

Research Paper

Gross Marine Product of Pakistan: Revisited

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Executive Summary

With a 90% share in global trade, the Marine economy is considered to be a new growth point in the global economic paradigm. Due to Pakistan's strategic geography, the Blue economy significantly contributes to the national GDP. More than 90% of Pakistan's international trade is primarily carried out through sea lines of communication (SLOC). However, Pakistan is following a traditional model of marine development which shows the contributions of the marine economy to the national exchequer through traditional measures like fish production and consumption statistics, thus being unable to comprehensively depict the state of Pakistan's Marine economy.

This paper aims to achieve the following objectives: (1) to analyse the current state of Pakistan's marine economy, and (2) to propose a vigorous framework for estimating the gross marine product of Pakistan.

The findings of the study underscore the significance of the marine economy. In the Gross Marine Product (GMP), Marine Fisheries (41%) constitute the largest share while the Mangroves ecosystems come second with (34%) share. Shipbreaking (14%) also makes a substantial contribution to the GMP. Additionally, Marine Tourism (0.003%), with an untapped potential plays a minimal but important role in shaping Pakistan's marine economy.

Recommendations:

- Pakistan is among the lowest in the global GHG emissions. However, it is among the countries predominantly vulnerable to climate change. By implementing strategies within the GMP framework on total carbon capture and emissions, Pakistan will not only be able to mitigate the escalating impacts of climate change but also strengthen its case on the global stage by providing empirical statistics.
- Within the national accounts, there are two types of accounts in the fisheries sector; marine fisheries and inland fisheries. Similar accounts should be introduced within the rest of the marine-related national accounts (e.g., marine tourism).
- Based on the GMP, targeted data-driven policies should be proposed to support the growth and development of the marine economy, showing their continued contribution to the socio-economic progress of Pakistan's economy.
- The government may need to increase the marine economy budget to enhance the local and domestic marine business.

Keywords: Blue Accounting Framework, Marine Economy, Gross Marine Product (GMP), Total Economic Value (TEV), System of National Accounts (SNA).

Introduction:

Marine Economy, refers to the economic activity produced by sectors and sub-sectors of the economy that depend on oceans¹. It significantly contributes to the Global economy while providing a variety of valuable resources to human beings. With a 90% share in global trade, it is considered to be a new growth point within the global economic paradigm²³.

Likewise, Pakistan has access to a substantial marine resource due to its vast coastline which spans more than 32,000 km⁴. It has a 1046-kilometer coastline with 350 nautical miles (NM) along with a vast Exclusive Economic Zone (EEZ)⁵ which covers 290,000 sq. km area of the sea⁶. More than 90% of its international trade is primarily through sea lines of communication (SLOC) due to its access to vital trade routes like Gwadar, Strait of Hormuz etc. Furthermore, international oil trade SLOCs flow close to the Pakistani coast, which is of significant importance for the global economy⁷.

Pakistan also has a diverse climate which supports and produces, consequently the economic activities throughout the year while fulfilling the food security needs of Pakistan⁸. Despite such potentials, its marine economy is facing severe socio-economic challenges, due to centuries of unsustainable short-term ocean practices, the careless and over-exploitation of oceanic resources, and the ceaseless pursuit of economic expansion and industrial revolutions. Such practices have disrupted the “Life below the water”⁹ and engendered a concern for grasping the strategic opportunities that the marine economy presents. Today, the development of the marine economy is one of the key issues for Pakistan’s sustainable growth and development¹⁰. Among many, one reason behind such socio-economic challenges is, over the years, Pakistan has followed a traditional model of marine development which tracks the contributions of the marine economy to the national exchequer through traditional measures like fish production and consumption statistics¹¹. However, in developed and industrialised nations it is carried out

¹ OECD (2023). <https://www.oecd.org/ocean/topics/ocean-economy/>

² ICS (2023). <https://www.ics-shipping.org/shipping-fact/shipping-and-world-trade-world-seaborne-trade/>

³ Copernicus (2017). <https://marine.copernicus.eu/news/ocean-economy-2030-oecd>

⁴ SUPARCO (2022). <https://suparco.gov.pk/products-services/coastal-and-marine-resources/>

⁵ EEZ, refers to an area of ocean where a country has rights to use marine resources, extending up to 200 nautical miles from its coastline (Noaa, 2023). <https://oceanservice.noaa.gov/facts/eez.html>

⁶ Salman & Amjad (2021).

https://www.researchgate.net/publication/377086657_Mission_Possible_Transforming_to_Blue_Society

⁷ Guoxing (2020). <https://dkiapcss.edu/Publications/Ocasional%20Papers/OPSloc.htm>

⁸ Ibid.

⁹ "Life below water" refers to **Sustainable Development Goal 14**. It focus on sustainable use of marine resources.

¹⁰ "OceanDevelopmentStrategy (2010). China's ocean development report state oceanic administration. Research Group. Beijing: Maritime Publishing House.

