

Science, Technology and Innovation to Bolster Philippine Blue Economy Development

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The Philippines

- 220 Million Hectares Water
- 29.8 Million Hectares Land
- Coral Triangle -
Center of Marine Biodiversity

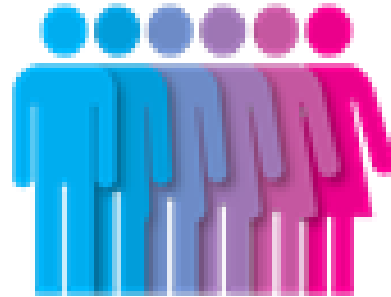


Philippines Moving into the Future

- Challenges old and new (poverty alleviation, pandemic, climate change, 4th Ind Rev and regional politics)
- Burgeoning population : 144 M by 2050
- Interdisciplinal, transdisciplinal systems approach fundamental to address complex and interrelated concerns

Philippine Coastal & Marine Features

62 Coastal Provinces
61 Coastal Cities
832 Coastal Municipalities



60% (55.3 million) of Philippine Population resides in coastal areas

Mangroves



Seagrasses



Coral reefs

Area:2,472 sq.km.
(USD Billion): 47.918

Area:978 sq.km.
(USD Billion): 2.828

Area:26,000 sq.km. (USD Billion): 915.847

RV Azanza, P Aliño, Cabral R, Juinio-Meñez, Pernia E, Mendoza R and C Siriban (2017). Valuing and Managing the Philippines Marine Resources Toward A Prosperous Ocean-Based Blue Economy. Policy Studies.Vpl.18:2-26.

Blue Economy

- *Sustainable Use of Marine Resources/
Environment for*
 - 1) *economic growth and improved
livelihoods, while*
 - 2) *preserving the health of the Marine
Ecosystems*

Sustainable Development / Blue Economy

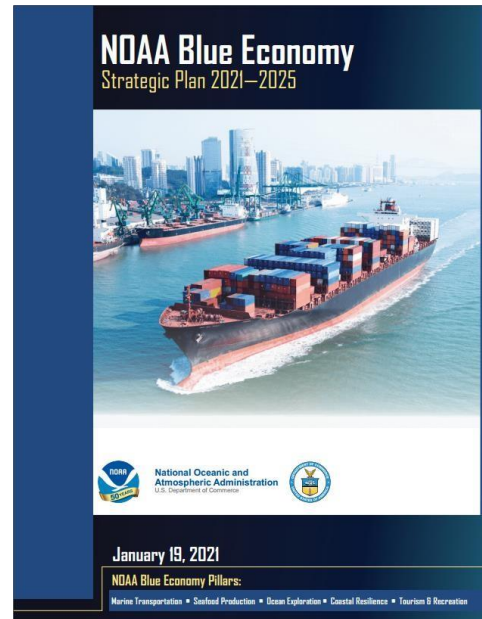
A 'new' Blue Economy is developing as established economic sectors are being disrupted and new economic sectors emerge, paving the way to a smart, sustainable and resilient use of ocean ecosystems.



The United Nations Decade of Ocean Science for Sustainable Development (2021-2030)



UN Decade of Ocean Science for Sustainable Development 2021 - 2030



NOAA Blue Economy Strategic Plan 2021-2025



January 19, 2021

NOAA Blue Economy Pillars: Marine Transportation • Seafood Production • Ocean Exploration • Coastal Resilience • Tourism & Recreation

US Blue Economy Strategic Plan 2021 - 2025



THE EU BLUE ECONOMY REPORT 2021

EU Blue Economy Report 2021



BLUE ECONOMY COOPERATIVE RESEARCH CENTRE

STRATEGIC PLAN 2021

Australian Government Department of Industry, Science, Energy and Resources AusIndustry Cooperative Research Centres Program

Australia Blue Economy Strategic Plan 2021



Coastal Inundation Challenge

Offshore Renewable Energy Challenge

Unlocking Autonomous Navigation Challenge

UK Admiralty Marine Innovation Programs 2020 - 2021

The PENCAS Bill of 2022

- institutionalize a Philippine Ecosystem and Natural Capital Accounting System (PENCAS) to reflect environmental inputs and outputs in the determination of national income accounts.
- shall adhere to the United Nations System of Environmental-Economic Accounting (SEEA)

Valuation of Marine Resources : The Ideal

Valuation of resources should consider their intrinsic and commercial values and the environmental and other risks in the area.

