea, without complicating the situation toward maintaining peace, stability and order in the East Sea," said Le Thi Thu Hang, the Vietnamese Foreign Ministry spokeswoman. Meanwhile, Manila repeatedly protested and even called on Filipino fishermen to ignore the Chinese ban and continue activities in the waters also known as the West Philippine Sea.

China is the world's largest seafood exporter. During GuangDong's summer fishing ban, the supply of seafood from China will decrease, which fluctuates global seafood prices, especially for species like mackerel, squid, and shrimp. Importers in Japan, South Korea, and the EU may face short-term supply gaps or increase in price.

2.4.3 Other Countries' Approach

Depletion of fish stocks and destruction of fish ecology is not an issue only Hong Kong faces; it is faced by other countries around the world, and these countries have their own solutions and responses to this serious problem.

2.4.3.1 European Union

For example, in order to decrease the rate of warming and acidification of seawater, the European Union implemented the Energy Transition Act to reduce greenhouse gas emissions to reduce climate change. Under the Green Deal, Europe has planned to being the first climate-neutral continent by 2050 by cutting greenhouse gas emissions by at least 55% compared to 1990 levels (Oceana, 2023). In terms of fisheries, the EU has planned to reduce greenhouse gas emissions by the fishery sector by 30% by 2030 compared to 2005 (Oceana, 2023).

Furthermore, the European Commission planned to have a climate-neutral and resilient EU fisheries sector by 2050. These actions include the use of renewable energy for EU fishing fleets, prioritizing fishing opportunities to less environmentally damaging fisheries, such as small fleets that do not use bottom trawling, and restricting bottom trawling (Oceana, 2023).

In addition, the EU used marine protected areas (MPAs), which are designated regions of the ocean where human activities are restricted or regulated to protect marine life and ecosystems. As of today, MPAs already cover about 12% of EU seas. However, the EU has planned to increase this number to 30% by 2030, with 10% being strictly protected (EEA, 2024). On the other hand, only around 5% of Hong Kong's waters are classified as MPAs, meaning that the other 95% is not protected.

2.4.3.2 Australia

The Australian Marine Conservation Society has launched a sustainable seafood guide, aiming to raise awareness among the public about the sustainability of consuming seafood. For fishers, the website informs them what type of fish to catch and release, and which species are allowed to be kept. For consumers, the guide informs them what type of fish to buy and red-listed restaurants that are classified as unsustainable to the fish population (Australian Marine Conservation Society, 2019)

2.4.3.3 Philippines

The Fish Forever Program in the Philippines identifies clear rights to fish in certain areas for the local fishing population, and includes the implementation of fully protected no-take marine reserves to replenish fish stocks (Rare. (n.d.).) It also enables fishers to adopt more sustainable and regulated behaviors, such as the usage of licenses and recording catches.

Another measure taken by the Philippines to sustain the population of marine species is releasing the young ones and the ones bearing eggs. For example, in the Philippines, there are regulations regarding the conservation of blue swimming crabs(BSC). These include, but are not limited to:

1. Limiting the catching of BSC to a minimum size of 10.2 centimeters for the carapace
2. Banning fishers from retaining egg-bearing BSC (Dr. Rafael D. Guerrero III, 2023)

By not retaining the young ones and the egg-bearing ones, reproduction can occur, sustaining a healthy population size, preventing depletion of fish stocks. However, Hong Kong does not have such regulations, so fishers would simply keep any fish they caught, regardless of their size or whether or not they are bearing eggs. Hence, fish species are unable to reproduce effectively, causing depletion in fish populations.

3. Methodology

3.1 Introduction

The aim of this chapter is to set out the methodological approach taken to discover the impacts of the 10-year commercial fishing ban in terms of both ecological and socio-economic aspects, as well as its enforcement. This chapter will present the objectives of this research and the methodological approach taken. It will present the samples that have been chosen and will set out the method used for data collection, along with the analysis of data. Finally, it will discuss any gaps and limitations of this study. The structure of this research paper is based on the paper *"A Qualitative Study of the Psychological Impact of Unemployment on Individuals"* (Marie Conroy, 2010)

3.2 Research Objectives

The aim of this research is to investigate the following research questions:

- Causes of fish ecology destruction
- Impacts of fish ecology destruction
- To analyze documented ecological changes since the fishing ban.
- To assess the livelihood transitions of affected fishers.
- To evaluate policy enforcement and compliance.