¹¹ World Bank (2023). “ <https://www.worldbank.org/en/topic/oceans-fisheries-and-coastal-economies> ”

by estimating the Gross Marine Product (GMP)^{12,13} of a country, which tracks the growth of oceanic ecosystems. Similarly, Pakistan's marine economy needs such an effective yardstick which not only tracks the health and vitality of oceanic ecosystems over time but also helps in proposing data-driven sector-specific solutions for a sustainable marine economy. This paper aims to achieve the following two crucial objectives¹⁴: (1) to analyse the current state of Pakistan's marine economy, and (2) to propose a vigorous framework for estimating the gross marine product of Pakistan. Collectively, objective (1) and objective (2) can help policymakers and practitioners in analysing the state of Pakistan's marine economy and keep track its growth. However, several challenges have contributed to the absence of such a framework in Pakistan. This framework requires comprehensive data related to all the sectors and subsectors of the Marine economy in its disaggregated form (micro-data) which is always difficult to get in developing countries like Pakistan¹⁵. Additionally, sufficient resources are required to get this microdata, which further acts as a hindrance in the collection and analysis of such data¹⁶.

Among many, an important aspiration behind providing this framework is to make it a compulsory and consistent scientific exercise in Pakistan's economy. Making the Blue Economic Accounting Framework (BEAF) ultimately become commonplace for the National Statistical Office (NSO), thus estimating GMP as a replication of the framework provided here.

Blue Economic Accounting Framework: An overview

Globally, several countries are working to find new ways to document the marine economy¹⁷. However, for the estimation of marine-related statistics, a single consistent framework is not available¹⁸. There are several guidelines provided in the form of a System of National Accounts (SNA) by the United Nations, which are used in the compilation of national accounts around the globe. Similarly in Pakistan, like many developing countries, both the National Statistical

¹² **GMP**: refers to the total economic output generated by marine economy within a specific time/geographic area.

¹³ Other less famous measures are Ocean Health Index (OHI), Marine Economy Account. See OECD (2023) <https://www.oecd-ilibrary.org/sites/d71e8b4d-en/index.html?itemId=%2Fcontent%2Fcomponent%2Fd71e8b4d-en> for detail.

¹⁴ While Salman & Amjad (2020) previously examined the overall marine economy of Pakistan by providing the Gross Marine Product (GMP) of Pakistan. The current study provides a brief overview of marine economy while focusing more on the marine economic accounting framework of Pakistan. It is the first effort of preparing a comprehensive framework for the GMP according to the guidelines provided by the SNA based on published officially national account estimations. An important guideline on the time and space of statistics is the estimation of a national account having all the statistics pertaining to the same year. However, in Pakistan, several statistics are not provided every year due to the unavailability of resources and the nature of the data (e.g., HIES, PSLM). However, this study follows the SNA requirement of the SNA by prodding all the statistics about FY 2023 only.

¹⁵ Gul (2021). "Policy Insights to Maritime Economy in Pakistan. *The Pakistan Development Review*."

¹⁶ Ibid.

¹⁷ OECD (2023) <https://www.oecd.org/ocean/topics/developing-countries-and-the-ocean-economy/>

¹⁸ Ocean Accounts (2023). <https://www.oceanaccounts.org/the-ocean-accounts-framework/>

Office (NSO) and the Ministry of Maritime Affairs do not provide such a framework. This study follows the basic guidelines¹⁹ provided in the SNA framework and also adopts the best practices followed worldwide for the compilation of marine-related statistics while taking the context of Pakistan's Marine economy into consideration²⁰.

Additionally, this study also takes help from the framework provided by leading maritime economies like China's Ocean Economy Accounting System (OECA)²¹ and the United States of America's National Oceans Economic Program (NOEP)²². However, for a more in-depth analysis methodologies followed by other countries from the South Asian region are also taken into consideration, such as Bangladesh, Australia etc.²³

As per the methodology adopted in this study, adherence to the National Statistical Office (NSO) guidelines and procedures is emphasised. Given that the NSO employs the production approach²⁴ in its methodologies, this study similarly adopts the production approach. Another crucial contemplation in this study is the difference between "income accruing" and "income originating"²⁵. This distinction is important as it takes into account the possible net income inflows or outflows which can result in inconsistent results. An activity can be produced within an ocean, but generates employment and revenues away from the ocean which can result in double-counting. Hence, this study adapts the latter approach, as it is aligned with the methodology of both GMP and the NSO; it records activities where they occur.

Defining Ocean Sectors

Before getting into the details of the GMP framework, it is important to define sectors of the economy that belong to the marine economy or identify ocean-related sectors and estimate what amount it contribute to the marine economy. As stated, the marine economy is an economy which impacts many of the sectors of the economy. For instance, in the national

¹⁹ Avoid "double counting", geographical region, etc.

²⁰ China and USA are considered to be the top GDPs around the globe. This study takes help from the marine policy of both China and USA.

²¹ Zhao (2014). Defining & quantifying China's ocean economy. *Marine Policy*.

²² Perissi (2021). The future: The blue economy. *The Empty Sea: The Future of the Blue Economy*.

²³ Framework of a single country cannot be applied to Pakistan. The dynamics of ocean are different from others. The accounting framework followed by the countries area based on the data availability and the underlying socio-economic challenges faced by the country. <https://unstats.un.org/unsd/envstats/fdes.cshtml?ref=oceanaccounts.org>

²⁴ The production approach measures national accounts by assessing the total value of goods and services produced within a geographical area. This method tracks the value added at each production stage without double-counting. <https://www150.statcan.gc.ca/n1/pub/13-607-x/2016001/225-eng.htm>

²⁵ **Income originating** means the location where income is generated. However, **Income Accruing** means the income that is accumulated or accrued, perhaps received or not. See, Salman & Shah (2023).

account, the data regarding the fish industry is provided in two forms, one is the in-land fisheries sector the second is the marine fisheries²⁶. It is important to estimate the marine proportion within the fisheries sector. This exercise also helps in determining the sectors which the National Statistic Office (NSO) does not usually cover. For instance, environmental benefits and many of the marine national accounts (the Ship-breaking industry), are not covered by the national accounts to avoid double counting^{27,28}. Another consideration that should be taken into account, is that the marine economy is a sub-part of the overall national economy. Its accounting principles also need to follow the principles followed by the NSO^{29,30}.

