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Valuing and Managing the Philippines' Marine Resources toward a Prosperous Ocean-Based Blue Economy

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Abstract

The ocean-based "blue economy" is a significant part of the Philippine economy that has largely been taken for granted despite its enormous potential. It is of critical importance to a substantial segment of our population dependent on the seas and coastal resources for their livelihood and sustenance, appreciably enlarge the country's wealth, and significantly contribute to its gross domestic product. This paper attempts to review the major issues concerning marine ecosystems in relation to the country's pursuit of the blue economy. It discusses the economic and social activities in relation to the seas and coastal areas, and provides updated estimates of the real value of the country's marine ecosystems' goods and services. Based on primary and available secondary data, the marine ecosystems (excluding the continental shelf) can contribute a conservative monetary value of US$ 966.6 billion to the economy. In light of the risks and threats to the blue economy, the paper further discusses the country's current national initiatives and involvement in regional collaborations toward ensuring its health and sustainable development. Given the Philippines' vast largely untapped potential, a recommendation for the creation of a Department of Marine Resources, separate from the Department of Agriculture, seems in order.

Keywords: blue economy, marine economy, marine resources, marine ecosystems, valuation, sustainable development, Philippines

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Introduction

"Blue economy" is defined as, according to the Changwon Declaration (2012), "a practical ocean-based economic model using green infrastructure and technologies, innovative financing mechanisms, and proactive institutional arrangements for meeting the twin goals of protecting our oceans and coasts and enhancing its potential contribution to sustainable development, including improving human well-being, and reducing environmental risks and ecological scarcities." The goal is to harness marine resources to advance human well-being and long-term national progress. The approach to tapping these resources must be judicious and sustainable so that the benefits can be shared equitably among the current and succeeding generations (APEC 2012). This approach should help promote resilient communities for a better future, including a rebalancing of emphasis from grains to fish to ensure food security and healthful diets.

The Philippines has a total coastline of 37,008 km—longer than the coastlines of China (14,500 km), United States (19,924 km), and Japan (29,751 km). The total coastal population of the country is estimated at 55.3 million or 60 percent of its total population (Philippine CTI NCC 2012), covering more than half of the municipalities and cities (Virola et al. 2009). With such a span encompassing fisheries, tourism, trade, energy, and other economic activities, it can be argued that the blue economy's potential could be tapped toward helping achieve the country's sustainable growth and inclusive development.

Over several decades, however, the Philippines seems to have been single-minded in using its traditional natural resources, such as land and forestry while exploiting the ocean and marine resources, in ways that adversely impact the environment. It is time the country carefully reviewed its methods of tapping its resources, including giving greater attention to the blue economy that has considerable potential for improving the lives of today's and tomorrow's Filipinos.

This paper discusses the importance of the Philippines' ocean-based blue economy and outlines the potential contributions of the marine sector to the country's inclusive development. Earlier economic valuations of the marine ecosystem have been done mostly in specific localities (White and Arquiza 1999; Samonte-Tan and Armedilla 2004; Samonte-Tan et al. 2007; Virola et al. 2009; Cruz-Trinidad et al. 2011). This represents the first attempt at valuating the country's total coastal and marine ecosystems. An overview of the coastal and marine ecosystems, fisheries sector, and associated economic activities is first provided. Estimated valuations of the ocean-based blue economy, major risks and threats to sustainability, and current national initiatives and involvements in regional collaborations are presented.

The Coastal and Marine Ecosystems

The Philippine archipelago comprises around 7,107 islands and is endowed with resources in various coastal, marine and inland waters, considered as some of the most productive and diverse habitats in the world (Juinio-Meñez and Toribio 2010). These habitats are found in coastal areas including brackish water ponds, nipa and mangrove swamps, estuaries and estuarine rivers, sandy beaches, seagrass beds, algal flats, coral reefs, and other soft bottom habitats. The archipelago's entire territorial waters is part of the Coral Triangle (CT) region that has one of the highest diversity of corals, fish, and other reef species (Roberts et al. 2002; Carpenter and Springer 2005; Burke et al. 2011). The country's roughly 26,000 km^2 of coral reef area is reckoned as the second largest in the Southeast Asia after Indonesia's (table 1) and the global center of marine biodiversity (Roberts et al. 2002; Carpenter and Springer 2005). It harbors about 500 species of stony corals, including twelve endemic species (Tacio 2012), and around 3,053 fish species of which 2,724 are marine species (Philippine CTI NCC 2012).

Table 1. Physical attributes and extent of coastal and sea areas

Attributes (km^2)	Indonesia	Malaysia	Papua New Guinea	Philippines	Solomon Islands	Timor-Leste
Total sea area	5,800,000	614,159	3,120,000	2,000,000	1,340,000	...
Total coastline	108,800	4,809	17,110	37,008	4,000	706
Total coral reef area	51,000	3,600	13,840	26,000	3,591	146
Total mangrove area	35,337	5,750	4,265	2,472*	650	18
Total seagrass area	30,000	...	...	978	100	22

*Estimate as of 2005; data not available

Source: Country State of the Coral Triangle reports as cited in ADB (2014).

Additionally, the Philippines together with other countries in the Coral Triangle region host some of the most extensive and diverse areas of mangroves and seagrass beds. Estimated at around 247,362 ha (2003), the total mangrove forest area is approximately 3.45 percent of the total forest cover in the country (Philippine Forestry Statistics 2011). Only Indonesia, Malaysia, Australia, and Papua New Guinea have more mangrove species than the Philippines (respectively, at 43, 41, 37, and 37 species) (Long and Giri 2011). On the other hand, the total area of seagrass beds is estimated to be 978 km^2, and sixteen seagrass species out of the twenty seagrass species in East Asia are found in the Philippines

(Fortes 1995). Moreover, the country's more than 800 recorded seaweed species are considered highly diversified among the flora in the Asia-Pacific region (Trono 1999). The coral reef ecosystem connections are important since both mangroves and seagrass beds are known to serve as the nursery ground to a number of juvenile reef fish (Honda et al. 2013).