3.3 Research Design

A qualitative research approach was adopted for this study. The process of research includes a systematic review of peer-reviewed articles, government reports, and publications by non-

government organizations (NGOs) on the causes of fish ecology destruction and Hong Kong's fishing ban. Observational data would be collected, such as Field notes on coastal conditions, fish market trends, and visible changes in marine activity.

On the other hand, a quantitative study uses numerical data to examine the relationship between variables and to test hypotheses. It typically uses independent variables (factors that affect dependent variables), dependent variables (outcomes measured), and control variables (factors kept the same). Furthermore, data in quantitative research are obtained in a systematic and structured manner, often by using closed-ended surveys, standardized questionnaires, and controlled experiments. Then, relationships between variables are identified.

One important advantage of quantitative research is it is able to produce measurable findings that can be applied to different contexts and populations. This makes it especially valuable in fields where precision, prediction, and large-scale applicability are important. However, because it relies heavily on standardized measurements, quantitative research lacks the flexibility and deeper understanding needed to explore individual experiences, cultural nuances, or social dynamics that underlie complex human issues. In such cases, such as when analyzing the fishing ban, qualitative research is more appropriate.

Hence, a qualitative approach was considered more appropriate to implement in this research as it enabled greater capacity to gain a more in-depth understanding of Hong Kong's fishing ban. For example, the livelihood transitions of fishers would be difficult to analyze using a quantitative approach, which is more numerically based, as it involves the fishers' feelings and beliefs. Thus, a qualitative approach is considered more appropriate.

3.4 Data Collection & Sampling

There are various methods of collecting information and data for a qualitative study. The following are examples:

1. Interviews: A researcher asks open-ended questions to a participant and collects the responses. This allows the researcher to explore individual beliefs, experiences, or perceptions in depth.

2. Focus Groups: A researcher hosts a discussion among a small group of people, encouraging them to share and respond to each other's views. This method helps reveal group norms, shared experiences, and social dynamics.

3. Participant Observation: A researcher immerses themselves in a social environment and observes people's behaviors, interactions, and routines, sometimes participating in the activities. This provides insights into natural behaviors and social contexts.

4. Field Notes: A researcher records detailed notes during or after fieldwork, capturing both what happened (descriptive notes) and their own reflections or interpretations (reflective notes). These notes help document context and meaning.

5. Case Studies: A researcher conducts an in-depth investigation of a single case (such as a person, group, or organization), often using multiple data sources. This method provides a detailed understanding of complex issues in real-life settings.

6. Ethnography: A researcher spends an extended period living within a community or culture, observing and participating in daily life. This allows for a deep understanding of cultural practices, beliefs, and values from an insider perspective.

7. Town-Hall Meetings: A researcher attends or organizes a public meeting where community members discuss local issues or concerns. This provides access to community perspectives, collective concerns, and real-time reactions in a group setting.

8. Reviewing Peer-Reviewed Articles: A researcher analyzes existing academic literature that has been reviewed by experts. This helps identify gaps in knowledge, understand established findings, and inform the context of the current study.

9. Reviewing NGO Reports: A researcher examines reports and publications produced by non-governmental organizations, often containing field data, case studies, and policy recommendations. This provides insights from practical, real-world experiences and advocacy work.

10. Observational Data: A researcher systematically observes and records data that reflects nature and analyzes trends by noting them down.

Due to limitations in budget and time, we were unable to conduct primary data collection methods such as interviews or town hall meetings. Instead, we used secondary data gathered from a variety of online sources. These included peer-reviewed journal articles, government reports, NGO reports, and observational data. During the literature review process, when we discovered an article or report that was relevant to our study, we examined its bibliography to trace and analyze the original sources it used. This helped us deepen our understanding and gather more data. After thoroughly reviewing the selected materials, we organized and synthesized the findings, which are presented in Section 2: Literature Review.

Sampling is essential to establish a good correspondence between research questions. The inclusion criteria were as follows:

- Academic articles on Hong Kong's marine policy (2013–2023).
- Government fisheries reports and environmental assessments.
- News reports on fisher protests, alternative livelihoods, and illegal fishing incidents.
- Other countries' fishing policies

Moreover, some data and articles that are not relevant to our study are excluded. The exclusion criteria are as follows:

- Studies regarding the fishing ban before 2013 (pre-ban). Non-peer-reviewed opinion pieces without data.
- Reports with insufficient methodological transparency, where methods for data collection or analysis are unclear.
- Grey literature (e.g., unpublished theses, internal government memos), unless verified and directly relevant.