Another important reason behind following the SNA framework in GMP estimation is that the results become comparable with the national accounts both in time and space³¹. For example, SNA guidelines state that the definition of a unit of employment should be the same across all locations and industries for a specific period³². Furthermore, the industry data should be observed and measured consistently over successive periods to allow for trend analysis. Moreover, the data should reflect standard economic theory describing the measurement of economic activity. Such statistics are not only replicable over time but also form the basis of a future data series while resulting in the economic contribution of the ocean in each of the sectors and summing to arrive at the Gross Marine Product (GMP) of Pakistan³³.

Based on the literature, several marine economy-related activities are identified³⁴. An important benchmark for the exclusion or inclusion of any account is, the economic activity produced by

²⁶ PES (2023). https://www.finance.gov.pk/survey/chapters_23/Highlights.pdf

²⁷ For a detail discussion on the marine related activities, see Zhao (2014). Defining and quantifying China's ocean economy. *Marine Policy*.

²⁸ UN (2010). https://unstats.un.org/unsd/economic_stat/China/Regional%20accounts%20-%20an%20introduction.pptx

²⁹ Wang (2022). A review on marine economics and management: How to exploit the ocean well.

³⁰ Data on some ocean-based activities is very difficult to obtain. For example, one cannot isolate or get marine chemical industries from general chemical industries, freight charges paid by individuals which are recorded in more than one account; PNSC and SBP, carbon sequestration from the ocean itself. Following the guidelines of SNA such sectors are included where disaggregated differentiable data is available (Cheloti, 2023). <https://www.tandfonline.com/doi/abs/10.1080/09599916.2022.2119879>

³¹ SNA is followed by the NSO, as well as around the globe. By following SNA, statistics can be easily comparable and replicable both nationally and internationally. Methodologies (e.g., Input output tables) are globally recognized as well because they based on the same principle.

³² Such as, if the NSO is following the Fiscal Year, the GMP estimation exercise should also follow the Fiscal Year.

³³ Dataversity (2023). <https://www.dataversity.net/measuring-data-consistency/>

³⁴ For this a detail survey of all the national accounts been carried out to differentiate between marine and non-marine related accounts. The most important documents in this regard were Pakistan Economic Surveys provided by Finance Division, State Bank of Pakistan Statistical Years books etc.

sectors and sub-sectors of the economy that depend on oceans. Here only those activities are taken into consideration which are closely linked or depend physically on the marine economy and also generate a flow of benefits to society over time that is direct and accessible to the majority of people (i.e., the benefits are enjoyed by an economy as a whole). Moreover, this study only accounted for activities in which the benefits flow primarily to Pakistan. The sectors included in this assessment are fisheries, coastal tourism, seafood processing, marine recreation and tourism, Ship-breaking, coastal ecosystems (i.e., mangroves) and marine transportation (consisting of support services such as marine shipping, freight and passenger transport).

Sectors such as minerals, offshore oil and gas are excluded because, in developing countries like Pakistan, these are subject to federal and provincial regulatory uncertainties or speculative sectors, where getting authentic and replicable data is difficult³⁵. Furthermore, studies have indicated that any oil and gas development is likely to result in consequences, such as low local employment and the creation of temporary instead of permanent jobs with burgeoning pollution levels as well. Marine technology, research and education, and professional services are not in abundance in Pakistan, thus they are also excluded. Moreover, they are not activities that are directly (physically) connected to the ocean and thus do not produce much output.

This paper focuses on Pakistan's marine industries, utilising available data or proxy indicators where necessary. The sectors analysed here represent a high proportion of the total value of the marine economy in Pakistan. The major marine sectors classified here are marine fishery, marine ecosystems, marine tourism, sea-water deployment industry & marine communications and transportation, and shipbreaking industry.

Gross Marine Product (GMP)

“Gross Marine Product is a measure of the value of all final goods and services provided by the marine economy”³⁶. It is the sum of the value of all final goods/services produced in the marine economy using production, income, and expenditure approaches³⁷ these three

³⁵ Ibid.

³⁶ BEA (2023). <https://www.bea.gov/data/special-topics/marine-economy>

³⁷ **Production Approach:** summing up the value of goods and services produced within a country. **Income Approach:** totalling all incomes earned by individuals and businesses in the economy. **Expenditure Approach:** adding up all expenditures on final goods and services within the economy.

approaches are multiple ways of estimating the Final value of goods produced in any geographical area at a specific time (also known as gross domestic product or GDP)³⁸³⁹.