The Fisheries Sector

The country has rich pelagic fisheries, including small pelagics and tuna, making it one of the top tuna producing countries in the world (Lu 2012). The total value of Philippine fishery exports in 2011 amounted to more than PHP 37.5B, with tuna (PHP 12.7B) and seaweed products (PHP 9.14B) accounting for more than half of the total fishery export value (BFAR 2011; see figure 1). Among the top destination countries of the country's fishery exports (quantity-wise) are the United States, Japan, Hong Kong, Canada, and China. Aggregate fishery exports to these countries amount to PHP 18.73B or about 50 percent of the total fishery export value (BFAR 2011). The Philippine fisheries sector's gross value added (GVA) in 2011 and 2012 amounted, respectively, to PHP 183.1B and PHP 193.2B (at current prices), representing approximately 1.89 percent and 1.83 percent of gross domestic product (GDP) (NSCB 2013).

The Philippines is regarded as one of the top producers of seaweeds in the world. Seaweeds are exported either in raw (fresh or dried seaweeds) or processed forms (semi-refined chips/carrageenan and refined carrageenan) (Ask and Azanza 2002). Seaweeds contributed 13.34 percent to total fisheries production and 68.9 percent to total aquaculture fisheries production in 2012. Seaweed production has been a major source of livelihood for hundreds of coastal families in the Visayas and Mindanao over the past two decades. Dried *Kappaphycus* and *Eucheuma* species are the country's top seaweed exports (BFAR 2010). In 2012 the fisheries sector made up for 1.43M jobs, constituting 3.8 percent of the total labor force (BLES 2013). Notably, poverty incidence among fisher folks is high relative to other basic sectors at 39.2 percent in 2012 (NSCB 2014). Regions with fisher folk poverty rates higher than 40 percent are all in the Visayas, Mindanao, and the Bicol region. While many of them would engage in other jobs (e.g., farming, carpentry, and government) during the lean season or when such opportunities arise, the additional income from these activities (amounting from US$ 1.25 to 10 per day) remains grossly insufficient to lift their households above the poverty threshold.

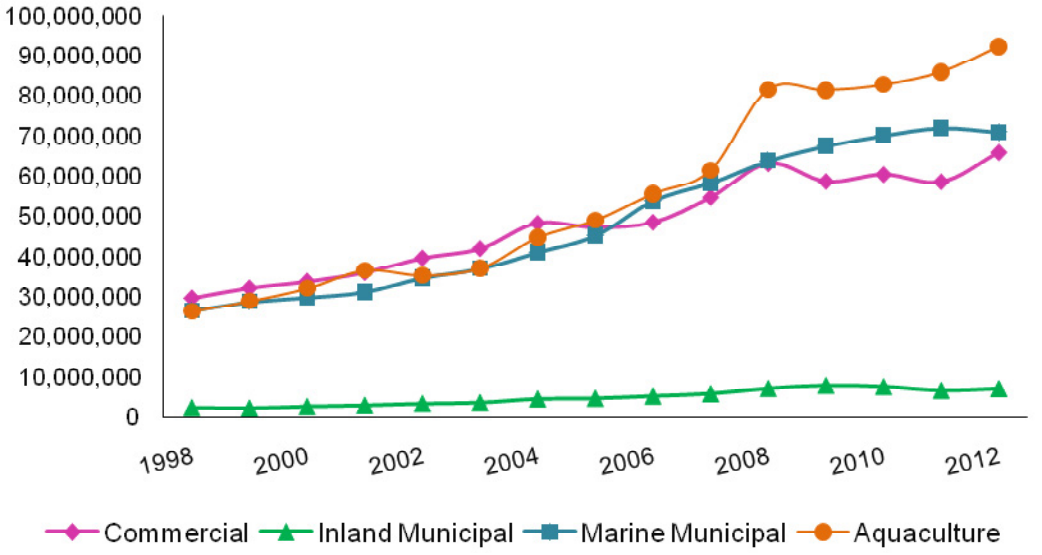

Figure 1. Value of fisheries production at current prices (PHP thousands)

Source: Bureau of Agricultural Statistics, BFAR (2010) and BFAR (2011)

The Maritime Sector and Related Industries

The importance of the seas extends to maritime trade. It is estimated that all seaborne trade accounts for 75 percent of the total world trade volume (Mandryk 2009). Among the top 50 ports, Manila is ranked 36th and has seen more than 24 percent increase in container traffic between 2008 and 2012 from 2.978M twenty-foot equivalent unit (TEU) to 3.705 TEU (IAPH 2012). In addition, domestic trade via shipping in 2012 accounted for virtually all of both domestic trade volume (99.8 percent or 21.532M MT of 21.568M MT) and domestic trade value (99.6 percent or PHP 575.923B of PHP 578.206B) (NSO 2012).

The estimated total contribution of the maritime sector, including the fishing industry, was valued at PHP 210.39B in 2009 (table 2). This accounts for 2.6 percent of the country's GDP—higher than the GVA of the mining and quarrying sector, which was PHP 106.40B (1.33 percent of GDP) during the same period (BSP 2013). Moreover, about 1.53 million persons were employed in the maritime sector (4.35 percent of total employed labor force) in 2009. This is higher than the total employed in mining and quarrying; and electricity, gas, and water supply sectors which employed less than 1.0 percent of total employment, as well as in the financial intermediation sector where workers represented only 1.05 percent of

the total workforce in 2009 (BLES 2012). The numbers above, however, probably underestimate the true contribution of the maritime sector to the blue economy of the Philippines. The study of Virola et al. (2010) includes only the harvesting of mangroves (forestry sector), construction of piers, wharves, dredging, and beach reconstruction (construction sector), passenger travel and vehicle (ship) insurance, among others, and excludes other industries due to lack of more disaggregated data.