In total, we reviewed about 200 articles, but only found 50 of them were relevant to our objectives and within a reasonable time period. With the implementation of inclusion and exclusion criteria, we were able to focus on data and articles relevant to our study. For example, we only included Hong Kong's marine policy articles from 2013 to 2023 due to the ten-year fishing ban taking place. However, we took into account government fishery reports and environmental assessments from before, during, and after the ban, such that we could assess the reasons for the implementation of the fishing ban, as well as assess whether or not the ban was successful by looking at data after the ban. Moreover, through the process of sampling, we were able to categorize data into a chronological order, in this case: pre, during,

and post ban. This categorization allowed us to view data and information in a more organized manner, hence making it easier to make sense of the data.

3.5 Data Analysis

3.5.1 Pre-Ban

1. By 2022, China accounted for nearly 40% of global fish output (Dialogue Earth, 2024), along with a large but poorly organized fishing population of 11.85 million (Shu Su, 2019). This raises concern for the depletion of fish stocks.

2. HK's annual average temperature rose by 0.12°C per decade from 1885 to 2017 (HKO, n.d). Furthermore, this increasing trend intensified in the latter half of the 20th century with a 0.18°C increase per decade from 1988 to 2017(HKO, n.d), resulting in a rise in sea level of 2.9mm per year since the 1950s (Y. H. He, 2015), also, in the past 50 years the mean sea level in Victoria Harbour rose by 0.12m (Y. H. He, 2015), disrupting marine ecosystems, contributing to acidification of seawater and coral death.

3. In terms of biomass, in 1970, the Estimated Demersal Fish Biomass (kg per hectare) was around 120–150 kg/ha; however, this number plummeted to only around 12–15 kg/ha in 2010 (AFCD, 2010), showcasing the necessity to regulate the usage of bottom trawling.

3.5.2 During-Ban

Hong Kong consumed 66.5 kg of seafood per person in 2017, which is more than three times the global average (WWF, n.d.), but due to the trawling ban and not being able to catch fishes locally, HongKong became the 14th largest seafood importer by value in 2019, bringing in nearly US$3.5 billion worth of seafood—over 350,000 metric tonnes annually. According to Mr. Lee Choi Wah, Chairman of the Hong Kong Chamber of Seafood Merchants Limited, the supply of fish can drop by 50–70%, leading to price increases of approximately 30%.

3.5.3 Post-Ban

1. By 2021, at least in some regions of Hong Kong waters, biomass at survey sites reached the "low" class ceiling (~50 kg/ha)—indicating a recovery of approximately 300–400% from 2012 levels. From 2004 to 2016, total abundance, biomass, and species richness of demersal fishes increased by 271%, 308% and 46% in the inner Tolo channel and by 356%, 316% and 73% in the outer Pearl River estuary after the trawl ban. (Yanny K. Y. Mak. 2021) However, this increasing trend does not apply to all regions of Hong Kong water; the abundance, biomass, mean weight, and species richness of the fishes in Southern Lamma Island decreased by 44%, 69%, 37% and 27% from 2015 to 2016.

2. Reports indicate that approximately 4,000 fishermen transitioned to alternative livelihoods, (AFCD, n.d.), while those who did not experienced income reductions of up to 50% (WWF-Hong Kong, n.d.), with Legislative Council report indicating that the average annual income for fishermen was around HKD 300,000, to mitigate impacts on livelihoods, the government has provided substantial support, including HK$953 million in trawl ban compensation, a HK$500 million Sustainable Fisheries Development Fund, however the EGA may cover only a fraction of their overall loss (Legislative Council, 2019).

3. As the Hong Kong trawling ban may not necessarily be effective, other countries' approach to fish ecology destruction may be a better way as Europe has committed to being the first climate-neutral continent by 2050 by cutting greenhouse gas emissions by at least 55% compared to 1990 levels (Oceana, 2023). In terms of fisheries, the EU has committed to reducing greenhouse gas emissions by the fishery sector by 30% by 2030 compared to 2005 (Oceana, 2023).