Valuation studies also help in the estimate of the carrying capacities of the areas to be developed and put a limit to the pressure that can be exerted to make the resource more profitable and sustainable (Azanza et al. 2017, Azanza 2019).

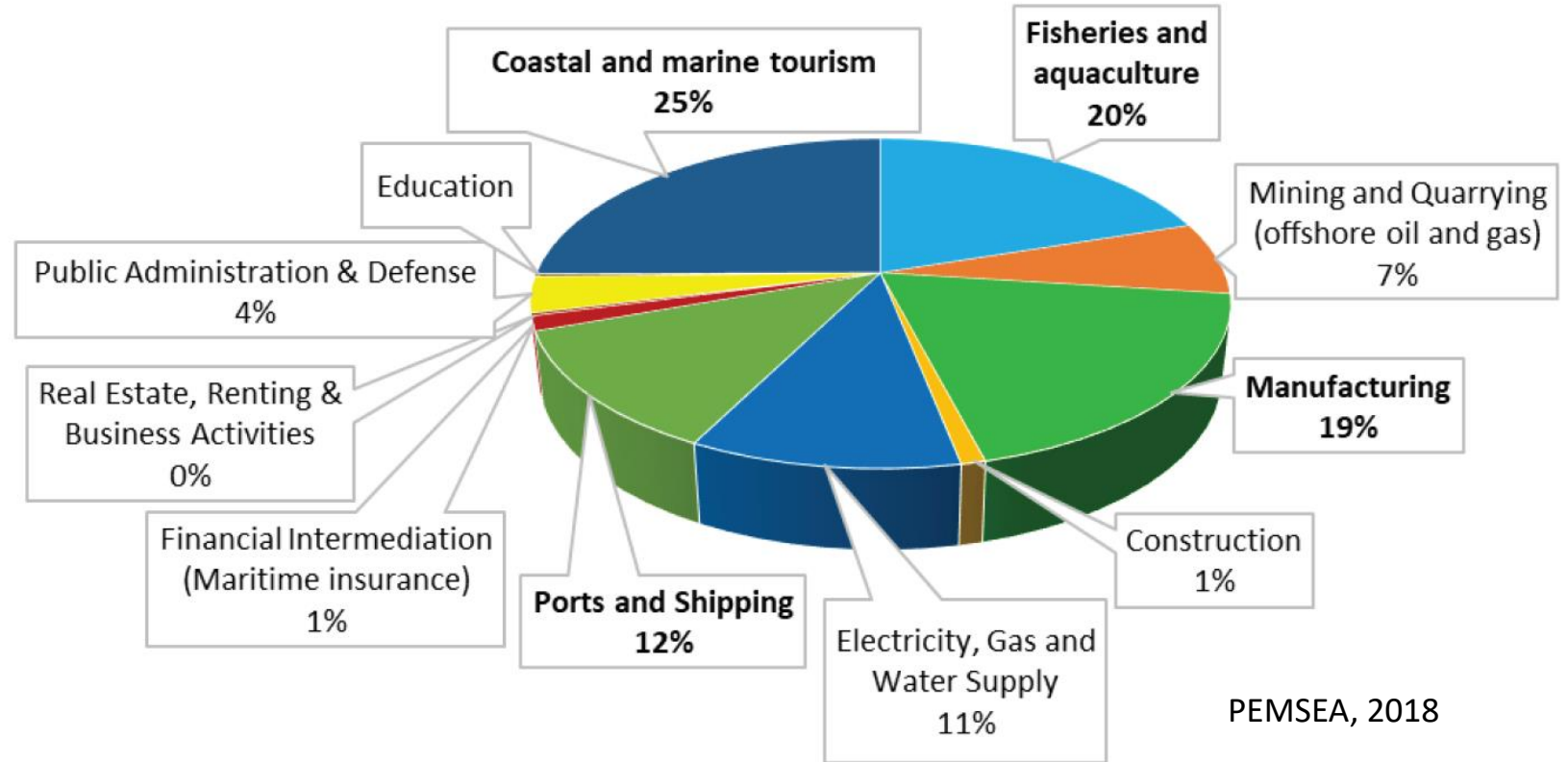
More practical is when blue investment areas would consider Programmatic Environmental Impact Studies to mitigate or prevent long term risks.