Table 2. Preliminary estimates of maritime sector's contribution to economy, 2012

Sector	Value added (PhP millions)	Total employed
Fishing	170,330.000	1,461,000
Manufacturing	14,069.162	34,328
Processing and preserving of fish and fish products and other seafoods	6,359.367	27,938
Building and repairing of ships and boats	7,709.795	6,390
Transport, Storage, and Communication	25,991.136	30,384
Ocean passenger transport	4,302.751	1,248
Ocean freight transport		
Interisland water passenger transport	5,100.088	8,388
Interisland water freight transport	4,627.895	4,630
Supporting and auxiliary activities to water transport	11,960.402	16,118
Total	210,390.298	1,525,712
Gross Domestic Product	8,026,143	
Total Employed Labor Force		35,061,000
Percent of GDP/ Percent of Labor Force	2.62	4.35

Source: NSCB (2013), NSCB (2014), NSO (2010), NSO (2012), and Bureau of Labor Employment and Statistics (2012)

The Marine Eco-Tourism Status and Potential

The country's travel and tourism industry is estimated to have directly contributed PHP 472.3B in 2013, increasing by 12.9 percent to PHP 533.0B (4.2 percent of GDP) in 2014. This industry encompasses economic activities associated with hotels, travel agents, airlines, and other transport services (excluding commuter services), restaurants, and leisure enterprises. Its aggregate contribution (including multiplier effects from investment, supply chains, and consumption) would likely be PHP 1.41T (11.2 percent of GDP) in 2014, up 9.3 percent from PHP 1.29T in 2013 (World Travel and Tourism Council 2015).

The marked increase in coastal and marine tourism in recent years is supported by the growing number of visitors in Boracay Island—foreign tourists (from 76,475 in 2001 to 278,531 in 2010) and both domestic and overseas Filipino (OF) visitors (from 188,332 in 2001 to 501,135 in 2010). The total receipts from tourism activities in Boracay have also steadily increased over the ten-year period, from PHP 4.87B in 2001 to PHP 14.33B in 2010 (figure 2).

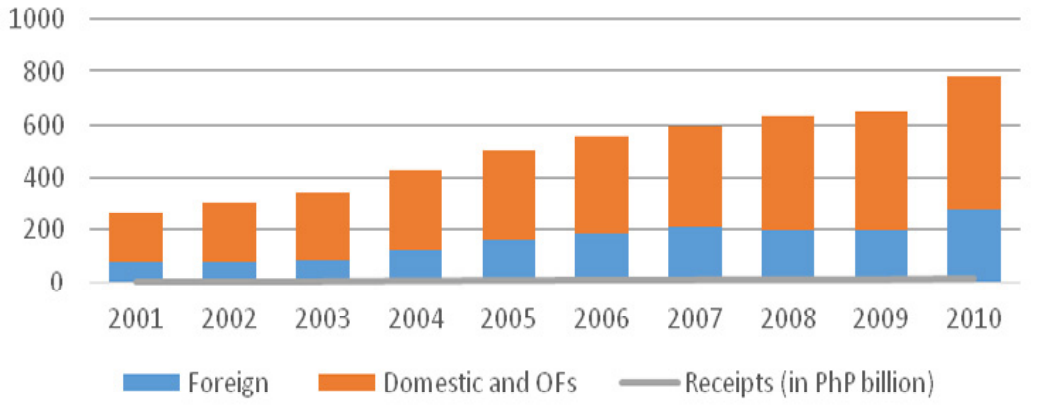

Figure 2. Visitor arrivals in Boracay (thousands) and tourism receipts (PHP billions).

Note: Left scale for visitor arrivals; right scale for tourism receipts. OFs stands for overseas Filipinos.
Source: Department of Tourism, as cited in NSCB Region 6 (2011).

Other coastal attractions have also become known over the past several years, including: (a) Hundred Islands National Park in Pangasinan—visited by 183,000 tourists (around 11,000 of which were foreign tourists) in 2012, on average accounting for more than 70 percent of tourists who visit Pangasinan annually; (b) Puerto Galera in Mindoro—stimated to attract around two million tourists every year; and (c) El Nido in Palawan—that has seen a noticeable spike in the number of tourist arrivals over the past twenty years from around 10,000 in 1994 to 65,000 as of August 2014 (Ma. Guerrero 2012, 2013; Rappler.com 2014). There are many more coastal and marine tourist attractions in other parts of Luzon, not to mention several major ones in the Visayas and Mindanao.

In addition, protected areas have also been known as tourism sites under the jurisdiction of the Biodiversity Management Bureau. These include: (a) Puerto Princesa Subterranean River National Park—whose tourist arrivals in 2011 (125,042) were nearly five times the number of visitors in 2003 (25,495); and (b) Apo Island Protected Landscape/Seascape in Negros Oriental—a famous scuba

diving site that harbors one of the oldest marine reserves in the country, for which the number of visitors in 2011 (20,471) was more than 2.5 times that (7,760 visitors) in 2003 (figure 3). The development of the country's sustainable marine ecotourism is promising, given its proximity to the Northeast Asian market (Japan, South Korea, and China) that has been a steady source of tourists.