3.6 Limitations

Although aiming to minimize gaps and limitations, while undertaking this research, we encountered several challenges that resulted in limitations in our study. The following are the limitations we encountered throughout the 12-week time period of conducting this study:

- Limited time: We were greatly restricted by time constraints, as we only had 12 weeks to complete the entire research paper. When conducting any form of research, it is beneficial for the researcher to collect primary data along with secondary data. However, our strictly limited time meant we were unable to conduct primary data collection, such as interviews or field work
- Limited budget: We had to work with minimal resources and budget. Making interviews and field work impossible, as specific and professional equipment is required for field work to monitor fish ecology changes, and people lack incentives to be interviewed without being paid. Furthermore, when collecting secondary data from online sources, a lot of articles need to be paid in order to gain access. Hence, the researchers were unable to collect data from these sources.
- Limited public influence: When conducting interviews or town hall meetings, it is important that the researchers are from an organization with public influence, such that people would treat them seriously. Therefore, the researchers were not able to conduct interviews or town hall meetings.
- Limited sampling size: Due to this topic being a not-so-commonly discussed topic, it is difficult to find relevant articles, especially after setting strict exclusion criteria.
- Lack of Direct Correlation Between Variables: While existing studies suggest associations between factors—such as linking climate change to declining fish stocks—there is often an absence of direct, quantitative data establishing causal relationships. For example, although it is widely claimed that rising global temperatures contribute to species loss in marine ecosystems, few studies provide specific empirical evidence demonstrating, for instance, that a 1°C increase in sea surface temperature directly resulted in the extinction or population collapse of two particular fish species. This lack of precise, measurable correlation limits the strength of the causal argument.
- Unable to access sensitive material: Although some government reports are open to the public, some are not, especially those regarding government policies, in this case, the fishing ban. This resulted in incomplete data.
- Lack of interviews and town hall events: Due to the number of reasons discussed above, we were unable to conduct interviews or town hall events. These methods could allow us to consult different groups, like fishermen, wholesalers, consumers, industries, and stakeholders. This lack of primary data, especially interviews, meant that we were unable to gain valuable insights regarding the fishers' personal experiences during the fishing ban, alongside how other groups of people are affected. This caused us to lack an essential part of qualitative research.
- Due to a lack of primary data collection, as mentioned above, we had to rely heavily on secondary sources, which can be biased. Articles from which the evidence is cited could have twisted the data in order to prove their own conclusion

3.7 Conclusion

This chapter discussed the methodological approach taken in this study. It outlined the research objectives, the methods used for data collection, the sampling methods, and how

data were analyzed, along with limitations of the study.

4. Key Findings

4.1 Introduction

This chapter will draw upon the main themes and present the findings which are obtained from the literature review and subsequent data analysis. The key themes that emerged following data analysis on Hong Kong's fishing ban were: ecological impacts, socio-economic effects, and other countries' responses to fish ecology destruction. All of the points above are interconnected and closely linked to each other.

4.2 Ecological Impacts

First and foremost, Research prior to 2012 revealed the serious issue of Hong Kong's depleting fish stocks and damaged fish ecology:

- In terms of catches landed, catches landed in Hong Kong have dropped from its peak of 90,000 metric tonnes in 1976 to only over 50,000 metric tonnes in 1996 (ERM 1998a)

- In terms of abundance of commercial fish species, Information from 1940 indicates that large groupers and wrasses, which are prized table fish, were common at large sizes in Hong Kong waters. Today, these species, if present at all, are extremely rare. In a recent study for AFCD (ERM 1998a), detailed assessments of the exploitation status of 17 fish species commonly caught in Hong Kong waters found that 12 of the species are classified as heavily overexploited, while the remainder fall into the fully exploited category.

- Moreover, in terms of biomass, in 1970, the Estimated Demersal Fish Biomass (kg per hectare) was around 120–150 kg/ha. However, this number plummeted to only around 12–15 kg/ha in 2010 (AFCD, 2010) due to the unregulated usage of bottom trawling.

- However, studies after Hong Kong's fishing ban showcase mixed recovery signs. Some reports indicate that fish biomass has increased, while others note slow recovery due to other environmental issues not being addressed, such as climate change, pollution, or land reclamation.

- For example, in terms of biomass, by 2021, at least in some regions of Hong Kong waters, biomass at survey sites reached the "low" class ceiling (~50 kg/ha)—indicating a recovery of approximately 300–400% from 2012 levels.

