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The Pakistan-China FTA: legal challenges and solutions for marine environmental protection

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Marine ecosystems play a vital role in development, human life, and health, thereby promoting sustainable development. However, due to rapid industrialization and urbanization, as well as intense exploitation of marine resources, among other phenomena, both Pakistani and Chinese marine ecosystems face severe challenges such as pollution, overfishing, and habitat destruction. In particular, the Pakistan-China Free Trade Agreement, which aims to boost economic growth, exacerbates these environmental issues due to the increased trade volume. The purpose of this article is to discuss the challenges of legal standards regulating marine environmental protection within the context of the Pakistan-China Free Trade Agreement. By examining the current state of the mentioned agreement as well as regional judicial practice, the current study demonstrates the need to adopt a number of legal measures, such as including specific teeth provisions within the Free Trade Agreement, establishing a special joint environmental commission, increasing public participation, and boosting national environmental law, in order to reduce the adverse effect on marine ecosystems and properly mitigate such effects with a view to achieving sustainability.

KEYWORDS

legal framework, marine economic growth, marine environmental protection, marine environmental challenges, Pakistan-China Free Trade Agreement (FTA), sustainable development

1 Introduction

Marine environment protection, marine biodiversity preservation, and the sustainable utilization of marine resources are significant to the survival and development of human society and a matter of inter-generational equity and need to be in the joint efforts of the international community. The economic cooperation between Pakistan and China, especially the Pakistan-China FTA, has been striving to drive economic growth and development; however, the fast development of rapid industrialization, urbanization, and intensified utilization of marine resources have brought challenges to the environment (Chang and Khan, 2019). Both Pakistan and China's marine ecosystems are experiencing severe pollution, a decline in marine plant and animal resources, and impaired ecological

function of coastal zones. However, the enhancement of the FTA has heightened the risks to these ecosystems, as increased trade activities have contributed to the growth of marine pollution. Furthermore, the FTA intensified maritime transport, overfishing, and habitat destruction to achieve this goal. Moreover, the marine economic ratio in China's national economy has also been promoted. Gross marine product occupies a certain proportion of China's gross domestic product. Pakistan, where the FTA is also in effect, also exhibits similar trends (Khan and Chang, 2021).

On the other hand, as human society rapidly develops, the negative impact of human activities on the marine ecosystem is gradually increasing. The marine ecosystem's carrying capacity has been declining, posing a significant challenge to the ecological environment. The legal framework of the FTA has impacted trade and economic cooperation, yet it lacks the necessary standards to safeguard the marine environment. Regulating overexploitation or pollution to a greater extent could pose a threat to the sustainability of the marine ecosystem. Pollution and the destruction of the marine environment's resources align with the interests of the majority. Such destruction and pollution cause adverse effects on the water environment as such, the marine organisms as the aquatic plants and animals, and the pollution. Traditional measures to protect environmental public goods have a disadvantage in that they require the use of traditional legal criteria to evaluate the impact of damage to environmental public goods, a process that is challenging due to the complexity, latency, and cumulative nature of such damage (Idrees and Rehna Gul, 2022).

Furthermore, the maritime trade between China and Pakistan from 2015 to 2023 has witnessed significant growth, driven by strategic economic partnerships and infrastructural developments. Central to this trade dynamic is the China-Pakistan Economic Corridor (CPEC), which has facilitated enhanced connectivity and logistics through ports like Gwadar. This period marked not only an increase in the volume of goods exchanged but also a diversification of traded commodities, including textiles, electronics, and agricultural products. However, this trade expansion has not been without challenges, particularly concerning legal frameworks governing maritime operations and environmental sustainability. Issues such as customs regulations, shipping security, and the impact of trade on marine ecosystems require comprehensive legal assessments to ensure sustainable practices. Overall, the evolving maritime trade landscape between China and Pakistan reflects broader geopolitical trends and economic strategies, underscoring the need for robust legal mechanisms to support and regulate this critical economic relationship (see Table 1).

The table detailing Trade Between China and Pakistan Through Marine Routes (2015-2023) highlights the significant growth in bilateral trade facilitated by maritime activities. Over the years, total trade volume has steadily increased, with projections suggesting a continued upward trend into 2023. Notably, exports from Pakistan have shown substantial growth, reflecting the country's increasing integration into global supply chains. However, this surge in trade is accompanied by rising shipping traffic, which has heightened concerns regarding marine environmental degradation. As outlined in the table, incidents of pollution, overfishing, and habitat destruction have escalated alongside trade growth, underscoring the urgent need for robust marine environmental protection measures within the framework of the China-Pakistan FTA. The correlation between increased trade activities and the subsequent environmental challenges emphasizes the critical importance of incorporating specific environmental provisions to mitigate these impacts and ensure sustainable trade practices moving forward.

TABLE 1 Trade between China and Pakistan through marine routes (2015-2023) (Ministry of Commerce, Pakistan, 2024).

Year	Billion)	Billion)	Billion)	Key Commodities Traded
2015	10.2	7.5	2.7	Machinery, Electronics, Textiles, Chemicals
2016	11.4	8.2	3.2	Machinery, Textiles, Agricultural Products
2017	13.0	9.0	4.0	Electronics, Textiles, Minerals, Chemicals
2018	14.5	10.2	4.3	Electronics, Textiles, Agricultural Products
2019	15.8	11.0	4.8	Machinery, Electronics, Textiles, Chemicals
2020	16.3	11.5	4.8	Electronics, Textiles, Agricultural Products
2021	17.5	12.3	5.2	Machinery, Electronics, Chemicals, Minerals
2022	18.6	13.1	5.5	Electronics, Textiles, Minerals, Agricultural Products
2023	19.8	14.0	5.8	Machinery, Textiles, Chemicals, Electronics

This article focuses on a specific legal challenges, namely the challenge that FTA poses for marine environmental protection, and possible solutions to the challenge. The FTA can have a positive impact on the environment by accepting specific clauses for marine protection, creating a joint environmental commission, maximally involving the public, and strengthening national environmental laws to meet the needs of the FTA. Finally, we introduce a solution to make the agreement environmentally friendly by combining it with international environmental standards and regional cooperation frameworks.

2 Research methodology

For this study, a qualitative research methodology has been implemented. It emphasizes the importance of a thorough review of primary and secondary materials in order to develop a profound understanding of the analyzed subject. The primary sources in this study include official trade data, governmental reports, and legal documentation of activities related to the FTA and marine environmental protection. Such resource-based analysis allows for obtaining firsthand information on the trade dynamics of the relations between two countries and the frameworks of their interrelations. As for the secondary sources, they include scholarly

and academic articles, books, and policy papers that analyze their implications on marine environments, trade activity, and legal frameworks. Such sources assist in reviewing existing research on the subject and the author's positions. So, the qualitative approach helps to do a deep analysis that brings together information from various sources and focuses on finding gaps in FTA's provisions for marine environmental protection and their effects on the environment. It also comes up with suggestions for how to keep sustainable development going for the trade case that was looked at.

3 Overview status of the Pakistan-China Free Trade Agreement

The FTA is the legal agreement signed between Pakistan and China, where it was first inked during the year 2006 and subsequently revised in 2019 (FTA, 2006). The objective of the FTA is to enhance bilateral trade between Pakistan and China. In every other way, the agreement should also focus on promoting economic growth by easing the imposition of tariffs and trade barriers in the areas of goods, services, and investments. The FTA has played a crucial role in significantly increasing trade between the two countries, and in one way or another, it helped in building and creating strong and closer economic ties between the two countries (Hussain and Ali Shah, 2017). The agreement ranges from liberalizing trade in goods and services to trying to facilitate investment. With the less burdensome trading atmosphere, FTA has ensured to promote increased market access, in the process creating more economic opportunities for either country. This way, FTA has been able to strengthen the economic relations between China and Pakistan. Although FTA has brought many economic benefits, the environmental disadvantages of such interactions have not been considered to date, especially in marine ecosystems. With the growth of trade volumes and the emergence of new economic partnerships, the effects of economic activities on natural environments and marine ecosystems in particular have become more pronounced. Increased marine pollution, reduced quality of habitats, and overfishing are just a few identified issues. However, the lack of environmental provisions in the FTA's text results in the so-called governance gap. As a result, the FTA's text increasingly ignores or fails to effectively address environmental problems. Changes in the FTA's text is necessary to integrate environmental protection mechanisms into the agreement (Irshad, 2017).