Quantification of Marine Economy

At present, the blue accounting framework is still in its infancy and quantifying the Total Economic Value (TEV)⁴⁰ of the ocean presents a formidable challenge due to the diverse array of tangible and intangible benefits it offers to society. This comprehensive value encompasses use, indirect use, and non-use values⁴¹, each comprising distinct elements. Thus, the estimation of national marine accounts needs extensive and disaggregated data; a very large number of variables are required. However, based on Dehlavi (2012)⁴², Zhao (2014)⁴³, WWF (2015)⁴⁴, Slaman & Amjad (2021)⁴⁵, and Salman & Shah (2023)⁴⁶ the formula for the total economic valuation of GMP of Pakistan is provided hereunder:

$$TEV_t = \sum_{i=1}^n UV_{i,t} \quad (1)$$

Where

TUV Total Economic Values

³⁸ WWF (2015). http://wwfintcampaigns.s3.amazonaws.com/ocean/media/BCGmethodology-Reviving_the_Ocean_Economy-WWF_report.pdf

³⁹ Another approach to estimating the economic contributions of the ocean is to use direct multipliers from provincial input–output tables (IOTs), which, when applied to total revenue, fulfils this purpose. However, such data is not available in Pakistan. Further details of the methods are provided in Zhao (2014) and WWF (2015).

⁴⁰ TEV known as total economic value refers to the flow of goods and services or the benefits from the marine economy. Unlike SNA (which only takes into account direct economic benefits), TEV composed of “*direct use values (DUVs)*” refers to those benefits that can be reaped at the oceans themselves which can be easily marketed. Take fisheries as an example. Indirect benefit or “*indirect use values (IUVs)*” refers to the indirect benefits that a country obtains from the marine economy but cannot be easily marketed such as environmental protection in the form of carbon sequestration and marine life (fisheries) conservation by mangrove forests. The “non-use value (NUV) refers to those benefits that are totally non-marketed. This study mainly accounts those in the form of eco-tourism and mangrove forests. For this a survey was carried out in Karachi for NUVs Dehlavi (2020) Economic valuation of wetlands: acknowledging values and services. WWF Pakistan.

⁴¹ Use value emanates from the direct utilization of oceanic resources. Direct use encompasses activities such as fishing and tourism, while indirect use pertains to the ecosystem services provided by marine ecosystems. Non-use values, on the other hand, capture a range of intangible aspects. These include bequest, option, and existence values, which extend beyond immediate consumption to encompass future benefits, the intrinsic satisfaction derived from the mere existence of nature, notable considerations, as well as cultural and spiritual connections to the oceanic realm. Thus, capturing the entirety of the ocean's economic worth requires an accounting framework for both its tangible and intangible contributions to human well-being and environmental resilience.

⁴² Ibid

⁴³ Ibid

⁴⁴ Ibid

⁴⁵ Ibid

⁴⁶ Salman, A., Shah, M. (2023). *Economic Outlook and Gross Domestic Product Framework of Balochistan*. Islamabad Policy Research Institute. <https://ipripak.org/economic-outlook-and-gross-domestic-product-framework-of-balochistan/>

- UV** Use Values (DUV, IUV, NUV)
- i** is (ranges from 1 to n) used for summation
- n** represents the total number of economic values
- t** refers to the time period⁴⁷

Equation (1) can also be written as:

$$\mathbf{TEV} = \text{DUV}_t + \text{IUV}_t + \text{NUV}_t \quad (2)$$

Where

- TUV** Total Economic Value, at time **t**
- DUV** Direct Use Value, at time **t**
- IUV** Indirect Use Value, at time **t**
- NUV** Non-use Value, at time (**t**)

The left side of Equation (1) is the Total Economic Benefits at a specific time (**t**), while the right-hand side of the Equation is the sum of all the economic benefits or the benefits of all the sectors of the marine economy that makes the GMP of Pakistan. Based on equation (1) and equation (2) the Gross Marine Product of Pakistan is estimated using a production approach (bottom-up⁴⁸) at current market prices⁴⁹ for the Fiscal Year 2023.

Tourism and Fisheries Sector

For the estimation of relevant shares in GMP reliable disaggregated data is required that can be used to assess the status of the stock and interpret fisheries production data, perform and develop a framework for managing marine resources. As the tourism and fisheries sectors are part of the National accounts of Pakistan, some reliable data is provided by the “Finance Division” and the “Ministry of Commerce and Textile Industry of the Government of Pakistan” for the two sectors.

⁴⁷ In this study *t* refers to **FY 2023**

⁴⁸ In the System of National Accounts (SNA), "bottom-up" refers to any aggregate estimated by first calculating the value added of individual industries or sectors, and then summing these values to obtain the total.

⁴⁹ **Current market price** refers to the prevailing prices at which transaction related to goods and services carried out.

For the Tourism industry, the National Statistical Office (NSO)⁵⁰ and Trade Development Authority Pakistan (TDAP)⁵¹ provide estimates of the activities which rely on the ocean, based on participation rates. For tourism, NSO data is utilised based on the share of marine tourism in the tourism industry. This method eludes the time-consuming task of accessing monthly and annual business administrative reports for finding the production activities' related data that is considered to be marine tourism-related⁵².