- However, fish stock replenishment and fish ecology regeneration vary by region in Hong Kong waters, with significant improvement in certain regions, but even a decrease in other regions. From 2004 to 2016, total abundance, biomass, and species richness of demersal fishes increased by 271%, 308% and 46% in the inner Tolo channel and by 356%, 316% and 73% in the outer Pearl River estuary after the trawl ban. (Yanny K. Y. Mak. 2021) However, this increasing trend does not apply to all regions of Hong Kong water; the abundance, biomass, mean weight, and species richness of the fishes in Southern Lamma Island decreased by 44%, 69%, 37% and 27% from 2015 to 2016

Despite the implementation of fishing bans and marine protected areas (MPAs), illegal fishing remains a crucial challenge, often as a result of economic incentives and weak enforcement. Observations and government reports show that fishers sometimes continue to engage in banned activities such as trawling or fishing in no-take zones. This greatly undermines conservation efforts, leading to habitat destruction and fish stock depletion. The following are factors contributing the illegal fishing:

1. Economic incentives: high market demand for seafood in Hong Kong motivates fishers to disregard regulations, especially when legal fishing yields lower profit and revenue.

2. Weak enforcement: Many marine parks and protected areas in Hong Kong do not have sufficient patrols, so illegal fisheries can operate undetected

3. Lack of alternative livelihoods: Many fishers rely on fishing as their only source of income for their entire life. Without alternatives, they may continue illegal practices out of economic necessity

4.3 Socio-Economic Effects

First and foremost, many fishers in Hong Kong experienced livelihood shifts due to Hong Kong's fishing ban; for example, some transitioned to aquaculture or tourism, but older fishers faced unemployment.

- Hong Kong's 2012 territory-wide trawl ban, which prohibited bottom trawling, made fishing less profitable; hence, a lot of fishers experienced a drop in income, with reports indicating that many fishermen experienced income reductions of up to 50% This huge drop in income caused a lot of fishers to transition to other occupations.

- A government report noted that following the trawl ban, approximately 4,000 fishermen transitioned to alternative livelihoods, indicating a significant shift in employment dynamics (AFCD, n.d.).

- Although the government has provided financial support, including HK$953 million in trawl ban compensation, a HK$500 million Sustainable Fisheries Development Fund, and retraining programs for alternative livelihoods like aquaculture. The ban was enacted by the legislative council and enforced by the Agriculture, Fisheries and Conservation Department(AFCD), with negligible direct participation of local fishing communities and stakeholders in the decision-making process (AFCD, 2013). Hence, a lot of fishermen complained that the compensation did not fully cover their losses.

- Secondly, due to the implementation of the fishing ban, local catches in Hong Kong dropped significantly, resulting in price variations, as well as import and export changes.

- Prior to the ban, about 90% of seafood was caught locally in Hong Kong; now, it's closer to 10%, catches in Hong Kong waters dropping from 170,000 tonnes in 2013 to 124,000 tonnes in 2018(USDA, 2025).

- The ban on trawling has severely impacted the availability of popular seafood in Hong Kong, particularly species like the golden threadfin bream and red tilefish. According to Mr. Lee Choi Wah, Chairman of the Hong Kong Chamber of Seafood Merchants Limited, the supply of these fish can drop by 50–70%, leading to price increases of approximately 30%.

4.4 Policies from Other Countries

First and foremost, Hong Kong's fishing ban is widely perceived as having a top-down approach, meaning that it is initiated not by the stakeholders or the people affected but rather by the government single-handedly. The policy, which banned all forms of trawling in Hong Kong waters, was enacted by the legislative council and enforced by the Agriculture, Fisheries and Conservation Department(AFCD), with negligible direct participation of local fishing communities in the decision-making process (AFCD, 2013).

Fish stock depletion and fish ecology destruction a serious issues faced by countries all over the world. A lot of these countries have their own approaches:

- For example, the European Union initiated the green deal, aiming to cut greenhouse gas emissions by at least 55% from 1990 levels. This drop in greenhouse gas emissions can significantly reverse global warming. Hence, reducing the rise in ocean temperatures and acidification, protecting fish species. In addition, the European Union prioritizes fishing opportunities to less environmentally damaging fisheries, such as small fleets not using bottom trawling. Furthermore, another measure taken by the EU is the implementation of marine protected areas (MPAs). Currently, MPAs already cover about 12% of EU seas. However, the EU has committed to increasing this number to 30% by 2030, with 10% being strictly protected (EEA, 2024).