3.1 Phase I of the China-Pakistan Free Trade Agreement

The China-Pakistan FTA Phase I signed in 2006 commenced a strategic partnership that is meant to enhance economic cooperation. The agreement stipulated the implementation of measures aimed at liberalizing trade and investment. The non-discriminatory actions included the removal of barriers and tariffs between the two nations and coverage of the agricultural, therapeutic, and telecommunication sectors (Dastgeer et al., 2023).

3.1.1 Tariff reductions

One of the pivotal Phase I features of the FTA was a sharp decrease in tariffs on a wide range of goods. The agreement included a detail that aimed to eliminate trade barriers and significantly accelerate economic exchange between the two states. Moreover, both Pakistan and China benefited equally from the decline in goods. It means that the list of goods included both primary commodities, industrial products, and consumer products that were in common use for the nations. The reduction in tariffs created an environment in which one of the parties found the product's price more beneficial for the consumer market. Such detail was expected to be one of the crucial aspects that would increase the trade volumes due to a more affordable price of the imported product (Khan et al., 2019).

In the meantime, for Pakistan, the implication was most likely beneficial, as cheapen and more accessible Chinese wares, from electronics to machinery, on the one hand, while the country's position in the Chinese market could be strengthened on the other, due to the demand growth for Pakistani products, primarily textiles, and agricultural goods, among others, which had become cheaper. Therefore, we anticipated that the reduced tariffs on specific products would enable Pakistan and China to leverage their comparative advantages, thereby enhancing their trade freedom and efficiency (Irshad, 2015). However, the ultimate aim of the reduced tariffs was to enhance bilateral trade and further economic integration between Pakistan and China. This process would regularize the removal or notable reduction of trade barriers and other restrictions that impede trade development. Such an outcome implied not only the growth of the volume of trade between the countries, but also a more profound economic integration, characterized by higher levels of interdependence. This integration was critical for creating a more dynamic type of economic relations that could promote investment and improve market access for both countries. Such integration was expected to function in the long-term perspective and, thus, was likely to have a long-lasting positive effect on the growth of trade and economic development. However, the agreement did not adequately address the negative environmental implications of the growing trade between the two countries, particularly the impact on marine ecosystems, indicating that future agreements should prioritize the environmental side of the issue (Uzair and Nawaz, 2018).

3.1.2 Trade facilitation

Whereas the first phase of the FTA concerned primarily tariff reductions, the agreement also contained a number of provisions intended to facilitate trade by means of simplifying customs processes and fostering operational efficiency. These provisions, or trade facilitation measures, were intended to address and eliminate logistical and administrative barriers and facilitate the smooth flow of goods between the two countries. Consequently, a significant number of these provisions relate to the simplification and acceleration of customs procedures. The parties called for the overcoming of bureaucratic barriers, which are one of the primary causes of trade slowdowns. That is why the parties attempted to reduce the time and energy spent on customs procedures. That means that the documentation required, and procedures used,

should be as efficient as possible to avoid unnecessary hold-ups in the process of goods transfer. As a result, the primary aim of these provisions was to facilitate a quicker and more predictable customs process and make trade between Pakistan and China as smooth as possible (Abbas et al., 2023).

To facilitate trade, another crucial aspect was improved border management. Firstly, we developed modern infrastructure to ensure the smooth and quick processing of cargo and minimize the risk of congestion. This aspect may be critical because various logistics-related issues and other factors could pose a significant threat. Additionally, both countries' customs authorities recognized a shift in their communication and made efforts to enhance coordination and information sharing, ensuring adherence to similar conditions. Phase I of the Intergovernmental Agreement saw the implementation of various trade facilitation policies, particularly in document handling and administration, which significantly reduced non-tariff trading costs. Thus, the frequency of trading activities between China and Pakistan has increased substantially. Simultaneously, we must acknowledge that the number of trades can only increase if these transactions become affordable, and the associated costs decrease. In other words, these policies imply that Chinese and Pakistani products are more competitive in both countries. The results for the countries' economies indicate that trade facilitation policies were an important driver of trade and economic cooperation between Pakistan and China (Chaudhry et al., 2017).

3.1.3 Investment promotion

Investment promotion was one of the key fields in phase one of the China-Pakistan FTA, apart from tariff reduction and trade facilitation. The agreement aimed to promote economic relationships between Pakistan and China by creating predictable and calm conditions suitable for foreign direct investment. The investment safeguards included a variety of critical provisions for securing the investment and their fair treatment. The investment safeguards aimed to protect investors and ease their concerns about the security and safety of their investments in the investment environment. The aforementioned provisions also enabled agents to operate in the best interest of the investors and to transfer their investments between the two countries. The investment promotion's primary goal was to attract and maintain investments in Pakistan and China (Shah et al., 2022). The factors that made the goal achievable were the efforts to create a relatively stable framework and environment for investments while protecting the interests of the investors made the goal achievable. In this case, it was hoped that the relatively stable environment would help in minimizing the levels of risk involved in investing in both countries. As a result, a significant surge in the levels of FDI was expected to be recorded in the respective countries. Additionally, we expected the increase in investment levels to enrich the respective countries by stimulating growth in both investments and companies. Finally, the fit measures aim at ensuring that the investments receive fair and equal treatment by preventing any form of discrimination against another investment or their investors. The two countries designed the measures to enhance their investment climate. Overall, the measures were very important (Fazal-ur-Rahman, 2010).

It is noteworthy that, even as the growth in Pakistan's exports to China exceeded that to the rest of the world, its imports from China increased even more. The consequence of this was that the trade deficit with China grew even bigger. It already accounted for a quarter of Pakistan's entire trade deficit in 2007, and by 2018, it stood at 35 percent. In addition, the CPFTA received widespread condemnation among business groups in Pakistan, which thought that it was disastrous. They argued that the country's negotiators had performed dismally in terms of the access to China for the country's most competitive exports and also when it came to the goods that would be let to flood the Pakistani market from China. This latter group of goods is what is believed to have played an essentially catalytic role in the process of premature deindustrialization (PBC, 2024). see (Table 2).

Phase I of the FTA successfully created a foundation for a more long-lasting and robust economic partnership, but it did not involve consideration or mitigation of potential environmental impacts that are associated with an increase in trade. While the economic implications of this phase are clear, it failed to provide support and establish a framework for addressing and mitigating the environmental implications of extending and increasing trade. Specifically, it was noted that an increase in the volume of trade will have a large negative impact on marine ecosystems, and thus the future phases of the agreement feature measures, which affect these resources (PBC, 2024).

Figure 1 below summarizes the concessions made in both program phases and displays the timelines.

3.2 Phase II of the China-Pakistan FTA

In 2019, the document regulating the trade between an economic powerhouse, China, and a developing country, Pakistan, had been upgraded. The China-Pakistan FTA's Phase II represents a crucial milestone in advancing the economic relationship between the two countries. In particular, the expansion of trade coverage, or the inclusion of more products and sectors in the agreement, facilitated the enhancement of the transition to Phase II. This improvement was bound to have

TABLE 2 Pakistan China trade 2007-2018 (PBC, 2024).

		2007	2018	Growth (%)
Trade with all countries		50	84	66
China	Exports	0.6	1.8	196
	Imports	4.2	14.5	249
	Trade balance	(3.6)	(12.7)	258
	Total trade	4.8	16.4	242
Rest of the world (excluding China)	Exports	17	20	16
	Imports	28	46	60
	Trade balance	(11)	(26)	129
	Total trade	46	66	44

FIGURE 1
Timeline for the FTA Pakistan and China (PBC, 2024).

multiple positive effects, including improved market access and the creation of new economic opportunities (Sahibzada, 2021).

These were the other key outcomes. First and foremost, the agreements of the former type facilitated deeper tariff reductions. Crucially, these reductions encompassed a wider range of goods; consequently, the documents aimed to intensify the impact of these measures by expanding the scope of the policy. As a result of this effort, it aimed to make the process of goods exchange between the two countries more efficient and less costly. In addition, the adoption and implementation of the respective agreements are known to have set the foundation for the improved investment framework. The agreement contributed to the adoption of more robust measures aimed at protecting and promoting investments, such as improved dispute prevention and settlement tools and arrangements aimed at ensuring that investments undertaken in the host country are secure. These improvements clearly aim to enhance the predictability of the investment climate. In turn, the increase in such predictability was supposed to result in higher investment levels and greater inflows of foreign direct investment (Abbas and Ali, 2018).