Azanza et al 2022

Philippine BLUE by the **numbers**

1. Tourism, Resorts, and Coastal Development
2. Fisheries and Aquaculture
3. Coastal Manufacturing
4. Ports, Shipping, and Marine Transport
5. Energy
6. Seabed Mining Oil and Gas
7. Marine Biotechnology and Medicine
8. Marine Technology and Environmental Services

% Contribution to the BLUE economy



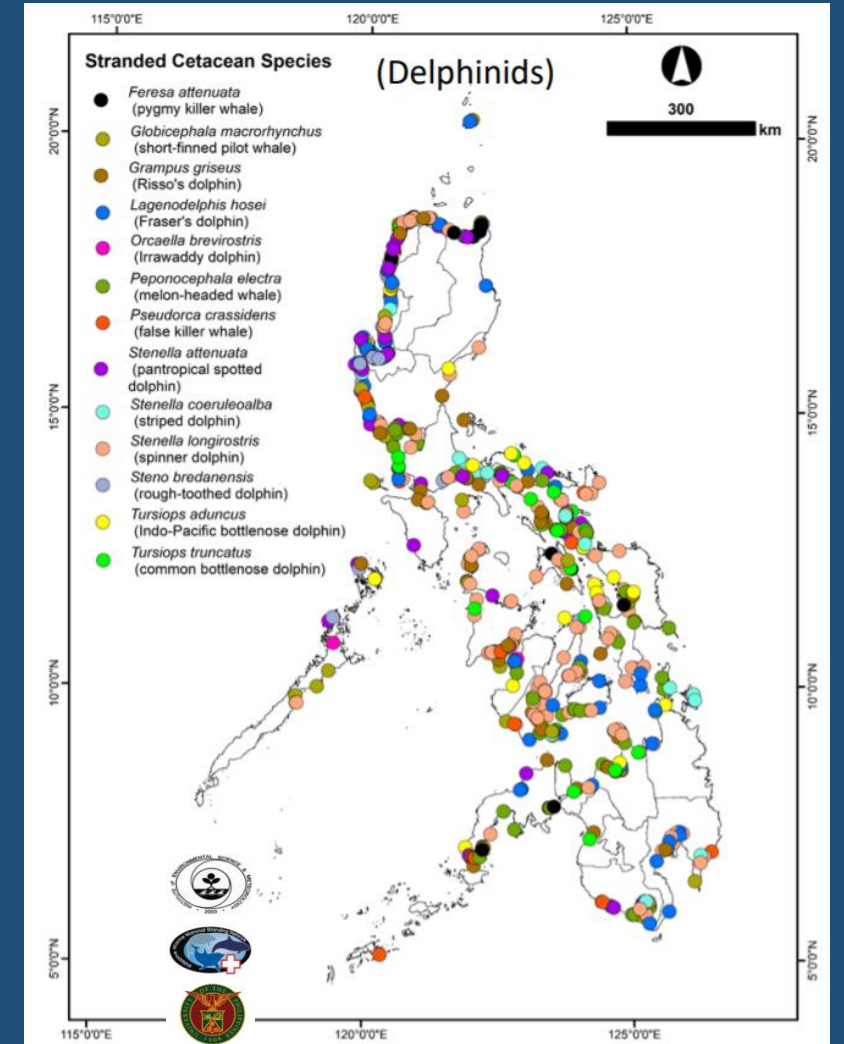
PEMSEA, 2018

OPPORTUNITIES & CHALLENGES

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- Our beaches, islands and diving spots are among the country's most popular tourist destinations. The contribution of Tourism Direct Gross Value Added (TDGVA) to the Philippine Gross Domestic Product is estimated at **12.7% GDP** (2019) with employment estimated at **5.71 million**