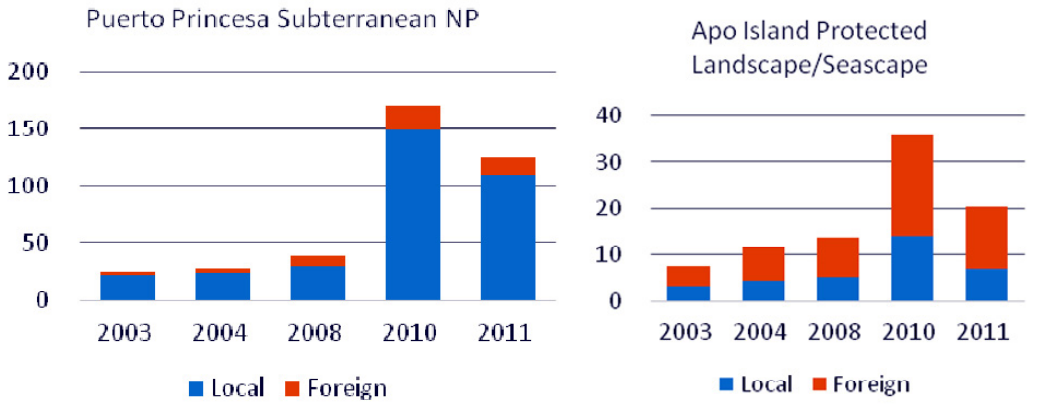

Figure 3. Visitor arrivals in Puerto Princesa Subterranean National Park and Apo Island (in thousands)

Source: DENR-PAWB (2003, 2004)

Methods of Estimating the Value of Coastal and Marine Ecosystems

Two methods are adopted to assess the benefits that can be derived from the Philippine marine ecosystems. The figures for fisheries and tourism are based on a survey conducted among marine ecosystem-dependent businesses and resource users in the area, taking into account differences in their operating costs.

Method 1 - Modification of Samonte-Tan et al. (2007) Valuation

This method uses the computed average net annual indirect benefits per hectare of coral reefs and applies them to the total coral reef, mangroves, and seagrass areas in the country as estimated based on the most recent "State of the Coral Triangle Report by the Philippines." The method, however, does not have estimates of indirect benefits associated with the coral reefs—i.e., total sea area is 2,000,000 km^2; total coastline - 37,000 km^2; coral reef - 26,000 km^2; seagrass - 978 km^2; and mangroves - 2,422 km^2. To supplement the method, earlier estimates by Samonte-Tan and Armedilla (2004) are used to compute for the

average net annual benefits per hectare of coral reefs associated with carbon sequestration and shoreline protection.

Method 2 - Modification of De Groot et al. (2012) Valuation

The other approach from De Groot et al. (2012) has estimates of average monetary value of different services associated with different ecosystem types of the world. This refers to the average of per hectare annual monetary values estimated by existing studies considered in De Groot et al. (2012) (table 3). The authors included only original case studies and standardized the monetary values using the purchasing power parity (PPP) method that takes into account differences in purchasing power of the US dollar across various countries. There is a significant variance vis-à-vis the estimated monetary values from the De Groot et al. studies (2012). As such, the estimation of total annual monetary value is done using median, minimum, and maximum per hectare monetary value estimates for each marine ecosystem.

Table 3. Summary of monetary value for services per biome of global costal ecosystems (in US$/ha/year, 2007 price levels)

Ecosystem services	Coral reefs	Coastal systems	Coastal wetlands
Provisioning services	55,724	2,396	2,998
Food	677	2,384	1,111
Water			1,217
Raw materials	21,528	12	358
Genetic resources	33,048		10
Medicinal resources			301
Ornamental resources	472		
Regulating services	171,478	25,847	171,515
Climate regulation	1,188	479	65
Disturbance moderation	16,991		5,351
Waste treatment	85		162,125
Erosion prevention	153,214	25,368	3,929
Nutrient cycling			45
Habitat services	16,210	375	17,138
Nursery service		194	10,648
Genetic diversity	16,210	180	6,490
Cultural services	108,837	300	2,193
Aesthetic information	11,390		
Recreation	96,302	256	2,193
Inspiration			
Spiritual experience		21	
Cognitive development	1,145	22	
Total economic value	352,249	28,917	193,845

Source: De Groot et al. (2012).

Valuation Results

The results of our estimates—based on figures from the early study of Samonte et al. (2007) coupled with indirect and other benefits—are shown in table 4. Estimated total annual net benefits amount to US$ 6.35B or PHP 285.75B (at US$ 1=PHP 45 exchange rate), with a sizable share accounted for by benefits from coral reefs. For mangroves, indirect use values, particularly those pertaining to nursery habitat and shoreline protection, make up more than 90 percent of the estimated total net annual benefits. For all marine ecosystem types, regulating services comprise an appreciable share of the average per hectare monetary value. Likewise, erosion prevention and waste treatment comprise a substantial proportion of average monetary values of regulating services for coral reefs and coastal systems and wetlands, respectively.

Table 4. Computed net annual benefits (in US$) from marine ecosystem components

Marine ecosystem components	Net annual benefits per ha (US$)	Total area (ha)	Net annual benefits
Coral reefs	2,347	2,600,000	6,102,141,278
Fisheries	1,184		
Tourism	827		
Research	50		
Carbon sequestration	18		
Shoreline protection	50		
Biodiversity	218		
Mangroves	973	247,200.00	240,451,507.54
Fisheries	13		
Mollusks/Echinoderms	26		
Nursery role	243		
Shoreline protection	672		
Biodiversity	19		
Seagrass	41	97,800.00	4,055,676.32
Fisheries	23		
Mollusks/Echinoderms	18		
Total			6,346,648,461.86

Note: The figures are drawn from previous site-specific studies, mostly from Samonte et al. (2007).

Our estimated total annual monetary value associated with each marine ecosystem component is shown in table 5. The estimated total monetary value of Philippine coral reefs, mangroves and seagrass amounts to US$ 966.594B or around PHP 15.269T.

Table 5. Estimated total monetary value of marine ecosystems (in US$ billion, 2007 prices)

Marine ecosystem	Total Monetary Value
Coral reefs	915.847
Seagrass	2.828
Mangroves	47.918
Continental shelf*	533.808
Total for coral reefs, mangroves and seagrass	966.594
Total (including continental shelf)	1,500.402

* Area of continental shelf = 184,600 km^2 (Padilla 2009); (using the average monetary value for each service per biome)

Since the estimated monetary values are expressed in US$, the appropriate exchange rate should be used to convert the values in local currency terms. In this case, the 2007 exchange rate of PHP 15.80=US$ 1 is used here and for the succeeding estimates in this section, which is larger than the country's 2007 nominal GDP of PHP 6.893T. Including the monetary value estimate for continental shelf, covering approximately an area of 184,600 km^2 (Padilla 2009), yields an estimated total monetary value of US$ 1.5T or PHP 23.701T in 2007 prices.