Nevertheless, Phase II of the FTA omitted environmentally significant issues. The sharp growth of trade volumes and economic activities between Pakistan and China, however, had a significant adverse effect on the environment, with a focus on marine ecosystems. Phase II's lack of specific provisions for environmental protection measures underscored the agreement's shortcomings, and future updates should incorporate these necessary measures (see Table 3). At the same time, it is crucial to include environmental issues in the FTA to ensure that the framework of agreements supports both economic growth and environmental balance, both of which are crucial for long-term sustainable development (PBC, 2024).

Furthermore, there is no proper regulation of marine environmental protection, in contrast to the free trade agreements that China has with other countries or unions. For instance, the China-Australia Free Trade Agreement includes a chapter that, with its rigidity and speed, focuses on sustainable development and the preservation of marine resources. The China-New Zealand Free Trade Agreement provides a separate chapter that promotes environmental cooperation. Furthermore, the Regional Comprehensive Economic Partnership decided to ensure sustainable fisheries use and marine biodiversity protection. To achieve the same results, officials should consider amending the China and Pakistan FTA to include specific provisions on marine environmental protection.

4 FTA and marine environmental challenges

The increased trade activities resulting from the FTA between Pakistan and China have led to several significant marine environmental issues. These challenges include pollution, overfishing, and habitat destruction, each of which poses substantial risks to marine ecosystems and biodiversity. (see the Figure 2)

4.1 Pollution

The first problem is marine pollution, which has become even more serious as ship traffic between Pakistan and China has increased. The main factor contributing to the marine environment's pollution is that the increased number of vessels in this arrangement leads to increased oil spills. Oil spills in seawater have several consequences, including contamination of the water, the death of numerous aquatic animals, and disruption of the ecological balance. Oil fills the whole water surface and sticks to the bodies of marine creatures, killing and poisoning them. Even when the oil spills evaporate, it still absorbs many other chemicals and never totally disappears, remaining in the water and animals for many years. The polluted seawater will stay unclean for decades and even centuries, affecting the whole food chain (Butt, 2021). In addition to this, ships dampen many other types of waste, such as plastics and various chemicals. The waste cycles are particularly dangerous for the environment since it takes many hundreds of years for plastics to decay and become harmless. Many predators in the ocean mistake plastics for their normal food, allowing them to enter their bodies.

TABLE 3 Marine environmental protection provisions in Phase I and Phase II of FTA.

Aspect	Phase I of FTA	Phase II of FTA
Environmental Focus	Limited focus on environmental protection, with no specific provisions dedicated to marine environments.	Some progress in recognizing environmental concerns, but still lacking explicit provisions for marine environmental protection.
Pollution Control Measures	No specific measures addressing marine pollution from increased trade activities.	General environmental clauses are present, but they are non-specific and non-enforceable regarding marine pollution.
Sustainable Fishing Practices	No mention of sustainable fishing practices or regulations to protect marine biodiversity.	Similar to Phase I, there is a lack of detailed provisions on sustainable fishing, leaving a regulatory gap in addressing overfishing.
Habitat Protection	No provisions for the protection of critical marine habitats like coral reefs, mangroves, or seagrass beds.	While Phase II expands trade coverage, it continues to overlook the protection of marine habitats, which are increasingly at risk due to infrastructure development.
Monitoring and Compliance	No mechanisms established for monitoring the environmental impact of trade activities on marine ecosystems.	Phase II remains without robust monitoring and compliance mechanisms for marine environmental protection, continuing the gap from Phase I.
Environmental Cooperation	Environmental cooperation between Pakistan and China is not a focus, with no provisions encouraging joint efforts to protect marine environments.	Although there is a broader recognition of environmental issues, Phase II does not establish a framework for bilateral cooperation specifically aimed at marine environmental protection.

This can lead to issues such as blocking the food channel and puncturing the stomach or intestine lining, which can result in animal death. Furthermore, plastics break down into smaller particles known as microplastics, which small aquatic animals consume and end up on human food tables (Mohsin et al., 2018).

Mainly, chemical pollutants such as heavy metals and toxic compounds infiltrate the marine environment through ship discharges and industrial runoff due to increased trading activities. These chemicals bioaccumulate in marine organisms, resulting in a variety of health complications, including reproductive and neurological developmental diseases. Additionally, toxic chemicals negatively impact the marine ecosystem by distorting the physiology and behavior of marine animals, resulting in the decline of several marine species' populations and changes in the composition of marine communities (Chang and Khan, 2019).

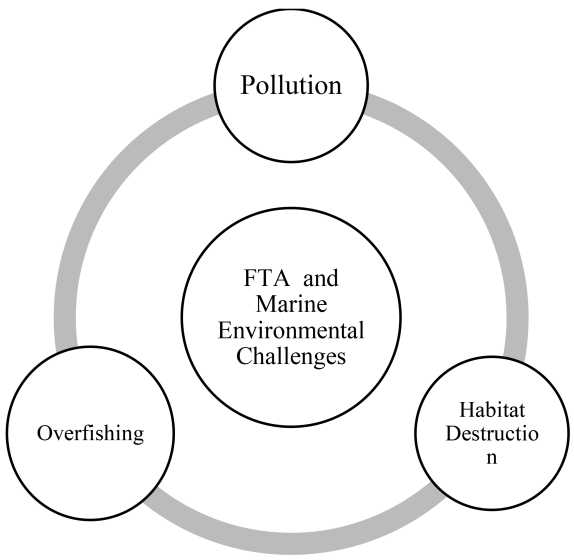

FIGURE 2
FTA and marine environmental challenges (Khan, 2022).

The overview of pathogens and invasive species is not the only harm caused by the discharge of other hazardous substances, such as untreated sewage and ballast water from ships. These substances have the potential to outcompete native species, which can lead to a decline in biodiversity and changes in the ecosystem. The pollutants add to the soil, which loses all its filtering capacities and can no longer purify the water. Marine organisms cannot use the contaminated water as a source of oxygen and nutrition, and people cannot use it for drinking and cooking. The impact on the health and stability of marine habitats is significant, leading to a rapid decrease in diversity. Contaminants concentrate in the coastal area, making it the most dangerous zone where species lose their habitats and people have limited recreational opportunities (Qayuum, 2021).

Numerous strategies exist to address marine pollution problems. Still, strict regulations and more effective waste management, such as sewage, known as black water, are required. Moreover, only international efforts and cooperation, along with improved monitoring systems, better sewage processing plants, and the use of pure fuel, can effectively control marine pollution. Ultimately, these measures could aid in mitigating the pollution impacts stemming from increased water traffic and the expansion of water-related infrastructure. If people implement these improvements and enhance the sustainability of their strategies by safeguarding the marine environment, humanity can benefit from increased trade and sustain this practice for future generations (Lin, 2018).

4.2 Overfishing

Overfishing is a significant challenge that arises from the increased market demand for seafood, which is a result of improved trade activities. Overfishing decreases the fish stock, thereby disturbing the natural balance of marine systems. To create the above balance, various fish species tend to be significant to the food chain. When fish stock

declines, the number of fish species in the system decreases. This imbalance has a wide-ranging impact on associated marine life and other marine systems. The decreased fish stock will lead to fish preying on other species to achieve abundance within the system. Eating will now be excessive, leading to the elimination of marine vegetation such as seagrass beds and coral colonies (Zulfiqar et al., 2023). The species in the system depend on such vegetation as breeding and feeding centers, and their reduction will have a significant impact. The impacted species will become extinct as a result of a lack of food for survival, the impacted species will become extinct. Inadequate food in the systems will also deter the few available species from reproduction, culminating in their extinction over time.