- **BIODIVERSITY TOURISM**

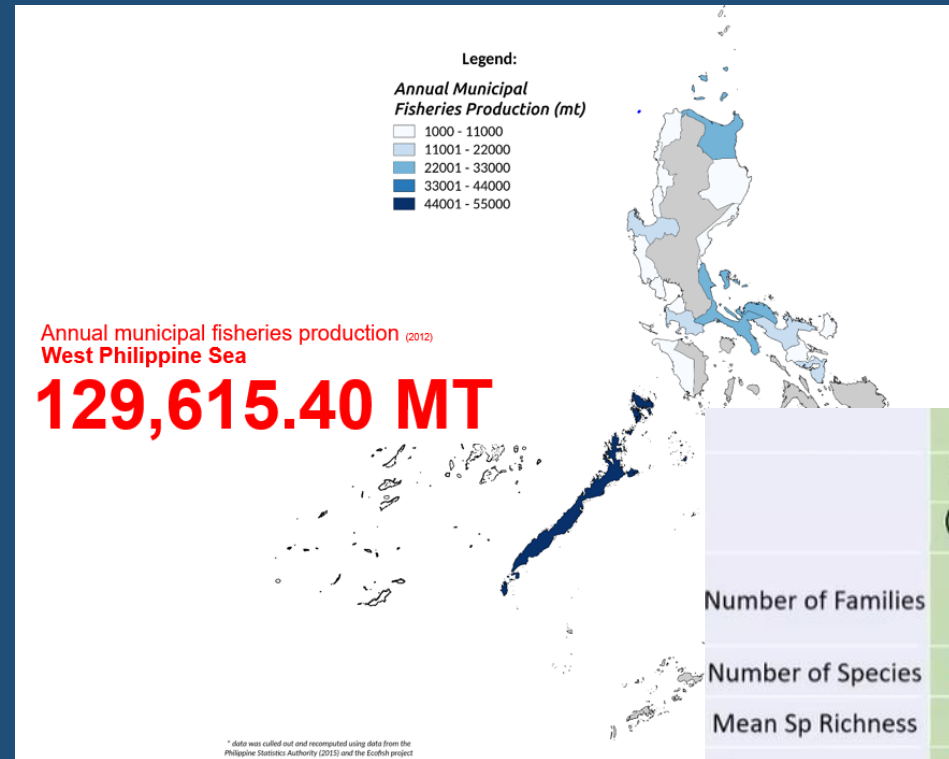


(Aragones et al. 2017, Aragones & Laggui 2019, unpublished data)

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- Fishing industry contributed **1.5%** and **1.7%** at current and constant prices, to the country's gross domestic products (GDP 2015)
- Fisheries sector providing employment to over **1.6 million** people and **40kg** per capita protein for 109 million Filipinos



	KIG only					
	1993	1997	1998	1999	2017	2019
	(n=18)	(n=8)	(n=16)	(n=8)	(n=28)	(n=7)
Number of Families	34	28	30	29	31	22
Number of Species	244	118	145	156	245	150
Mean Sp Richness	63	42	40	49	48	49
Mean Abundance	2478	638	643	934	686	497
Mean Biomass	103	14	13	23	33	28

- Dr. Deo Onda

- Dr Van Rodriguez

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- The Philippines is fairly connected with the global container shipping services network with an UNCTAD's Liner Shipping Connectivity Index (LSCI 2012) **66 out of 159 countries** with a total of **7,926 employees**.
- **121** licensed shipyards (2012) for construction and/or repair of big (8), medium sized (14) and smaller ships (99).
- Considered as the **fifth world's largest shipbuilding country** after China, Japan, Korea and Brazil.

- **Archipelagic Sea Lanes**
Shipping connectivity is an important determinant of the country's trade competitiveness



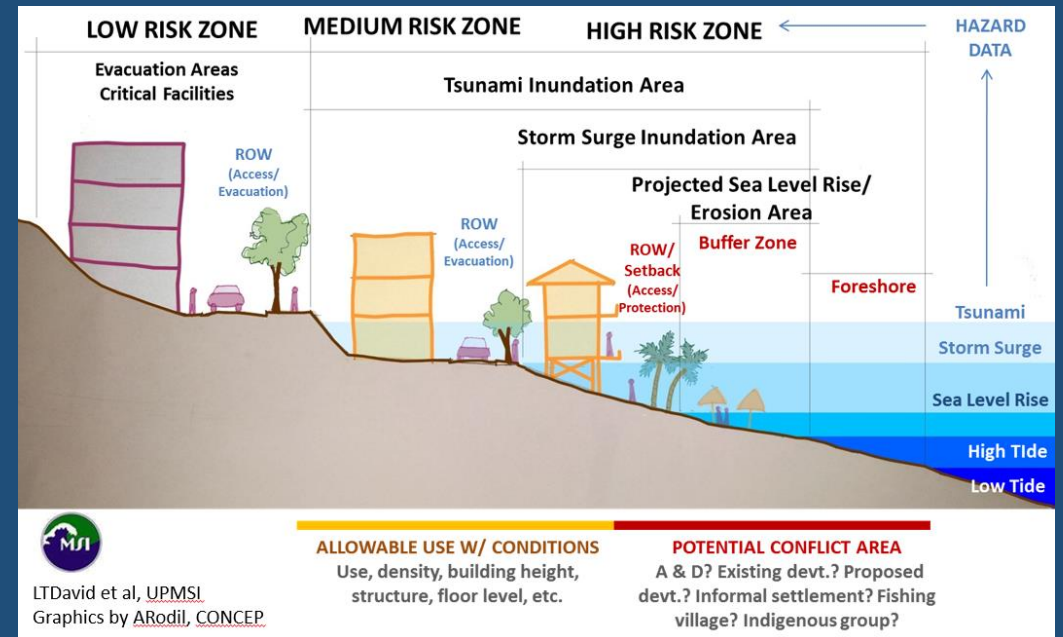
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- Coastal industry includes iron and steel works, oil refineries, alumina refineries, cement works, chemical plants, meat and fish processing plants, power stations, lead smelters, pulp and paper mills. It employs more than **300 thousand people** and contributes about **4.7% of the GDP** (2014)