There is a high variability in the estimates of annual monetary values of coral reefs and mangroves, on one hand, and a low variability for seagrass and continental shelf, on the other (table 6). This can be attributed to a wider range of per hectare monetary values from the studies considered in the case of mangroves and other coastal wetlands (ranging from US$ 300 to 887,828 per ha per year) compared with seagrass, continental shelf and other coastal systems (ranging from US$ 26,167 to 42,063 per ha per year). While using the median and minimum values yield estimates that are lower than the one generated using the average monetary value, the values can still be considered substantial. In this case, total monetary value associated with coral reefs, seagrass, and mangroves using the minimum per hectare estimate of annual monetary value (for each marine ecosystem type) is estimated to be US$ 98.298B or PHP 1.553T (in 2007 prices), which is almost at par with the contribution of the manufacturing sector to the country's nominal GDP in 2007 (PHP 1.568T). When the estimated total monetary value for continental shelf is included, total monetary value estimate using the minimum values in this case jumps to US$ 581.341B or PHP 9.183T (in 2007 prices).

Table 6. Estimated total monetary value using the median, minimum, and maximum monetary value per annum for each marine biome (US$, 2007 prices)

Marine ecosystem	Median	Minimum	Maximum
Coral reefs	515.54	95.664	5,535.717
Seagrass	2.617	2.559	4.114
Mangroves	3.007	0.074	219.472
Continental shelf*	493.990	483.043	776.483
Total for coral reefs, mangroves and seagrass	520.163	98.298	5,759.302
Total	1,014.153	581.341	6,535.785

Note: Estimates may not add up due to rounding off of values per hectare. Median, minimum and maximum values for each coastal ecosystem obtained from De Groot et al. (2012).

Risks and Threats to Sustainable Coastal and Marine Ecosystems

Risks Induced by Human Activities

Unsustainable coastal development, excessive nutrient input and pollution, sedimentation, overfishing, and illegal, unreported, and unregulated (IUU) fishing have been the primary threats to the sustainability of marine ecosystem in Southeast Asia (Burke et al. 2011). Around 48 percent of all the coral reefs in the Southeast Asia are predicted to be facing high or very high risks due to combined local threats (figure 4). The State of the Coral Triangle report cited overfishing and the use of destructive fishing practices as the top two threats to Philippine coral reefs as of 2002 (Philippine CTI NCC 2012).

Coastal development has adverse impacts on marine ecosystems both directly (e.g., through dredging and land filling) and indirectly (through increased runoff of sediment, pollution, and sewage) (Philippine CTI NCC 2012). The removal of coastal vegetation (e.g., mangroves) can possibly damage nearby ecosystems where large quantities of sediments are washed into coastal waters. Sewage pollution is another issue of concern which could induce plankton blooms causing fish kills or toxicity to humans and other mammals (Azanza 2012). Among other concerns, sewage includes emission of toxic chemicals in aquaculture, agriculture, and industrial activities, as well as from households (Burke et al. 2011). In addition, Primavera and Esteban (2008) have cited various factors affecting the observed decline of mangrove cover in Philippines including mangrove conversion to fishponds, reclamation of mangroves for airports, piers and housing, and overexploitation and utilization of mangroves for firewood purposes (Melana et al. 2000).

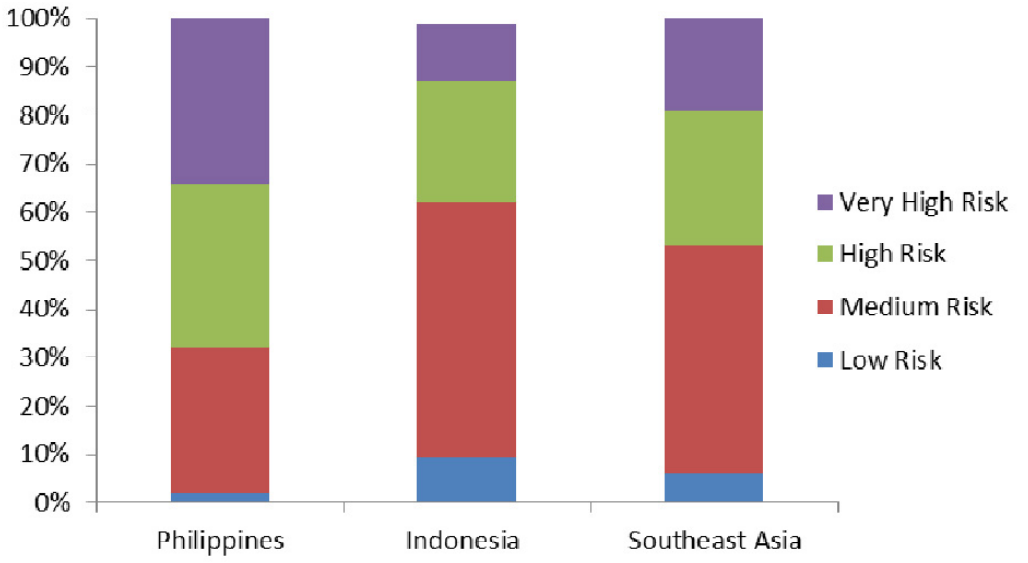

Figure 4. Proportion of coral reefs affected by local threats

Source: Burke et al. (2011)

Climate Change

Climate change, associated with ocean acidification, sea level rise, extreme weather conditions, and elevated sea surface temperature and anomaly can adversely affect the socioecological conditions of marine and coastal ecosystems. For example, it is projected that the proportion of coral reefs across the whole world that will be adversely affected by thermal stress will significantly increase in the coming years to 50 percent by the 2030s and 95 percent by the 2050s (Burke et al. 2011). This is in addition to the negative effect of warming on the marine biodiversity in the tropics (Burrows et al. 2011).