Overfishing affects local communities that depend on fishing, adding to the socio-economic implications of degradation. Small fishing businesses often fail to compete with the industrial scale and disappear from the market. Often, overexploitation leads to economic difficulties and the loss of traditional living structures. Overfishing can lead to increased competition between fishing businesses and countries. To preserve marine life, it is necessary to support the variety of fish by designing sustainable measures, such as catch limitations, seasonal closure periods, and marine protected areas. Application of sustainable aquaculture can also alleviate the pressure on the wild fish population and give the public access to a safe alternative source of seafood (Khan and Xu, 2021). Advanced fisheries management often relied on effective monitoring and enforcement of existing regulations. Various means, including the use of advanced technologies, can help detect numerous violations and ensure that all fisheries operate in compliance. For example, there are satellite tracking and electronic log and reporting systems that detect overfishing or illegal attempted overfishing. Such monitoring is especially important since the long transboundary nature of marine resources calls for international cooperation to be addressed. Public education and awareness can also be an effective tool, since nowadays many consumers are ready to make a difference by not purchasing fish that has been overfished. As a conclusion, it is possible to say that the problem of overfishing is a complex one, and it calls for both comprehensive ecological studies and the analysis of local social and economic particulars. Although the expansion of trade and fisheries is a good thing, it should be implemented in a way that preserves the so-called carrying capacity of marine ecosystems. In other words, sustainable management of marine resources is needed to address the problem (Lakhani, 2016).

4.3 Habitat destruction

Infrastructure for enhancing trade, e.g., ports and shipping lanes, requires the destruction of vital marine habitats. Nearly all marine species depend on these habitats, composed of mangroves, coral reefs, and seagrass beds, for their survival. Firstly, they provide a breeding and feeding ground. Additionally, they preserve marine biodiversity and produce and sustain certain ecological services. Mangroves can reduce the coast's vulnerability to flooding and erosion from hurricanes and storms. They are a barrier to the wind, waves, and other water-related activities. They also serve as a barrier to other human establishments along the coastline. Furthermore, they act as a nursery for several fish species. They remain in the mangroves until they grow large enough to venture into the open waters. For instance, schnappers, mullets, tilapia fish, and lobsters nest in the mangroves and fertilize the sand. The destruction of mangroves is lethal for the species that live in them and will increase the chances for hurricanes to devastate coastlines (Hassan Daud Butt and Majeed, 2022).

Another crucial type of habitat is coral reefs. Often called the "rainforest of the sea" for their stunning level of diversity, they provide habitat and refuge to about 25% of all marine life. Surprisingly, they make up less than 1% of the ocean floor (Siig et al., 2023). It is also important for local economies since coral reefs support both tourism and fishing industries. However, the construction of ports and shipping lanes often destroys the physical structure of reefs, produces pollution from the construction processes, and increases sedimentation, which quickly smothers the coral and reduces its rate of photosynthesis and growth. Another equally important type of habitat is seagrass beds, which serve as food and habitat for many different types of sea life, such as marine mammals, fish, and endangered species, including sea turtles and dugongs (Amir, 2022). Furthermore, seagrass beds are vital for the purposes of carbon sequestration; seagrass captures the carbon and breathe out oxygen, and the climate crisis is one of the anthropogenic factors that contributes to the destruction of seagrass beds.

Habitat destruction is destructive because it disrupts the natural processes that enable marine life to exist. Firstly, the fragmentation and reduction of habitats pose a threat to organisms that seek food, reproduce, and migrate. Thus, the population of various marine animals tends to decline, leading to their extinction in other cases. In addition, biodiversity alters the adaptability of such ecosystems. The greater the diversity, the more resilient. Given the existing processes, it is crucial to devise methods for conserving these habitats (Solangi et al., 2018). One example is the use of marine protected areas to curb destructive activities. In addition, an example is that after digging the institution in such habitats, the law requiring people to operate in the habitats can be implemented. Restoration can also serve as a method; one example is the replanting of mangroves and coral.

Sustainable development is the right approach to balance economic interests and environmental protection. For example, using eco-friendly materials in construction and planning infrastructure projects in a way that does not affect sensitive habitats in the world's oceans would reduce habitat destruction. Furthermore, when individuals actively participate in safeguarding certain marine habitats and gain a deeper understanding of the vitality of these ecosystems, they can reduce habitat destruction by encouraging their stewardship and backing of conservation initiatives. Therefore, we can counteract habitat destruction by creating new frameworks that reinforce the importance of environmental protection in trade and development policies. Trade policies can preserve biodiversity, ecosystem services, and the future health of marine systems if they prioritize the protection and restoration of vital marine habitats (Naz and Parveen, 2022).

A specific approach to solving these problems is that future agreements considering the agreement between Canada and Pakistan should drive robust environmental protection as one of the viable strategy aspects. Future phases of the agreement may be

focused on new provisions of reducing the risks of trade for marine environments. New measures presuppose focusing on pollution control and sustainable fisheries implementation, including the protection of specific habitats. Thus, it is expected that the new regulations will be strictly implemented through new conditions of the agreement. This approach is likely to restore the affected marine environments, while ensuring trade practices align with sustainability principles. In this way, both aims, economic growth, and environmental protection will have been achieved.

5 Legal framework governing marine environmental protection

5.1 International legal instruments

5.1.1 United Nations Convention on the Law of the Sea

Protection of the maritime environment, the responsibility of both countries, is presented under the UNCLOS. Considered as the "constitution for the oceans," the act establishes a set of rules aimed at ensuring the sustainable use and protection of the marine environment. Both countries are required to take measures to prevent, reduce, and control pollution of the sea and nature. Generally, both Pakistan and China are members of the convention that formulates a regime for protecting the maritime environment (Suncls and Cai, 1982).

a. Stricter Regulations on Pollution Control:

UNCLOS mandates that states take all necessary measures to prevent, reduce, and control pollution of the marine environment from various sources, including land-based activities, seabed activities, dumping, and vessel-source pollution. This framework requires states to adopt laws and regulations to mitigate the adverse effects of pollution on marine ecosystems. To align with these obligations, future phases of the FTA should incorporate stricter pollution control measures. Enhanced monitoring and enforcement mechanisms are essential to ensure compliance with pollution regulations by shipping companies and industrial operators. Advanced technologies such as satellite tracking and real-time water quality monitoring can help detect and respond to pollution incidents more effectively (Wardhana, 2015). Additionally, mandating the use of cleaner fuels and advanced waste treatment systems on ships can significantly reduce the discharge of harmful pollutants into the ocean. Regulations should also require ships to minimize their ballast water discharge to prevent the spread of invasive species. Implementing pollution prevention programs that focus on reducing waste generation and promoting the use of environmentally friendly materials can further aid in minimizing environmental damage.

b. Sustainable Fishing Practices.

UNCLOS, in addition to maritime economic zones, deals with the conservation and management of marine living resources. The treaty requires the states to maintain populations of harvested species at levels capable of producing a sustained yield. The FTA should introduce sustainable fishing practices to fight overfishing and ensure the long-term viability of fish populations. A set of scientifically determined catch limits, or quotas, would provide early warning of overexploitation of a fish population and prevent the onset of long-term decline. To adapt the measures to changing conditions, they should be based on the best available scientific data and reviewed periodically (Stougaard-Andresen, 2023). The FTA should also enforce seasonal and area restrictions to provide marine species with critical breeding and feeding grounds in which to recover. Marine protected areas should be created to act as safe havens for marine species and ensure biodiversity in the oceans. Certification and labeling programs should be promoted for consumers who wish to choose seafood that has been produced using sustainable fishing methods. Market incentives will help promote the FTA in the fisheries.

c. Protection of Critical Marine Habitats.

According to UNCLOS, states *"shall take, individually or in cooperation with other States or international organizations, all measures consistent with this Convention that are necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened, or endangered species and other forms of marine life."* Therefore, protecting and restoring critical marine habitats is vital for ensuring biodiversity and ecological balance. In future phases of the FTA, there may be requirements and provisions for funding and supporting habitat restoration projects. For instance, the projects may incorporate measures for mangrove reforestation, coral reef restoration, and seagrass bed rehabilitation. These measures will help restore the degraded habitats and improve their ecological functions, supporting coastal protection, carbon sequestration, and various marine life forms. Additionally, Comprehensive Environmental Impact Assessments (EIAs) (Glasson and Therivel, 2013) should be required for all major infrastructure trade-related projects. These assessments should include evaluating the risks for marine habitats and proposing mitigation measures to reduce the harm. Additionally, the FTA can establish partnerships with local communities, NGOs, and international organizations to bolster conservation efforts and guarantee the implementation of environmental protection measures (Camara Sanchez, 2011).

Incorporating the principles and obligations elucidated by UNCLOS with regards to the FTA paradigm would ensure that Pakistan and China's trading practices and their enterprises are compatible with the convention's general and particular objectives. This step would not only confirm relevant international standards and laws, but it would also facilitate the long-term protection and stability of marine resource availability, striving to preserve a balance between developmental economic benefits and the natural environment (Nguyen, 2023).