A sub-sector of agriculture which plays the most significant role in both the national and marine economy is Fisheries. This sector also fulfils the food security of the population by reducing and moderating the demand for poultry, beef, and mutton⁵³. NSO provides fisheries-related statistics, inter alia, species-wise fish production (both marine and inland), growth, and export destinations both quantity and value-wise. For the Fishery sector, both NSO and Food and Agriculture Organisation (FAO)⁵⁴ data are utilized using a production approach^{55,56}

Pakistan National Shipping Corporation (PNSC)

For Marine transportation (also known as seaborne trade) Pakistan National Shipping Corporation (PNSC) names this sector as firms and businesses that are engaged in the transportation of goods and passengers (e.g., cargo), and also services such as ship selling, piloting, harbour, and port operation (other services such as ancillary services are included as well). In its annual yearbook, PNSC

MT KARACHI disposed by PNSC for PKR 5011 million in FY 2023



⁵⁰ PES (2023). https://www.finance.gov.pk/survey/chapters_23/Economic_Survey_2022_23.pdf

⁵¹ TDAP (2022). https://tdap.gov.pk/wp-content/uploads/2022/04/Updated_Research-Report-on-Tourism-converted.pdf

⁵² In addition, due to secrecy issues, revenue data may not always be accessible to the researchers, and these data may have to be obtained by conducting primary surveys. Moreover, the data pertaining to the number of tourism firms providing tourism activities also not available. So for this industry the share of marine tourism is estimated based on the disaggregated data marine tourism data based on PES and TDAP.

⁵³ Ibid.

⁵⁴ FAO (2023). <https://www.fao.org/countryprofiles/index/en/?iso3=PAK>

⁵⁵ Recreational fisheries, refer to fishing for pleasure rather than selling the fish for profit.

⁵⁶ For Fishery details WWF (2015). For Tourism Details see TDAP

disaggregate its total production and operations into the following three broader categories: 1) Dry Cargo 2) Liquid Cargo 3) Other services to private businesses.

Shipbreaking

Unfortunately, for the shipbreaking industry contribution to GMP, the Pakistan Shipbreaking Association (PSBA) does not publish any data. State Bank of Pakistan and NGO shipbreaking provide data on the number of ships that arrived at the Gaddani shipbreaking yard. The best approach to capturing the economic contribution of this sector is to estimate the total tonnage produced times its per tonnage monetary values⁵⁷. Fortunately, PNSC provides the monetary values and tonnage associated with the ships Disposed or Broken. On the other hand, NGO ship breaking⁵⁸ provides disaggregated data of thousands of tons of multiple ships broken⁵⁹.

Another complicated task is to estimate the support the shipbreaking industry provided to the national exchequer in the form of customs duties, infrastructure cess, tonnage fee, sales tax, income tax etc⁶⁰. In Pakistan, multiple provincial and Federal ministries act to get these financial resources for multiple ship breakers with varying taxes and duties (due to multiple incentives or exemptions provided to different segments of the economy). Here, second to the best approach is chosen; to estimate the ratio of average tax revenue generated by the shipbreaking industry annually based on the literature⁶¹.

Mangroves

A significant challenge in the GMP estimation is the estimation of the value of indicators which poses both marketed and non-marketed values or for which the market is not available in Pakistan. Mangroves are an example of such ecosystems. Nonetheless, alternative methods can

⁵⁷ For countries where such data is not available, a second to best approach is to find a similar industry with similar socioeconomic characteristics and find the economic contribution of ships and vassals. Then find it for Pakistan ships industry.

⁵⁸ NGOSB (2023). <https://shipbreakingplatform.org/annual-lists/>

⁵⁹ NGO Shipbreaking is preferred over SBP data because the NGO data is consistent with SBP. However, SBP is an entity which more concerned with the monetary transaction associated with the industry. However, the NGO provides data pertaining to IMO Number, Name, Type, Gross Tonnage, Light Displacement Tonnage, Built, Flag, Change Of Flag For Breaking, Beneficial Owner, Bo, Country, Commercial Operator, Registered Owner, Ro Country, Place, Country Arrival.

⁶⁰ Cess is a custom duty levied on the value of a good entering a geographical region. Tonnage fees, income and sales tax are also types of levies imposed. See: <https://www.brecorder.com/news/4665940>

⁶¹ Based on the insights provided by the Pakistan shipbreaking association Head Deewan

be utilised to assess the economic value of such ecosystems. For such estimation, mainly there are two methods available in the literature⁶²:

1) Insights from existing studies that provide for similar ecosystems or regions where valuation has been conducted to estimate the value of mangrove ecosystems. This approach involves transferring economic values from one location to another based on similarities in ecosystem characteristics, services provided, and socio-economic factors.

2) Primary Surveys such as long-term monitoring and research investment to collect data on the ecological and socio-economic benefits of mangrove ecosystems. This includes field surveys, remote sensing, and socio-economic studies to quantify ecosystem services and their value accurately over time.

Based on Dehlavi (2012) and Salman (2021), this study follows the former approach for the estimation of mangrove ecosystems' total economic values⁶³. Details of all indicators used in the framework are provided hereunder:

Table 1: Summary of Indicators

| SECTOR/SUB-SECTOR⁶⁴ | Indicator | Data Source⁶⁵ |
|---------------------------------------|------------------------------------|---------------------------------|
| Agriculture | | |
| Fishing | Share in Output | PES |
| Mangroves | Total Economic Benefits | Salman (2020) |
| Industry | | |
| PSBA | Total Production | NGO Shipbreaking |
| PSBA (Taxes Paid) | Share in Revenue | NGO Shipbreaking |
| Services | | |
| PNSC | Total Profit Before Tax | Annual Book PNSC |
| PNSC (Tax Paid) | Taxation | Annual Book PNSC |
| Tourism | Share in Tourism Services Produced | PES, TDAP |

Results and Discussion

Based on Equation (1) and Equation (2) the gross marine product (GMP) of Pakistan at current market prices is provided in Table 2. In FY 2023 the GMP of Pakistan has a combined value

⁶² Another subjective approach can be, to engage experts in the field of ecology, economics, and environmental science to provide informed judgments or estimates of the economic value of mangrove ecosystems based on their knowledge and expertise. This approach can be utilized when data are scarce or unavailable.