- In the Philippines, a lot of regulations promote awareness among the fishing population. For example, in the Philippines, there are regulations regarding the conservation of blue swimming crabs(BSC). These include, but are not limited to:

1. limiting the catching of BSC with a minimum size of 10.2 centimeters for the carapace

2. Banning fishers from retaining egg-bearing BSC （Dr. Rafael D. Guerrero III, 2023）

The above policies from other countries are often considered to be more effective than Hong Kong's fishing ban, as they take into account fishers and other stakeholders. Furthermore, they take a more natural approach, rather than directly banning.

5. Discussion

5.1 Partial Success

The fishing ban was effective as there was a significant increase in biomass in some of the key regions like Southern Lamma Island, substantial fish stock recovery, and a major shift from unsustainable fishing methods, all with the help of government financial funds, which helped to mitigate socio-economic impacts.

5.2 Inclusion of Stakeholders

Fishing should be initiated by stakeholders instead of using the government's top-down approach.

Some fishermen complained that the government compensation "did not fully cover their losses," leading to income reductions of up to 50%. So if stakeholders like fishers were involved in the ban, it would likely be more tailored to actual economic needs because it covers not only immediate loss, but as fishermen possess more understanding about on-the-ground knowledge of their operational costs, which the government is likely to underestimate.

Weak enforcement is a key challenge if using a top-down approach. A stakeholder-initiated process creates a sense of ownership. Instead of relying solely on government rules, local fishing communities could become partners in monitoring and reporting illegal activities, making enforcement more effective and less costly.

5.3 Unable to Address All Causes

While the fishing ban successfully addressed the issue of overexploitation, it does not mitigate all threats to marine ecosystems.

The ecological recovery has been mixed and incomplete because the ban fails to address other significant causes of habitat destruction - such as pollution from land-based sources, the

ongoing impact on the coast through land reclamation, and climate change—including ocean warming and acidification—continue to worsen Hong Kong's marine environment. Therefore, for fish ecology to be fully restored, the ban must be part of a broader, integrated strategy that tackles such challenges. Compared to the EU's strategic approach to marine ecology destruction, which addresses not only overfishing but also the root causes, which is essential for long-term recovery.

6. Conclusion

6.1 Objectives

This research has provided a comprehensive analysis of the marine environment impact of Hong Kong's 10-year fishing ban. Our objectives were to investigate the following questions:

- Causes of fish ecology destruction
- Impacts of fish ecology destruction
- To analyze documented ecological changes since the fishing ban.
- To assess the livelihood transitions of affected fishers.
- To evaluate policy enforcement and compliance.

6.2 Shortcomings & Recommendations

Over the course of this research paper, we had many setbacks, including the following:

- Limited time
- Limited budget
- Limited public influence
- Little sampling size
- Lack of direct correlation between variables
- Unable to access sensitive material
- Lack of interviews and town hall events
- Timezone differences

Ultimately, we lacked comprehensive primary data, which is crucial for capturing the experiences and perspectives of fishermen directly impacted by the fishing ban.

However, in contrast to these limitations, we have come up with solutions to counter them. As this topic is fairly interesting and mildly popular, people would go for this kind of research. If anyone wants to attempt this research, feel free to use the following suggestions:

- Increase budget→ Money is essential as it unlocks more information, such as paid articles and even interviews and town hall events with the fishermen, generally giving you much more information to work with.

- Bigger team → As we were a 3-man team, it was difficult for us to work, especially with little time on hand. If you have more people, not only would it speed up the process, but it would also take less money per person to pay for expenses regarding this research.

- Increase collaboration→ This could be with either the government or other researchers. By collaborating, it becomes possible to access more information, especially data that is reliable.

- Host interviews→ • Qualitative research is a research that evolves around the questions "why" and "how" instead of "how many". Interviews are an essential way to understand individuals' experiences, which is especially crucial given the fact that a lot of fishermen have been greatly affected by the fishing ban.

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Authors contributions

Isaac Seah was responsible for the lead of this team that wrote the article, as well as the Methodology, Key findings, Introduction, additional attributions towards literature review, drafting the manuscript and finalizing the paper. Alex Xue was responsible for key contributions towards Literature review, Key findings, Discussion, Conclusion as well as revising the paper thoroughly. Ava Wong was responsible for contributions towards Literature review and Discussion, as well as helping out on drafting.

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