5.1.2 Convention on Biological Diversity

In 1992, the Earth Summit in Rio de Janeiro adopted the CBD as an international document. The CBD is a serious international document that aims to conserve biological diversity, promote sustainable use of its components, and ensure equitable sharing of benefits from genetic resources. It is clear that conservation of the

web of life on our planet is necessary for safe and healthy ecosystems, as well as for humanity's well-being (De Oliveira et al., 2011).

There are three primary goals set by the CBD. The first one is biological diversity conservation. This is a fundamental goal to which the two others will also refer. The CBD promotes the protection of ecosystems, species, and genetic diversity. The conservation effort aims to maintain the vitality of ecosystems that provide humans with essential services like clean air, water, and fertile soil. The other two objectives pertain to the prudent and sustainable utilization of biological diversity. Second, the CBD advocates the sustainable use of diversity. A balance should be achieved between the usage of such diversity for the existing needs and for generations to come. It could be explained by the necessity to preserve the integrity of ecosystems and to provide the proper functioning of the latter. Finally, the third goal is the fair and equitable sharing of benefits from such genetic resources. It refers to the need to recognize the efforts that Latin American communities and indigenous people have employed to sustain and use their resources (Chandra and Idrisova, 2011).

From the perspective of marine biodiversity, the CBD contains several significant provisions. This convention places an emphasis on maintaining marine and coastal areas and places the importance of habitats at its core. Coral reefs, mangroves, and seagrass beds are essential to the marine biosphere and provide life-supporting functions for the world community as they protect the shores and sequester carbon. Moreover, the CBD promotes the creation and management of marine protected areas as a vital means to protect biodiversity. These areas can be used for protecting the habitats, stopping the depletion of the populations that are under threat, and helping the recovery of such species.

Yet another notable feature of the CBD is its access and benefit sharing mechanism. By putting the provision in place, the CBD ascertained that countries and communities that provided genetic resources would receive a fair share of benefits from their use. The elaborate ABS arrangement aims to enhance equity and development sustainability by crediting those who have kept and used their genetic resources over the years (Marino et al., 2015).

The CBD is primarily a capacity-building instrument, aimed at ensuring that nations are able to conserve biodiversity in accordance with the three objectives. It usually operates through regular meetings of the Conference of the Parties, in which member states review their progress, adopt decisions to enforce the treaty, and develop new goals to further its effectiveness. The CBD's Secretariat assists countries with respect to their commitments and facilitates the sharing of knowledge among governments, scientists, and other stakeholders.

Ensuring that economic development and trade operations do not jeopardize their conservation goals is appropriate. An example of this is the incorporation of CBD principles into the China-Pakistan FTA, as future phases should incorporate requirements that align with the objectives of CBD. These objectives encompass the sustainable use of marine resources, the preservation of marine ecosystems, and the identification of equitable methods for sharing all potential benefits derived from these resources. Once the FTA adopts CBD objectives, they will integrate these goals into the trade policy, thereby promoting a balance between economic growth and environmental protection principles (Secretariat, 2001).

5.1.3 International Convention for the Prevention of Pollution from Ships

The International Convention for the Prevention of Pollution from Ships, or MARPOL, is the central international agreement that aims to reduce the effect of marine pollution from shipping. First adopted in 1973, the Protocol of 1978, though altered and made more inclusive, represents an international regime that actively manages the substances ships may discharge into the sea. It is a coordinated effort by member states to protect the marine environment from the negative impacts of maritime pollution. MARPOL's primary goal is to prevent and control ship-based marine pollution. The convention divides into multiple annexes, each focusing on a specific type or source of pollution, to achieve this goal. For example, Annex I deal with oil pollution, specifying the standards for discharging oil and oily mixtures from ships. Additionally, Annex I mandate the use and maintenance of oil filtering equipment, details the records required for oil discharge by ships, and outlines procedures for both operational and accidental spills to occur on the smallest possible scale (MEPC, 2011).

Pollution from noxious liquid substances carried in bulk is the subject of Annex II. It specifies criteria to prevent maritime pollution by regulating every facet of these substances discharged. Similarly, Annex III deals with the disposal of harmful substances packaged in containers and includes the corresponding requirements for the safe handling, packaging, and transport of these noxious liquid substances. Annex IV of MARPOL also plays a significant role, as it deals with sewage pollution from ships. This annex makes it mandatory to use onboard sewage treatment systems and establishes discharge limits. In order to lessen the impact of garbage on the marine environment, Annex V regulates the discharge of various types of waste from ships, including plastics and food (Club and Thomas, 2013). Annex VI is the latest addition that affects the atmospheric problems involving air pollution from ships. It outlines limits that apply to conditions such as the emissions of sulfur oxides, nitrogen oxides, and particulate matter from ship engines, along with additional measures to reduce the emissions of greenhouse gases that contribute to pollution. This initiative aims to mitigate the impact of shipping on pollution emissions and climate change.

MARPOL's enforcement is contingent on a combination of national and international measures. National states enforce MARPOL by implementing its provisions in their territories. The states bear the responsibility of conducting inspections and ensuring the compliance of ships flying their flag with the convention. The International Maritime Organization oversees MARPOL and provides guidance, updates, and fosters international cooperation to effectively implement the treaty. At present, integrating MARPOL's standards into trade agreements, such as the China-Pakistan FTA, is crucial for ensuring that increased maritime trade does not generate higher levels of marine pollution. Future phases of FTA should include provisions that align with MARPOL's requirements, including more strict pollution control measures and improved waste management practices. By introducing these measures, trade policies could support sustainable maritime activities, decrease the environmental impact of shipping, and protect marine ecosystems.

Because MARPOL is a core component of the existing international framework for marine environment protection, integrating trade agreements with its standards is critical for balancing economic development and the need to maintain the environment (Jea, 2011).

5.2 National legal frameworks

5.2.1 Pakistan's legal framework for marine environmental protection

Marine environmental protection in Pakistan relies primarily on two major legal instruments, one of which is the Pakistan Environmental Protection Act, 1997, and the other is the Marine Fisheries Ordinance, 1983. The first-mentioned Act is a comprehensive piece of legislation that aims to protect the environment on Pakistan's territories, including its marine environment. This Act establishes the Pakistan Environmental Protection Agency, which is responsible for implementing governmental policy in the environmental field and ensuring compliance with the proper standards and regulations. The Act contains provisions relating to environmental impact assessment, pollution control, and environmental quality standards formulation. However, despite the Act's excellent framework for formulating objectives and technical means for their implementation, numerous enforcement difficulties often hinder the effectiveness and implementation of these regulations (Ullah et al., 2021).

The Marine Fisheries Ordinance, 1983, is another legal instrument that specifically relates to marine fisheries and fishery resource management. The ordinance's establishment aims to regulate, prevent, and control overfishing in the sea, thereby preserving its biodiversity. Its functions include licensing, registration, monitoring, controlling, and regulating fishing practices, as well as the use of fishery resources in the marine environment. The World Fisheries Conference and the Food and Agriculture Organization support the provisions of this ordinance. However, like the Environmental Protection Act, there is inadequate enforcement of the law, leading to numerous cases of illegal fishing. Additionally, poor monitoring frequently leads to incidents. Furthermore, the federal government faces significant challenges in effectively coordinating the activities of various agencies. As a result, the enforcement of the laws is also inadequate. Despite the challenges in enforcing these two laws, as previously mentioned, what steps would you take to guarantee the effective protection of Pakistan's marine environment and the effectiveness of these laws (Lau, 2018).

Furthermore, the Sindh Marine Fishing Ordinance, 1980 is the legislation that governs the coastal areas of Sindh. The ordinance aims to safeguard the management and conservation of marine resources by regulating fishing licenses and prohibiting practices that lead to overfishing of specific species or jeopardize marine diversity. It is complemented by the Pakistan Wildlife Protection Act, 1972, which covers all of the wildlife and is not limited to the marine species, as that act provides the legal grounds for protection of fauna, including prohibiting hunting and trade of certain species and encouraging conservation of environmental resources. The Coastal Development Authority Act, 1994 addresses the development of Pakistan's coastal areas, providing solutions to infrastructure-related issues, managing land use, and preserving coastal ecosystems. The National Water Policy, 2018, is the final act relevant to the preservation of diminishing marine resources in Pakistan. It provides a comprehensive and voiced approach to the topic of water management in Pakistan.