⁶³ However, Aneel (2020)'s study is carried out for the FY 2020. Extrapolations are made based on the available statistics pertaining to the year Fiscal Year 2023; the figures are adjusted for inflation and discounted with appropriate rate of returns.

⁶⁴ Based on "Shah (2023), Federal Bureau of Statistics also known as National Statistical Office, the Pakistan Standard Industrial Classification (PSIC) and CPC (Central Product Classification) (Revision 4 of PSIC (2010) is used to describe activities/industries while version 2 of the CPC provided by the United Nations in 2015 is used to outline services in the GMP)".

⁶⁵ **PES:** Pakistan Economic Survey. **PNSC:** Pakistan National Shipping Corporation.

of PKR 287679 million (US\$1027 million) accounting for 0.34% of Pakistan’s overall Gross Domestic Product (GDP)⁶⁶. Pakistan’s major marine sector is Fisheries, with 41% and 34% shares in the in for of Marine Fisheries and mangrove ecosystems, respectively. While the industry and services sectors are the next largest contributors with marine tourism (0.003%), shipbreaking industry (14%), and marine transportation (11%).

| Table 2: Gross Marine Product Pakistan at current prices (FY 2023)⁶⁷ | | |
|--|-------------------------------|-------------------------------------|
| Components | Value (in PKR million) | Sources |
| Mangroves | 98539 | PES 2023 |
| Marine Fish | 118144 | NGO Ship Breaking Platform |
| PSBA Revenue | 32600 | PNSC Annual Report 2023 |
| Revenue from Tax (PSBA) | 6520 | PNSC Annual Report 2023 |
| PNSC Revenue | 29994 | NGO Ship Breaking Platform |
| Revenue from Tax (PNSC) | 1882 | Author's own based on Salman (2020) |
| Maritime Tourism | 1 | TDAP, PES 2023 |
| GMP Pakistan | <u>287679</u> | Aneel Salman & Muneeb Shah (2023) |
| GMP of Pakistan (in US\$) | 1027 | Average exchange rate FY (2023) |
| <i>Source: Author's calculation based on Table 1</i> | | |

A closer look at the GMP (see Figure 1) reveals that the contribution of living sectors is greater than that of the non-living sectors, comprising 85% of the GMP. Marine fisheries⁶⁸ contribute the largest to the GMP in the form of food security in the country while reducing pressure on demand for mutton, beef, and poultry. During FY2023, total fish production remained at 475 thousand MT (151 thousand MT exported) while 324MT for the domestic production. However, this amount is far lower than the actual production of Pakistan showing an overall decrease in fish production due to unhealthy fish-catching practices.

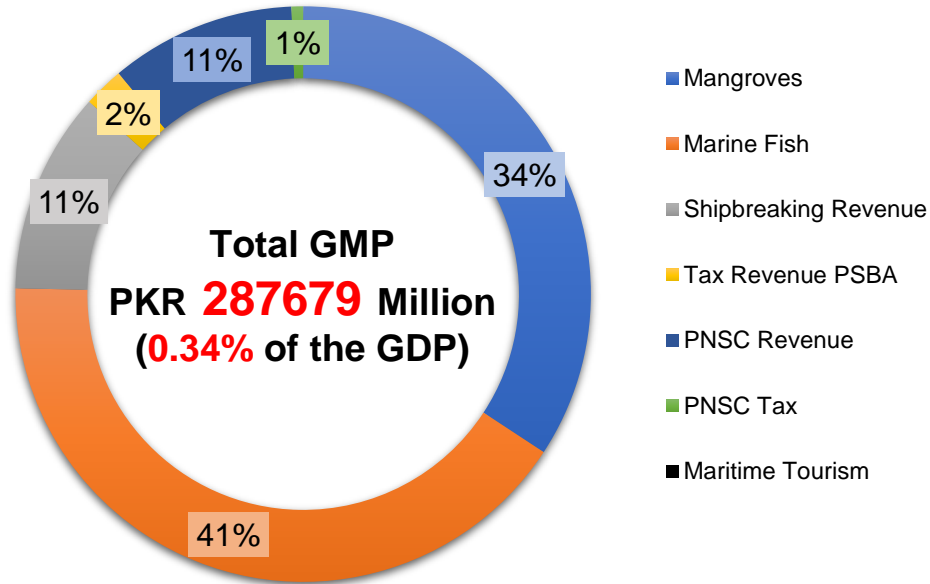
⁶⁶ Ibid.

⁶⁷ The GMP is estimated at current market prices, using production approach. The FY2023’s average exchange rate PKR/US\$, used here is 280. based on <https://www.exchange-rates.org/exchange-rate-history/usd-pkr-2023>

⁶⁸ Pakistan’s major fish buyers are Thailand, Sri Lanka, Malaysia, Middle East, China, and Japan.

Figure 1: GMP Sectoral Break-up⁶⁹

Gross Marine Product of Pakistan (FY 2023)



Mangrove Ecosystems come second after Marine Fisheries with an overall contribution of PKR 98539 million (% of GMP). There are 9 mangrove sites in Pakistan with a total area of 146,359 hectares. Mangrove ecosystems not only provide tangible benefits such as timber production and coastal protection from floods but also provide intangible benefits such as biodiversity conservation, carbon sequestration, shoreline stabilization etc.