The Philippines, being tropical and highly exposed to typhoon pathways, has been projected to be one of the most vulnerable countries to climate change (Hughes et al. 2012; Burke et al. 2011; Cabral et al. 2013). Climate change is expected to exacerbate extreme events such as heavy rainfall during typhoons, as in the case of typhoon Ketsana which adversely affected Metro Manila and adjacent areas, and typhoons Chan-hom and Haiyan which brought about significant damage to infrastructure and livelihoods in the Visayas and Mindanao areas (Masigan 2013). The predicted highest increase in temperature will be during summer months (March, April, and May). In general, the southern part

of the Philippines will experience higher temperature increase than the northern part. Both in 2020 and 2050, a reduction in rainfall is projected from January to May and in September in most parts of the country. As a consequence, the dry season will be longer. Also a significant increase in rainfall during June, July, and August is likely in most parts of Luzon and Visayas (PAGASA 2011).

Discussion

Metrics to Capture Ocean-Based 'Blue Economy' Performance

Measuring the economic contribution of the maritime sector/marine ecosystems is still at its formative stage (Virola et al. 2009). Tracking the performance of the Philippines' maritime/marine sector or its ocean-based 'blue economy' should include ecological and human well-being indicators. Previous estimates showed significantly large non-market values of the Philippine coastal and marine ecosystems. Our study provides further support on the significant values of the Philippine marine resources that are often neglected in public policy. The undervaluation of natural capital is a major cause of ecosystem degradation and biodiversity loss. Non-use values must, therefore, also be considered in the sustainability of economic activities, especially those included in the accounting system. These are much harder to estimate than the normally collected economic performance metrics, yet this initial study represents a step in that direction. As the private and public sectors better appreciate the new metrics, data gathering can be made easier with the assistance of local governments and corporate social responsibility units.

The development of such metrics can allow policymakers to track trends over time on the relative importance of the different sectors in the marine economy, as well as determine the extent of the impact of natural calamities and other phenomena such as climate change and associated economic implications. Overall, this would enable the government to craft suitable and evidence-based policy initiatives and investments as regards the utilization and management of coastal and marine resources. With global trends regarding significant extraction of various natural resources (such as declines in ocean and coastal fish stocks and greater incidence of water shortages on tillable land), it is expected that the ocean sector will play a more prominent role in the coming years. Examples include wind and ocean energy and offshore aquaculture, among others (Kildow and McIlgorm 2010).

However, valuation methods of the marine economy here and elsewhere do not consider the sustainability of ocean activities (Dyck and Sumaila 2010; Virola

et al. 2009). For instance, measurement of economic activities in offshore oil and gas sector do not reflect the real price of depletion of non-renewable resources, while in the case of tourism, the above estimates do not consider the vulnerability of such resources to economic or natural shocks (Kildow and McIlgorm 2010). Furthermore, there are environmental risks associated with some of the economic activities included in the accounting of the economic contribution of oceans and seas. These include, for instance, oil spills that may occur as a result of maritime accidents or the use of detrimental methods of fisheries capture. Accordingly, there is a critical need for environmental accounting toward ensuring sustainable resource utilization (Kildow and McIlgorm 2010; Virola et al. 2009).

An important concept in quantifying the significance of the marine economy concerns estimating all the benefits that accrue from various coastal and marine resources and ecosystems. Analysts typically have adopted the Total Economic Valuation (TEV) framework (figure 5). This classifies the total economic value into: (a) use value (i.e., the benefit from utilizing the resource); (b) option value (the willingness to preserve the resource for future use or discovery, e.g., possible medicine for cancer); and (c) non-use value (the willingness to pay for the improvement and preservation of a resource regardless of whether or not it will be directly utilized) (Tietenberg and Lewis 2009).

Figure 5 illustrates further disaggregation of the benefits. Use value can be obtained from direct consumption of the services accruing from the resource (direct use value) and from benefits that feed into related economic activities (indirect use value). On the other hand, non-use value takes into account the bequest value which attaches importance to the direct use value accruing to succeeding generations, and the value obtained from sheer knowledge of the existence of a resource. Nonetheless, TEV has not been carried out for the marine ecosystem due to lack of earlier studies or the requisite data set.

In the Philippine context, the means for valuating natural resources should be agreed and should gain widespread acceptance. The UN Statistical Commission's System of Environmental and Economic Accounting (SEEA), which was approved in 2012, provides guidance on natural resources. To quote, "This is the accepted framework for integrating the ecosystems and environment in the national income accounts." The SEEA is intended to meet the needs of policymakers by providing indicators and descriptive statistics as well as serving as a tool for strategic planning and policy analysis to identify more sustainable development paths. Although this tool is generally on natural resource, the framework upon which this tool is based on can be used to account for the Philippine ocean blue economy.

Studies like ours provide guidance to policy makers but the main challenge is institutionalizing the valuation, i.e., a government agency or multi-agency initiative (in partnership with the academe) conducting resource valuation as part of development planning. The several aspects of ocean economy is vast and a multi-agency collaboration is necessary. Multi-agency collaboration in the country is strengthening but nonetheless still suffers from "turfing" issues and conflicting mandate which often derail efforts at collaboration.