5.2.2 China legal framework for marine environmental protection

China has established a legal framework in the field of marine conservation through the legislation of the Marine Environment Protection Law and the Fisheries Law. These documents have been critical in regulating marine environmental protection and managing fisheries resources. The Marine Environment Protection Law is the primary legislation that seeks to conserve and enhance the marine environment. It contains an extensive array of regulations targeted at the prevention and control of marine pollution, integrated coastal zone management, and conservation of marine biodiversity. As such, it requires pollution control by limiting the number of contaminants discharged into the sea through shipping and industrial activities. The law also requires an environmental impact assessment to evaluate environmentally sound marine project activities. The law also addresses a variety of issues related to the conservation of marine ecosystems and the protection of marine species. Despite the law's broad scope, its implementation has encountered numerous challenges. These include issues such as insufficient enforcement and monitoring capabilities and inadequate public awareness (Chang et al., 2020).

The law focuses mainly on the sustainable management of fishery resources and the protection of aquatic environments. It includes provisions on regulating fishing activities, among other critical aspects of fishing. The law mandates that relevant government agencies and departments, as well as any other institution responsible for managing or regulating fishery resources, must obtain licenses before conducting any fishing operations. The law also requires that these responsible institutions establish firm management and quotas of fish to and from the country. However, similar to the law on the protection of the marine environment, China's Fisheries Law encounters numerous challenges in its implementation. Among other issues, the society confronts a significant challenge in the form of illegal fishing in the seas and oceans, both within and outside China. Insufficient enforcement and monitoring of the law also limits its practical application (Mahaseth, 2021).

The implementation of the law that emphasizes the protection of China's seas and oceans presents several key challenges. Most often, the implementation of the law in question faces challenges when all relevant parties are not involved in the law enforcement activities. Moreover, the absence or scarcity of crucial organs and equipment necessary for monitoring and enforcing the law can pose a significant challenge to its implementation. Inadequate management and coordination of other efforts in support of the law may lead to additional challenges. Finally, inadequate public involvement in supporting the law may pose a challenge to its implementation (Guo, 2020).

5.3 Provisions within the Pakistan-China FTA

The FTA between Pakistan and China brought revolutionary changes in economic relations between the two countries; however, one of the limitations of the agreement is that it does not have concrete provisions related to marine environmental protection. Furthermore, the general framing and non-enforcement of environmental clauses hinders the effective management of marine environmental impacts linked to heightened trade.

Generally framed and not enforceable, environmental clauses in the existing framework do not specifically assist in mitigating environmental impact issues. Such a clause's nature is vague and not specific. The general environmental clauses are connotative, containing general commitments for environmental sustainability or detailing the parties' adherence to existing environmental regulations. However, the specific clauses do not address the impact of trade on the marine ecological system. For example, the FTA may not have addressed the distribution and pollution aspects of increased shipping activities. It may not have addressed the overfishing issues and failed to provide specific measures for protecting marine ecosystems related to trade and development (Idrees and Rehna Gul, 2022).

This means the agreement is unenforceable for any environmental measure. In addition to that, the lack of enforceable environmental measures means that there is little to no accountability concerning the environmental effects of trade activities. The FTA lacks a mechanism to prevent trade from damaging the environment, as it lacks specific and rigorous requirements regarding the issue and does not allow for concrete data to pinpoint possible instances of marine pollution, overfishing, and habitat destruction. Therefore, these challenges highlight the difficulties in incorporating environmental factors into a formal trade agreement, particularly when the expansion and expansion of globally significant businesses trump environmental objectives.

A future phase of the FTA should have detailed and enforceable environmental provisions to address these weaknesses. It can include clear prescriptions for pollution control, guidelines on sustainable fishing, as well as measures to protect marine habitats. These clear provisions will help to ensure that both countries are able to regulate their trade properly and reduce the environmental impact of their activities, which will support the sustainability of their marine ecosystems. Such an approach would help to align trade with environmental protection efforts while also improving the overall effectiveness of the FTA in supporting a balanced and sustainable economic relationship (Abbas et al., 2023).

6 Identifying gaps and challenges

6.1 Inadequate environmental provisions in the FTA

The Pakistan and China FTA aims to promote economic integration and bilateral trade, and it contributes to marine environmental protection to a lesser extent. While China and Pakistan's FTA may have broad commitments to environmental preservation, it lacks explicit and detailed environmental provisions, resulting in the absence of legal bias to address and control the environmental impact of increased trade. The current environmental provisions generally frame the marine environmental problem without specificity. It implies that the agreement may have a general reference to environmental issues and sustainability. However, the agreement does not show specific concerns with respect to marine pollution, overfishing, and the destruction of habitats. The current provisions are limited due to their lack of emphasis on the specific environmental issues. It does not provide any concrete measures, programs, or implementation modalities. It also does not specify the necessary national capacities and enforceable or institutional provisions to implement marine environmental protection. For example, the terms of the agreement do not contain provisions that regulate marine pollution related to increased transportation or control the unloading of waste and oil from vehicles. Additionally, there are no special provisions that would prevent overfishing due to increased trade or protect the vulnerable marine stenoses and mangroves from habitat loss linked to trade. Thus, because of the general nature of the environmental clauses, there is no formal mechanism that would ensure that trade does not affect the environment in this way (Irshad, 2017).

This legislative gap is part of a broader issue relative to incorporating environmental provisions within trade agreements. As a result, the current issues listed in Table 1 cannot be effectively prevented because there are no precise provisions that could be enforced to guarantee that any economic activities unrelated to trade would not be harmful to the marine environment. Therefore, to bridge the gap between economic growth and environmental sustainability within the FTA, specific, concise, and enforceable provisions addressing pollution, overfishing, and habitat destruction should accompany the development of future regulations.

6.2 Weak enforcement mechanisms

Pakistan and China are unable to effectively enforce the existing environmental laws. This situation exacerbates the challenges in protecting marine environments under the FTA. Several factors primarily drive this issue, including the lack of sufficient resources, the lack of coordination among the concerned entities, and the lack of political will. Insufficient provision of facilities by the concerned agencies hinders the execution of environmental laws in Pakistan. Pakistan Environmental Protection Agency (EPA) and the other involved bodies suffer financial, technical, and human resource deficit. This limits their scope of proper monitoring and execution of environmental standards, including those that pertain to the protection of marine environment. Some government bodies work in isolation, which may not deliver success in executing environmental laws. China faces similar challenges in terms of enforcing the law to protect its marine environment. Despite the country's extensive legal framework, which includes statutes and regulations like the Marine Environment Protection Law and the Fisheries Law, the lack of resources and proper monitoring systems

may hinder the implementation of these legal instruments. Another issue is the decentralization of regulatory control, with different responsibilities shared by government agencies across various levels. The low political priority of marine environmental issues complicates this state of affairs, resulting in inconsistent enforcement and a diminished determination to enforce them (Khan and Chang, 2021).

Furthermore, a lack of public awareness and attentiveness hinders the enforcement of environmental protection laws. Both countries struggle to generate strong support for environmental protection initiatives and keep stakeholders engaged in monitoring and reporting breaches. Moreover, the absence of proper public participation and accountability in enforcing the law amplifies the inadequacies in the implementation of environmental protection measures. The process of meeting the challenges and opportunities of the implementation of laws includes the current capacities and resources of the relevant regulatory and other bodies and political organizations, as well as the commitment of political leadership to use them. The discussion also highlighted the importance of fostering public awareness and participation, which is crucial for monitoring and reporting illegal and inappropriate activities. Both nations should act to capitalize on these points and enforce their environmental protection laws accordingly to protect marine environments during the rise in trade flows (Guo, 2020).

6.3 Economic vs. environmental priorities

Trade agreements such as the FTA are often marred by considerable tension in relation to economic and environmental priorities. The primary issue lies in the perception that economic priorities often overshadow the imperative for environmentally sustainable practices. This is because a FTA primarily aims to increase trade volume, increase investments, and realize the development of economic potential. In the case of the FTA between China and Pakistan, representatives from both countries warn about the need to reduce tariffs both in China and Pakistan to encourage trading and investments and to ensure better economic growth. In other words, the principal priority of the economic agreement is to improve the trade relationship between both countries, create more jobs, and accelerate the growth of industries (Jea, 2011).