Investing more in Pakistan’s marine ecosystems will not only help in food security but also help in tackling the climate change and health security problems of Pakistan.

| Total Economic Value (TEV) Mangroves Ecosystem in Pakistan (FY 2023) | | |
|--|----------------------|-------------------|
| TEV per hectare | Mangroves’ Area (ha) | TEV ⁷⁰ |
| 673268.74 | 146359.00 | 98539.94 |
| Source: Author’s, Based on Dehlavi (2012) Salman (2021) ⁷¹ | | |

Despite being one of the most vulnerable sectors of the economy, the shipbreaking industry provides significant support to the national exchequer with a revenue and tax collection worth PKR 32600 million and PKR 6520 million respectively, having a production of Gross Tonnage (GT) of 567853 MT of steel. Despite a stark decline in ship arrivals due to economic instability (at the Gaddani Shipbreaking yard only 6 ships arrived in 2023 (Jan-June), however in FY 2010, 107 ships arrived when the

⁶⁹ BoP & SDPI (2022). https://www.bop.com.pk/Documents/Resource_Center/Blue.pdf

⁷⁰ *Inflation adjusted and discounted value at 16% & 10% inflation and discount rates respectively.

⁷¹ Ibid.

industry was operating at its normal), the industry continues to play a significant role in Pakistan's economic landscape⁷².

Custom duties, infrastructure cess, tonnage fees, sales taxes, and income taxes are among the various charges/duties imposed on the shipbreaking industry. Previously, only Pakistan and Taiwan were engaged in ship-breaking activities in the region. However, Indian and Bangladeshi businesses visited Pakistan to learn about this industry. Now, the industry not only faces competition from these countries but is also affected by severe regulations and an unfriendly business environment within the country.

Gaddani is the sole shipbreaking industry in Pakistan and the only industry in Balochistan with a capacity of 2 million tons under normal conditions. It directly employs 20,000 workers and indirectly creates around 0.1 million job opportunities⁷³. The industry provides both direct and indirect benefits to the economy in the form of employment, recycling, steel and vice versa. From the world's top ship-breaking yard industry to just 6 ships in 2023, it is now abundantly clear that a much faster, deeper, and more ambitious response is required to uplift this industry. Fiscal Year 2023, was financially a sound year for PNSC (in nominal terms)^{74,75}. It has achieved the highest ever profit after tax by providing services amounted to PKR. 30 Bn, with an increase of 431% as compared to last year's profit after tax; PKR 6 Tr. However, PNSC is operating below its potential. Nonetheless, in nominal terms, there is an increase however, there was a 22% decline in terms of gross tonnage; in 2022 (106.8 MT) and 2023 (82.95 MT).

The Pakistan National Shipping Corporation (PNSC) offers employment opportunities, recycling activities, and transportation services while contributing to the overall economic resilience of the country. PNSC gave significant support to the national exchequer in the form of PKR 29994 million worth of transportation services and PKR 1882 million worth of tax paid in FY 2023. Like the shipbreaking industry, PNSC is also affected by economic instability. It has lifted total cargo of 10.83 million tons however in FY 2022 it had lifted 11.97 million tons (11% decrease).

Over the years, concerns have been raised over the “uplifting of PNSC and Shipbreaking industry” as their operations are related to import and export which require dollar-related transactions. However, in reality, both of these industries reduce pressure on the balance of payment accounts in Pakistan. The PNSC support the BoP account as it transfers payments to

⁷² BR (2023). <https://www.brecorder.com/news/4665940> Bhatti (2020). <https://www.brecorder.com/news/597451>

⁷³ Ibid (2021)

⁷⁴ Value at current market price, not quantity. It includes the inflation factor as well.

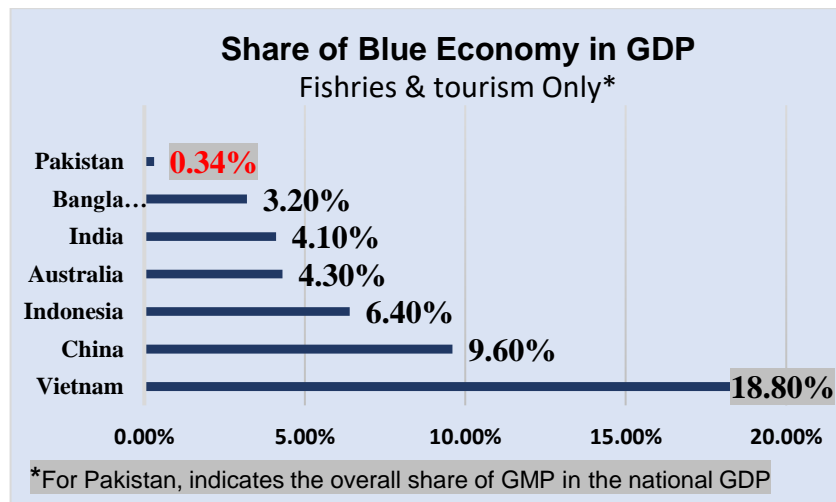
⁷⁵ PNSC (2023). https://pnscc.com.pk/financials/PNSC_AR_2023_REUPLOADED.pdf?t=1709152367489