Integrated Development

Rank	Province	Max surge height (m)
1	Samar	7.45
2	Leyte	6.84
3	Palawan	6.71
4	Iloilo	6.29
5	Biliran	6.26
6	Camarines Sur	6.17
7	Quezon	5.86
8	Masbate	5.45
9	Southern Leyte	5.32
10	Bataan	5.04

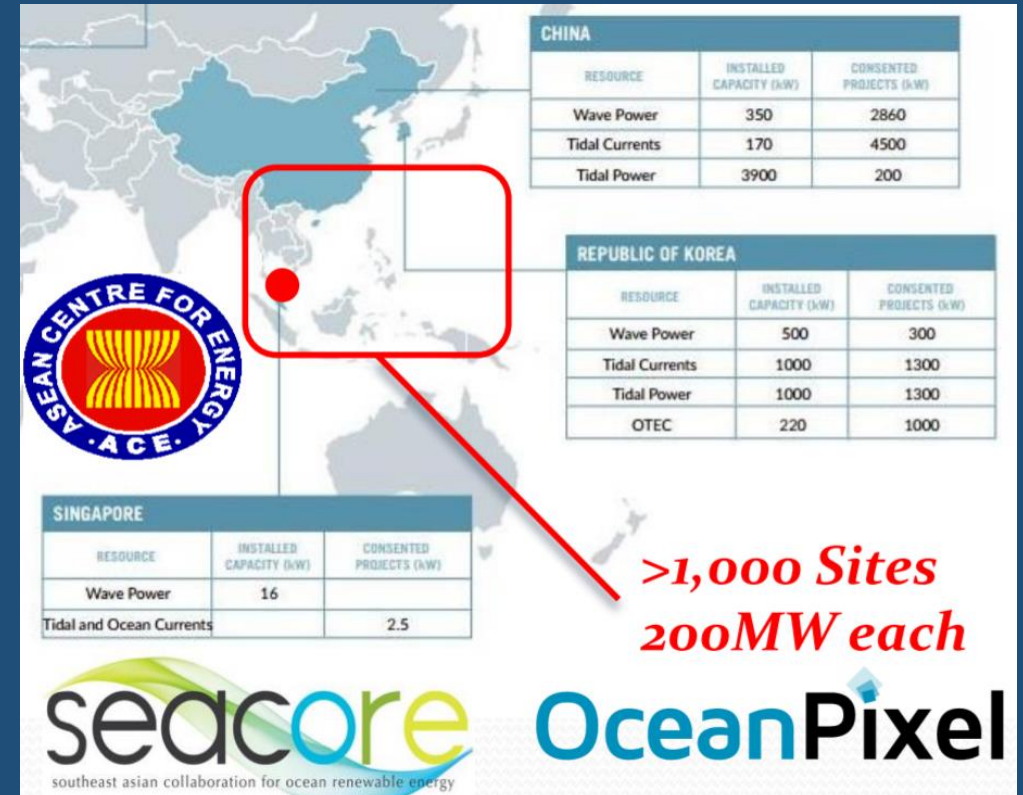


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- Coal-fired thermal plants now accounts for **43% of the national energy mix**. Given new investments, coal's share of the pie will reach 50 percent in 2030.
- The Philippines holds **3.48 trillion cubic feet** (Tcf) of proven gas reserves as of 2017, equivalent to **31.4 times its annual consumption**.