However, the issue with economic growth is that it often comes at the expense of specific environmental conditions. For example, the FTA agreement facilitates accelerated trade, which results in increased traffic from shipping, industrial operations, and resource extraction. This, in turn, leads to an increase in sea, fishing, and marine traffic, which further contributes to sea pollution, overfishing, and habitat destruction. However, for various reasons, people often overlook the environmental effects of pursuing economic growth. Economic objectives are more urgent and measurable, which implies that they represent a more critical problem requiring an immediate solution. Simultaneously, we can view environmental difficulties as a lower priority issue that we can address at a later time. This argument suggests that we choose unsustainable development because its short-term benefits to economic development outweigh its long-term negative environmental consequences (Amir, 2022).

Therefore, reconciling economic and environmental goals requires a more integrated approach. Therefore, such agreements as FTA should imply adequate environmental provisions that are compatible with the governments' economic objectives. This necessitates the implementation of policies and laws that mitigate environmental harm, encourage environmentally sustainable practices, and guarantee the attainment of economic objectives without negatively impacting environmental quality. If both countries can achieve a balance, which is not an unattainable goal, it should be possible for China and Pakistan to achieve strong economic development while protecting their marine environment.

7 Proposed legal solutions

7.1 Incorporating specific environmental clauses in the FTA

There are major imbalances in the FTA between Pakistan and China when it comes to the availability of the right set of political tools to protect the marine environment. This is why any future revisions should include separate clauses for environmental sustainability. To ensure that trade operations do not adversely affect marine ecosystems, these clauses should aim to establish viable, enforceable standards and create thorough monitoring and compliance mechanisms.

Future versions of FTA should have distinct environmental standards targeting key spheres: pollution control, sustainable fishing, and habitat protection. Thus, we can implement specific measures to regulate shipping-related pollution and manage waste and oil spills. As regards fishing practices, the agreement can set catch limits, define unsafe seasons and areas, and introduce measures that protect endangered species. Equally important is developing enforceable standards, which are precise and supported with detailed guidelines on acceptable practices and non-compliance fines. In this manner, everyone involved will understand their responsibilities and feel motivated to enhance their practices to meet the agreement's standards (Monteiro, 2016).

The compliance and control mechanisms must assist in tracking and, if necessary, limiting the impact of trade on environmental standards. An important measure would be to establish a joint body empowered to control the effects of trade on the marine environment. Specifically, we should mandate the latter to conduct routine checks of the situation, assess the degree of compliance with existing environmental standards, and address non-compliance problems. The monitoring and control mechanisms will imply that both countries have established data collection and range requirements. This will allow us to track the sufficiency of the measures and determine if more radical steps are required. The open-data policy is also necessary to improve accountability on the part of both countries and build trust with the stakeholders.

It would also be adequate to try and introduce some adjustments aimed at increasing the capacities of the regulatory bodies and employing closer cooperation between Pakistan and China. For instance, it is possible to offer to cooperate with both countries and provide resources and training to the enforcement agencies to optimize their ability to follow and enforce environmental standards. Additionally, we can propose closer cooperation with China to exchange valuable information, thereby increasing the efficiency of all environmental measures taken by both countries. With the propositions for the environmental clauses described above, it will be feasible to incorporate the clauses regarding the protection of marine environments into the FTA. As a result, it will contribute to both preventing the adverse effects of the booming trade, such as the pollution of marine environments, and ensuring that the economic cooperation with China remains stable and free from serious disputes (Monteiro, 2016).

A comparison with other international agreements with environmental protection clauses would take the discussion of the proposed legal measures to the next level of relevance. One of the possible examples mentioned in the module is the North American Agreement on Environmental Cooperation, which is a side agreement to the North American Free Trade Agreement. The European Union's trade agreements employ a similar structure with subsections concentrating on sustainable development, where signatories agree on their parties' compliance with the existing environmental standards and a dialogue on related issues. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership includes binding clauses that dictate compliance with environmental standards and provide that the implementation of the agreement cannot undermine conservation efforts. Therefore, a comparative table of these templates would offer a thorough analysis of the successful implementation and operation of similar measures in other countries. By combining the best samples and their strong points with the shortcomings of others, we could outline prevailing environmental challenges that should be addressed in the FTA. Such comparison is also proof that environmental concerns should be taken into consideration in all trade agreements.

7.2 Establishing a Joint Environmental Commission

In order to resolve the environmental problems that have emerged as a result of the FTA between Pakistan and China, it is essential to create a Joint Environmental Commission. This commission will focus precisely on the environmental issues that led to the FTA, as well as the consequences of the agreement. An environmental commission would contribute to cooperation between the two countries and ensure the efficient and effective implementation of environmental provisions.

A Joint Environmental Commission will serve as a dedicated platform for bilateral environmental cooperation. Upon the establishment of such a commission, experts, policymakers, and other interested parties from both countries will be able to cooperate on pertinent environmental issues. With the commission in place, the countries may develop and pursue joint courses of action to address such issues as marine pollution, overfishing, and habitat destruction. Therefore, the level of cooperation between the two countries in the environmental management area will increase, leading to more coherent and effective environmental policies applicable to both countries and their respective and shared marine ecosystems.

The proposed commission aims to facilitate information sharing between Pakistan and China. This would imply the dissemination of data regarding the level and scale of environmental impact, trade activities, and adherence to the agreed standards among the parties. Both countries involved could benefit from a designated process for regular and convenient sharing of these data sets, which would keep them updated on new environmental issues and aid in evaluating the efficacy of adopted remedies. Furthermore, the commission can serve as a "*environmental data hub*" that stores all collected information, making it accessible to relevant stakeholders and the public. Building transparency in this area is of primary importance for developing trust and recognition among all involved parties.

The commission would also be responsible for implementing the FTA's environmental provisions. In other words, the commission would be responsible for monitoring compliance with the environmental standards, conducting the inspection, and dealing with the violations. Therefore, the establishment of clear enforcement mechanisms would help to ensure that both China and Pakistan would be in compliance with the agreed-upon measures. Furthermore, the commission would also have to review and, if needed, update the provisions based on the new information, technological development, or environmental changes (Ullah et al., 2021).

In addition to its obvious functions and activities of constant oversight and immediate execution, the Joint Environmental Commission may serve as an effective medium for capacity building and technical support to various stakeholders and regulatory agencies. As a result, it could devise training programs and workshops to popularize environmental management best practices, develop a series of monitoring and assessment tools, and promote the development of contacts between environmental and trade experts. In other words, such a commission enhances the capacity of the involved parties, thereby improving the performance of environmental protection and marine resource management. In summary, this approach represents a significant advancement in balancing trade profits and prudent economic growth through effective environmental activities.

The Gulf of Maine Council on the Marine Environment. The United States and Canada cooperated to form this commission. The development aims to safeguard and conserve the marine environment of the Gulf of Maine, highlighting the significance of cooperative management and sustainable development. The development places significant focus on safeguarding the environment. This joint commission's key goals are to develop a coordinated approach to marine area management, to promote human and ecosystem health, to protect and restore marine and coastal habitats, to reduce pollution and improve waste management, to sustain fisheries, and to reduce and mitigate

bycatch. This joint commission serves as a promising model for developing a joint commission that can improve the environmental conditions associated with the China-Pakistan Free Trade Agreement. Including such a purpose in the agreement will ensure that both countries work to mitigate possible negative effects of trade on the marine environment and promote sustainable practices for both parties.

7.3 Enhancing public participation and transparency

Increasing transparency and public administration involvement provide the key approaches to enhancing environmental governance under the FTA. As the agreements are being determined, trade-related conservation activities and allegations could be made transparent with the aim of assisting relevant parties in being heard, appealing, and adopting improved decision-making requirements. The benefit of more transparent agreements is that they effectively link environmental tendencies in the FTA and ensure an increased performance level. By making information available, the public, businesses, and non-governmental organizations can gain a deeper understanding of the environmental governance agreements, particularly the trends and stipulations they provide.

Additionally, the decision-making processes should incorporate public participation. Engaging civil society, including local communities, environmental NGOs, and other stakeholders, can improve the quality of environmental governance. Public participation allows taking into account a greater variety of perspectives and expertise, thus making the decisions more balanced and informed. There are several forms of such involvement, such as public consultations, stakeholder forums, and participatory assessments. The FTA can effectively address environmental concerns and ensure the interests of affected communities by incorporating the voices of various groups in the decision-making processes.