Pakistani Businesses in Pakistani currency from its revenues. The Shipbreaking industry provides input to the economy in the form of steel when the local steel industry needs its input supply (steel), in the absence of the shipbreaking industry otherwise, steel has to be imported increasing the pressure on the BP account.⁷⁶

As stated, Pakistan has a vast coastline which spans more than 32,000 km. However, the share of Maritime Tourism in the GMP is a meagre 0.0003% (PKR 1 million). This meagre share ranks Pakistan comparatively far below as compared to the other regional countries⁷⁷ in attracting international tourists. Lack of connectivity, tourist infrastructure and weak security environment have all led to such an underdeveloped tourist industry. According to a local news agency⁷⁸, Pakistan has considerable potential to grow revenue from marine tourism (US\$ 5 bn can be generated annually from developing coastal tourism infrastructure).

The total value of GMP is aligned with the available studies according to the sector and indicator being compared. However, the total share of GMP is far below the regional and global average which highlights the importance of

Figure 2: Regional Comparison⁷⁹



maintaining healthy oceans. Given future projected climate change, life “below the water” can become more vulnerable and can result in more challenging economic conditions for Pakistan.

Data and Other Factors Influence Results

The framework outlined here is designed to simplify the process of conducting marine economic assessments, enabling its broader application by individuals across different scales, sectors, and geographical regions. Its accessibility to a wider audience makes it invaluable for guiding decisions regarding the use and protection of marine resources. The emphasis on

⁷⁶ Insights are based on an interview with PNSC officials.

⁷⁷ Thailand, Sri Lanka, and Malaysia earn 18%, 6%, 0.4% of GDP through coastal tourism.

https://www.bop.com.pk/Documents/Resource_Center/Blue.pdf

⁷⁸ <https://dailytimes.com.pk/662925/pakistan-has-4-5bn-coastal-tourism-potential-experts/>

⁷⁹ Ibid. https://www.bop.com.pk/Documents/Resource_Center/Blue.pdf

practicality allows for quick “back-of-the-envelope” calculations, providing a directional guide for informed decision-making in marine resource management. Moreover, this streamlined approach is particularly advantageous when dealing with complex sectors (like tourism) and coastal ecosystems (mangroves), where detailed breakdowns and allocations of spending across various economic sectors (e.g., enjoyment, happiness, accommodation, transportation) can be time-consuming and laborious.

Furthermore, this approach accounted only for benefits that accrue to sectors that provide services for activities that are closest to the ocean (see Table 1). Additionally, supporting service sectors (like shipbreaking) were deemed to be captured by multiple sources which shows the need to form a comprehensive data set for the marine economy to minimise the time required for the data collection and can provide more rigorous estimates⁸⁰.

Recommendations

The collection and compilation of socio-economic data for ocean-related sectors is an important element of the information system required for promoting a more sustainable approach to marine policy. Globally, work has also been done in establishing the value of both the market and non-market services from marine ecosystems. However, as mentioned, this has not generally been the case in Pakistan. If Pakistan aims to underpin the significance of the marine economy, significant investment is required, both on provincial and national levels. The following considerations can be taken into account in such initiatives:

- Within the national accounts, there are two accounts in the fisheries sector; marine fisheries and inland fisheries. Similar accounts should be introduced within the rest of the marine-related national accounts (e.g., marine tourism).
- Sea trade benefits countries by transporting large volumes of goods cost-effectively as compared to land trade. Focusing, on the seaborne trade element of the marine economy will help in multiple socio-economic problems particularly in environment protection and energy conservation, balance of payment, inflation, etc.
- Significant socio-economic challenges are faced by the PNSC and the Shipbreaking industry. Due to the unfriendly business environment (higher duties, economic and political instability), shipping industry-related businesses are shifting to Bangladesh and India. Ease of doing business should be ensured through a healthy business environment with business-

⁸⁰ Having more datasets provided by the NSO can enable the option to incorporate multiple datasets in the framework and for further use in integrated analysis or scenario modelling and assessment for policy related endeavours/analysis.

friendly regulations, Special Economic Zones (while ensuring daily operations), access to financing and letter of credit issues etc.

- Pakistan's global greenhouse gas (GHG) emissions are 0.9%. But it is among the countries most vulnerable to climate change. Implementing strategies within the Gross Marine Product (GMP) framework on total carbon capture and emissions, Pakistan will not only benefit domestically but can strengthen its case on the global stage.
- Collaboration between government agencies, research institutions, and other stakeholders will be essential in enhancing data availability and quality, thereby enabling more robust analyses and informed policy interventions.
- Based on the GMP, targeted data-driven policies should be designed to support the development of the marine economy, ensuring their continued contribution to the socio-economic progress of Pakistan's economy.
- The government may need to increase the marine economy budget to enhance the local and domestic marine business.

Conclusion

This paper presents a comprehensive blue accounting framework for estimating the Gross Marine Product (GMP) of Pakistan, thereby addressing the critical need to assess the economic value of oceanic resources. The state of the marine economy of Pakistan provided here has highlighted this intricate relationship between economic growth and the marine economy, revealing that fluctuations in one significantly impact the other. The national economy operates as an interconnected web, with each sector playing a crucial role. A robust national maritime policy with a string blue accounting framework emerges as a vital instrument for steering the economy towards sustainable growth and development. Moreover, the above policy considerations should be taken into account in the upcoming Marine Policy of Pakistan.

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