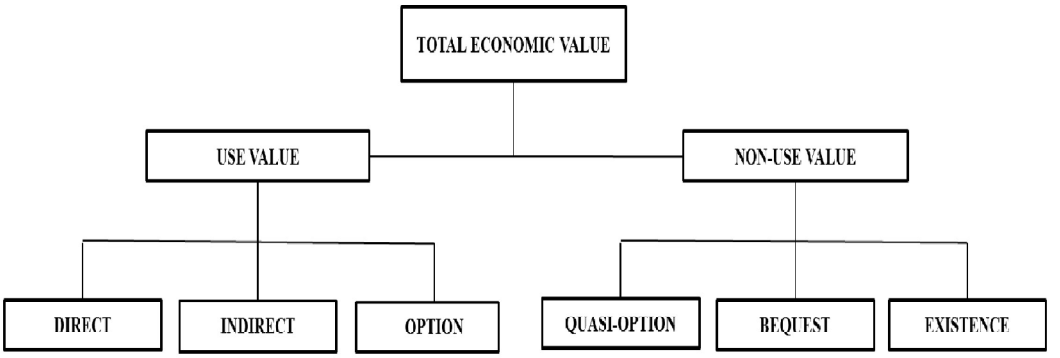

Figure 5. Total Economic Valuation framework

Source: UNEP (2003), as cited in Samonte-Tan and Armedilla (2004)

Systematizing Natural Capital and Environmental Management

A portion of the benefits from the marine economy should be reinvested to ensure resilient and sustainable resource base and ecosystem. This should supplement local government funds for proper fishery sector management. The fishery sector contributes some PHP 183B to the GDP (BFAR 2011). The sector's active contribution to resource management and sustainable use should be a prerequisite to the "right to fish." The conservation and management effort should extend beyond the fishers through the value chain down to the consumers. As recommended by Lam and Pauly (2010), "the ethical lacuna, between governments as trustees and citizens as owners of the fishery resources, can be filled with information, education, and communication inculcating responsibility that shares the societal costs and benefits of marine resource exploitation and conservation."

Capacity building through education afforded by the Conditional Cash Transfer (CCT), among other programs, should also be promoted along with

ecosystem stewardship, disaster risk reduction preparedness, and climate change mitigation. The ocean-based blue economy concerns should involve marginalized vulnerable sectors of fishers through diversifying livelihood opportunities that assist in sustainable use and social and ecological recovery. The government can partner with different stakeholders, such as academic institutions and environmental groups, to contribute to the conservation of coastal and marine resources on a larger scale.

Support for the government agencies in charge of monitoring and protecting marine resources, such as the Philippine Navy and Coast Guard, should be increased. The increased support can also be used for collaboration among the Coast Guard, Navy, marine-related agencies (BFAR and BMB), and the academe to develop a system for a more effective monitoring of the status of various coastal and marine ecosystems. This requires the establishment of several data-gathering stations across the country toward systematizing all monitoring and management efforts.

Promoting Trade Efficiencies and Equity and Promoting Sustainable Investments

Work toward free trade policies should continue (e.g., at the Asia Pacific Economic Cooperation or APEC level). At the national level, the condition of trade and trading facilities should be improved to enhance the value retention in coastal communities. Reduction of intermediary transactions through development of satellite trading centers enabling direct access can enhance the value retention at the local level, thereby promoting equitable distribution of benefits for coastal communities. The Philippines and the Coral Triangle countries (CT6), in general, are net exporters of fish and fisheries products (figures 6 and 7). The price differential between exports and imports is wide. Policies should ensure that this margin is distributed equitably throughout the market chain, including the producers/harvesters of the products.

Government agencies such as DENR and DA-BFAR have the mandate to manage our natural resource, and they are key to guiding the development trajectory of our ocean-based blue economy. These agencies, together with other government agencies in charge of social and economic development such as NEDA, DOT (for the case of tourism), and DSWD among others, should also serve to guide investment strategies related to ocean conservation and development. Investments are tightly linked to the conditions of natural resource. Therefore, investors have huge stakes on how natural resources are managed and therefore, private sectors and investors should also be involved in the discussion on harnessing ocean-based

blue economy. From an investment point of view, de-risking the resource base is good for business and de-risking can only be done by setting up appropriate management and institutions that will be respected by all parties.

The Climate Change Commission, as well as other government agencies like DA-Bureau of Agricultural Research (DA-BAR), also plays a vital role in these development and investments strategies of ocean economy. These agencies can serve as the authoritative agency for quantifying risks and uncertainties in livelihoods, investments, and as well as in developing strategies for de-risking ocean investments and in making the social and ecological systems, especially those related to rural and coastal communities, resilient to predicted effects of climate change. The involvement of the academe, particularly fisheries scientists, in the investments and management strategies at the local level (i.e., community-based approach in the coastal community) is strongly recommended to ensure effective generation of knowledge and adaptation of technology by local communities and the LGU.

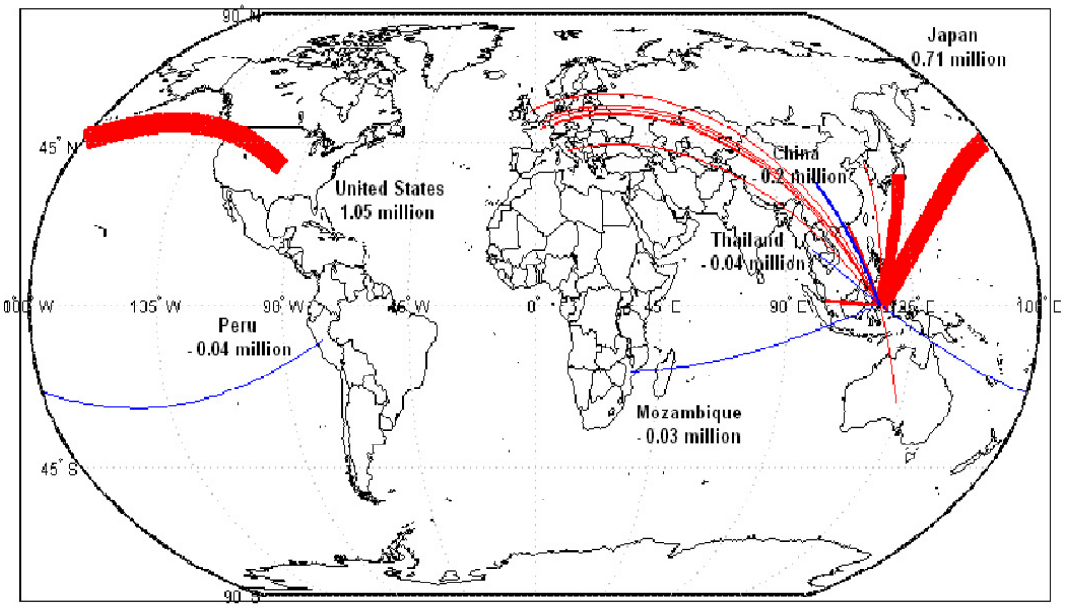

Figure 6. Net fish exports (exports-imports) in US$ of CT6, 2009

Note: Red indicates CT6 as net fish exporters and blue as net fish importers. Includes trade of fish, crustaceans, molluscs and other aquatic animals, but excludes aquatic mammals, crocodiles, caimans, alligators and aquatic plants.