It would be beneficial to institutionalize public participation within the FTA framework by introducing mechanisms for regular consultations and feedback. This may take the form of advisory committees or working groups, with substantial representation from civil society, to provide guidance on increasing environmental protection, track policy implementation, and recommend improvements. In addition, the FTA may include provisions that require the availability of environmental information as well as reports about the state of the environment, allowing civil society to monitor the impacts of trade and environmental policies and engage on equal footing in the discussions of relevant issues. In summary, the FTA framework's guaranteed transparency and increased public participation will enhance environmental governance by integrating environmental considerations into overall decision-making. As a result, these measures will help the FTA reconcile economic growth with environmental sustainability and introduce a more inclusive, as well as accountable, approach to managing trade's environmental impacts (Lau, 2018).

The inclusion of examples from international agreements with relatively strong environmental provisions would greatly enhance the FTA. For example, the North American Agreement on Environmental Cooperation is part of NAFTA. Such provisions as public participation and information in the decision-making process clearly contribute to assuring environmentally responsible behavior of the participants. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership, which countries signed after the USA withdrew from TTP, serves as another example. It includes a separate chapter, "Environment," which ensures sustainable resource management among the members of the agreement as well as adherence to environmental law. Finally, a table showing similar rules in other free trade agreements (FTAs) would help show why specific environmental clauses and more public participation need to be a part of the FTA.

7.4 Strengthening national environmental laws

To solve problems of ecological maintenance and implementation of the FTA, the national environment legislation must be improved and supplemented, taking it into conformity with contemporary requirements. From that point of view, both Pakistan and China have to hold qualifying reviews of environmental legislation, realizing the necessity to expand national environmental laws. The proposed legislation aims to enhance oversight and penalize violations. There is a need to extend the list of environmental abuse along with stringency of penalties and punishment. It is required to tighten pollution protection standards, to expand marine environment defense, and to improve the legislation in order to address environmental circumstances occurring due to trading activities.

Strengthening national laws with respect to increasing penalties for environmental violations is another important aspect to consider. Imposing higher fines and other penalties on violators appears to be an essential means to harshen the existing enforcement measures for harming the environment. Financial deterrence of noncompliance contributes to reducing the risk of illegal practices in businesses and by private individuals. Offenders should at least remunerate the costs of long-term recovery efforts and compensate the victims of environmental violations. Penalties against the offenders must be proportionate to the severity of environmental damage. In addition, it can be effective to enhance the capacity of the institutions with the regulatory function. Regulatory authorities must have sufficient resources, training, and other means to monitor compliance and solve environmental problems. This requires investing in environmental monitoring technologies, conducting the necessary inspections, and providing training programs for supervisory staff. Efficient enforcement also requires increased coordination between different regulatory bodies and transnational relations with international organizations (Dobson, 2005).

In addition, Pakistan and China should foster cooperation between the government, industry, and civil society organizations to effectively implement and uphold the legal standards.

Stakeholder awareness and other forms of engagement can assist the national government in monitoring compliance to ensure that all government and private agencies understand and follow the regulations and standards. The suggested improvements to the above steps suggest that Pakistan and China can effectively manage the environmental impacts of the FTA and ensure sustainable economic growth. In the long run, the new measures will help to put more restrictions in place to allow the exploitation of the marine ecosystem without causing a negative, long-lasting impact.

7.5 Promoting sustainable trade practices

It is crucial to promote sustainable trading practices, thus minimizing the environmental impacts of state activities that are associated with the FTA conclusion between China and Pakistan. The mentioned goal can be reached by applying the following measures: sustainable fishing promotion, marine pollution prevention, and green port investment. All of these approaches will greatly contribute to the successful completion of the deliberated task and promote environmentally friendly trade between Pakistan and China. Encouraging sustainable fishing practices is one of the most important ways to maintain the population and biodiversity of marine creatures. They suggest specific regulations aimed at curbing overfishing and preventing the overexploitation of any species. Laws should protect endangered animals, necessitating expert assessments of fisheries sustainability. As a result, quotas and catch limitation regulations could be based on scientific research. Furthermore, the FTA could obligate fishermen to use selective gear or practices and avoid bycatch, which could lead to harmful results not only for non-targeted species but also for the ocean as a whole. Thus, fishing practices may be considered sustainable by the FTA if they can help keep the balance between the income of all the groups involved and their negative effect on nature. Mitigation and reduction of marine pollution is a significant element of enhancing sustainable trading. Stricter requirements and expanded regulations regarding the management and control of ship-generated waste and other activities, the introduction of cleaner technologies, and the improvement of monitoring and control systems can control such activities. For instance, we can significantly lessen the adverse environmental effects of the maritime trade by enforcing stricter regulations on the discharge of garbage and waste on ships, as well as establishing standards for the use of clean fuel. By doing so, we can significantly reduce the pollution of the marine environment and preserve local habitats and organisms (Chang et al., 2020).

Promoting green port infrastructure is critical because it helps reduce and mitigate the environmental impact of increased trade. To understand, green port facilities usually imply that their operating procedures and technologies are environmentally friendly, or at least have minimal negative impact. To Promoting the infrastructure and greening of ports in trade-involving countries like Pakistan and China is crucial to achieve this. instance, there should be more energy-friendly and green lighting, green energy, recycling, and adequate waste management. To ensure that the operation of ports is green or near-green, some pollution should be avoided or mitigated. Such pollution pertains to air contamination and should be avoided, along with measures to limit water pollution, energy loss, and pollution of the marine environment around ports. Overall, the promotion of sustainable trade practices requires a complex of measures aimed at integrating environmental considerations into trade policies and infrastructure development. If the FTA sponsors sustainable fishing, marine pollution reduction, and green port infrastructure, China and Pakistan will be able to support a more balanced and sustainable economic relationship. These measures will ensure that trade continues to promote sustainable economic growth while protecting marine ecosystems and promoting their long-term health.

8 Conclusion

In conclusion, there is no doubt that the FTA between Pakistan and China has increased the level of bilateral trade. To a higher degree, such a fact implies that the nations' economic integration is also becoming deeper and more pronounced. In the meantime, increased trade intensity and intrusiveness have significant environmental consequences, especially for marine ecosystems. The overarching conclusion is that integration and trade, in general, should be complemented by more sophisticated consideration of economic and environmental balance and appropriate solutions to specific environmental issues. Trade-related pollution, overfishing, and critical habitat destruction are the environmental issues that are getting more severe as a result of increased shipping activity and the overall higher level of resource exploitation resulting from the FTA.

Although the FTA has some good economic effects, the overall policy lacks commitment to marine environmental protection. The FTA lacks specific environmental clauses and relies on weak compliance procedures for enforcement. The combination of missing clauses and weak enforcement causes double damage by creating regulatory gaps and failing to impose sanctions on countries focused on economic objectives. As a result, various practices regarding the exploitation of the seas reduce marine sustainability and lead to long-term problems.

Future FTA revisions should include specific environmental clauses dedicated to the protection of the marine environment to address the described problems. These revisions could involve the establishment of a joint environmental commission, which would facilitate enhanced collaboration and ensure the effective implementation of environmental clauses. Increasing the transparency of processes and provisions can enhance the public's involvement in environmental governance and decision-making processes. In addition, both countries should strengthen their national environmental laws and enforcement measures and promote sustainable trade, including responsible fishing, pollution reduction, and green port infrastructure investment.

Further research should be done in order to research the potential to integrate the most effective and comprehensive environmental provisions within a trade agreement and assess their effectiveness on the degree of environmental impact. Best practices from other international agreements and trade partnerships can be used to enhance the environmental framework of the FTA. Future studies of this issue can also look at the climatic, socio-economic, and other impacts of the net environmental degradation for local communities

and ecosystems. Such factors could especially dominate the degradation of natural areas on the border between the two states. Moreover, future agreements will involve policymakers, industries, environmental experts, and researchers who will strive to strike a balance between trade and the environment. Therefore, policymakers from states, green industries, and other stakeholders should collaborate to develop FTAs that are both economically beneficial and environmentally friendly.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding author.

Author contributions

MU: Writing – review & editing, Investigation, Conceptualization. AK: Writing – original draft, Methodology, Funding acquisition, Formal analysis.

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