- **Ocean Renewable Energy**



Ocean Energy in the Philippine Archipelago

The location of the Philippines is ideal for the use of our **archipelagic coast as source of ocean energy for power generation acc. to Department of Energy (DOE 2020 ;with support from scientists and engineers)**

15 sites that are qualified for this system that may generate an estimated 265 million megawatts of electricity.

These potential sites are San Vicente in Ilocos Sur, Agno in Pangasinan, Palauig in Zambales, Agusuhin in Bataan, Mananao in Mindoro, San Jose in Antique, Manukan in Misamis Occidental, Omosmarata in Basilan, Palaui Island in Cagayan, Dijohan Pt. in Bulacan, Mascasco in Masbate, Batag Island in Samar, San Francisco in Surigao del Norte, Lamon Pt. in Surigao

Marine Genetic Resources (MGRs)



MGRs screened for potentially useful bioactive compounds for drug development



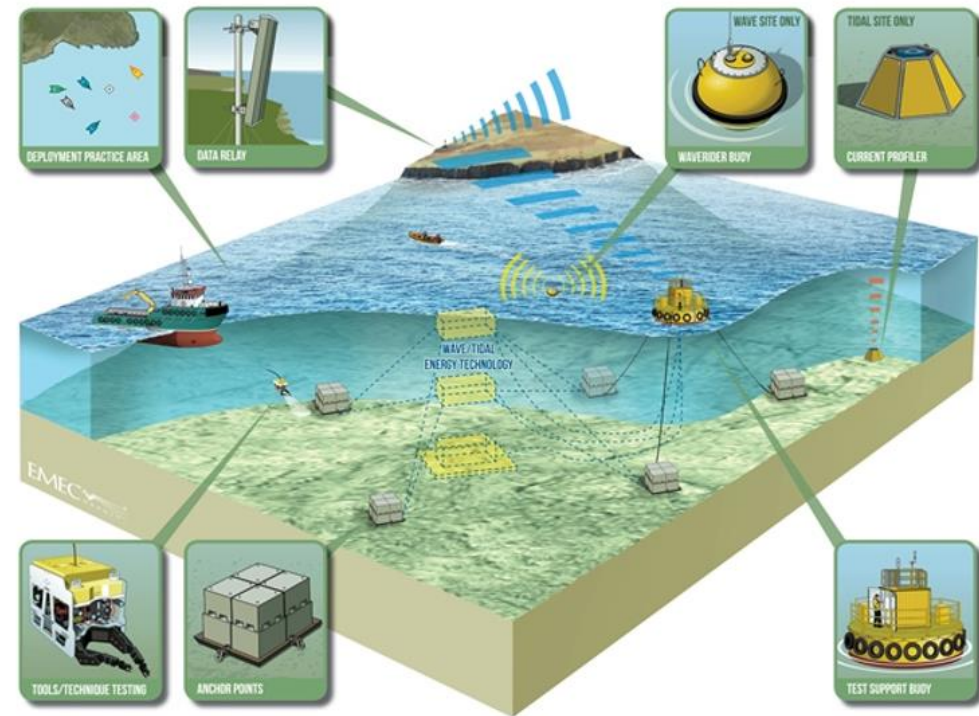
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8. **Marine Technology and Environmental Services**

- **Marine Technology Testing Center**

Scaled Test Site/s
("nursery")

Energy Converters (e.g. Tidal Current, Wave) and Other Devices (eg ROV, Anchoring and Mooring Systems, Buoys, etc)



The Philippine Blue Economy Bill 2023

- An Archipelagic and Maritime Nation
- Comprehensive Framework for Philippine Blue Economy
- National Maritime Council (National Maritime Zone Act) NEDA Blue Economy Section as secretariat
- Development Plans and Blue Financing/Governance

PAGTANAW 2050

Harnessing the

TALENT and TOOLS

in Science and Technology

to **INNOVATE**

towards a

Prosperous, Archipelagic,

Maritime Nation by 2050

WAYS TO GO (From Pagtanaw 2050 Phil STI foresight) for the Philippine Archipelago

Human capital : more crisis-resilient food system and inclusive healthcare system, with the vulnerable population equipped with STEM education, as well as specialized education to combat disinformation.

Underpinning science and technology strategies should be **strong institutions and good governance**, to manage the inevitable disruptions triggered by increasing globalization wave.

Leveling the playing field should include inclusive opportunities for **decent living and long term strategic solutions**

***Thank
You!***