Source: Stefania Vannuccini, Fishery Statistician (Commodities), FAO FIPS (Fisheries and Aquaculture Statistics and Information Service)

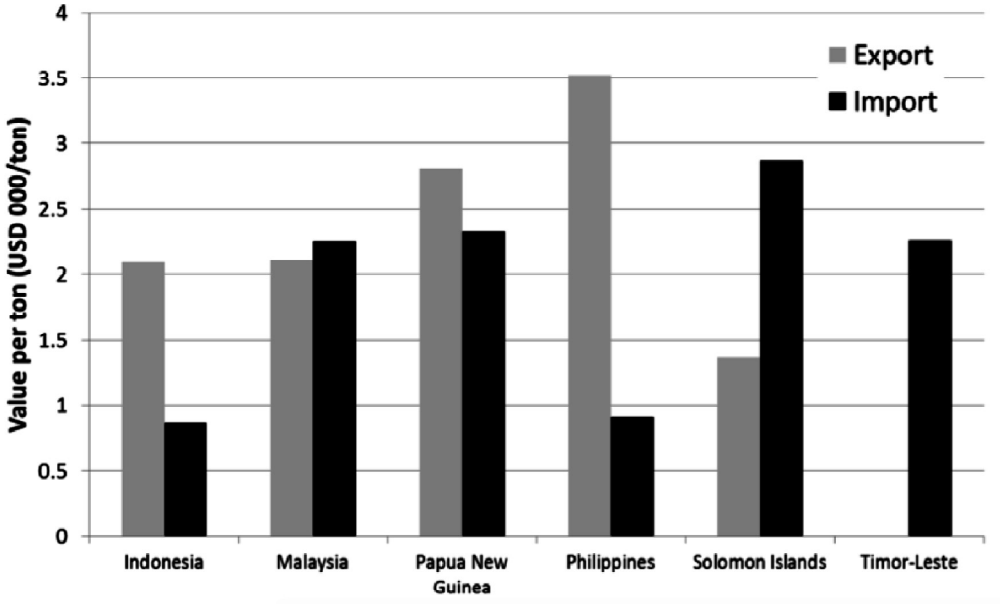

Figure 7. Value of fish exports and imports per ton of the CT6 countries, 2011

Note: Data include "fish" commodity only per FAO classification.

Source: Food and Agriculture on United Nations – Fisheries and Aquaculture Department http://www.fao.org/fishery/topic/16140/en

National Initiatives and Regional Cooperation for Marine Management and Sustainable Development

There have been a number of national and regional/global initiatives on marine ecosystem, fisheries management and development, as can be gleaned from various studies. These include ecosystem approach to fisheries management, investment in technology for sustainable and efficient fisheries and aquaculture, professionalizing fisheries, community-level compensation mechanisms, advocating for a "blue" solution for consumption and production, and marine spatial planning (Cabral et al. 2015). More recently, initiatives include integrated and sustainable ecotourism, mitigating and abating pollution from agriculture, industry, shipping, disaster risk reduction and climate change adaptation, enhanced research, and development of alternative energy and marine biotechnology.

In addition to domestic policy measures, countries will need to consider cross-border cooperation in order to efficiently and sustainably tap the blue economy. This is part of the Changwon Declaration which aimed at creating international

collaborations for harnessing the ocean-based blue economy of East Asian countries. Mendoza and Siriban (2013) have undertaken a review of international cooperation initiatives in the marine economy, with a view toward sustainable resource management. Based on fourteen cases of international cooperation, they found several common characteristics that might comprise the beginnings of an operational approach to regional public goods in the blue economy. From among the approaches the following could be considered the most innovative and valuable to cooperation for sustainability:

- Clarification of burden-sharing arrangements promotes stronger collective action, by clarifying the respective net benefits from the cooperation initiative.
- The use of side payments helps craft a much more fair collective action agreement both among and within countries.
- External parties (e.g., Asian Development Bank and the Global Environment Facility in the CTI, and the European Union regarding the Danube river basin) involvement in some agreements may be necessary in cases where there are challenges in setting regional priority goals.

Conclusion and Recommendation

As an archipelago, the Philippines' marine-based wealth spans roughly 70 percent of its internationally and legitimately defined aggregate geographic area, compared with its land-based resources covering the balance of only 30 percent. Given its vast, largely untapped potential, a recommendation for the creation of a Department of Marine Resources, separate from the Department of Agriculture, seems in order. This new agency can lead the efforts in valuating the ocean-based economy, developing investment and development strategies for ocean use, as well as lead in the coordination and harmonization of efforts and policies from various government agencies related to marine resources and their uses.

The Philippines' pursuit of the blue economy potential will require a perspective of promoting inclusive sustainable development incorporating an archipelagic development framework (DENR-UNDP/MERFI 2004). This will require strategic and pragmatic international cooperation that will enhance the benefits derived from marine resources within and in areas beyond national jurisdiction. While some updated estimates of the country's marine ecosystems have been done, adaptive management studies are required for incorporating the

monitoring of the cost effectiveness of the management of marine ecosystems goods and services, as well as communicating the appropriate proactive responses. Refocusing on the Philippine blue economy should primarily consider the resiliency, health and sustainability of these ecosystems. Equitability of costs and benefits pertinent to sustainable development of its ecosystem goods and services for the people should be primordial.

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