PwC HELM Circumnavigation: An integrated approach to the economy of the sea

CPLP in the World

PwC Economy of the Sea Barometer (World)

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Introduction

Introduction

The seas have always been one of mankind's biggest and most significant natural resources. In the past, primarily for food, shipbuilding, transport, and naval defences; more recently for oil and gas, and tourism; and now, increasingly, for 'blue' biotechnology, robotics, seabed mining, and renewable energy. It's no surprise, then, that coastal nations see their seas as vital national assets, and are putting an ever greater emphasis on protecting them. More countries are applying to the UN to extend their continental platform, and more companies are competing for the opportunity to explore and exploit them. The potential is as vast as the sea itself: over 70% of the planet is covered by water, and yet even now, only 5% of the seabed has been mapped and photographed.

But the more industries the seas support, the more potential there is for conflict – conflict between industries, conflict between human exploitation and marine conservation, and even conflict between nations. In many cases, these tensions can arise because of the different ways the seas are used – some industries operate on the surface (like shipping, fishing, and cruise ships), others on the seabed (like oil and gas), and others use the winds above the water. The interests of those working within each of the dimensions are often in direct opposition, and in many cases the three dimensions sit uneasily together. For example, sometimes tourist marinas co-exist uneasily with fishing ports – they often compete for the same locations and have different objectives. But a more integrated approach could find ways to make these activities more mutually supportive, and the skills more transferable. Likewise ports and fish farming have previously been mutually exclusive, but it could be possible to find ways to share space and resources to their mutual benefit.

In summary, the sustainable growth and development of the economy of the sea need an integrated approach.

Only such ***an integrated approach*** to the seas can ensure they are used responsibly, effectively, and equitably. International bodies like the EU are starting to recommend such an approach, and individual countries are also looking at ways to integrate their own maritime industries. For example, by understanding how reductions in a nation's fishing fleet affect the port economy, shipbuilding, and employment opportunities in coastal communities.

PwC Portugal has been assessing the usage of the seas for more than 10 years, as part of the international HELM project. It's a unique barometer of the health of the various industries that depend on the oceans, and captures the new and emerging trends affecting them. In this report we look in particular at the challenges and advantages of taking an integrated approach to the oceans: the issues that arise, the practicalities that need to be addressed, and the size of the prize if this can be achieved. We also provide a snapshot of the state of play in the maritime industries, and between the maritime nations.

The new economy of the sea

As technology advances, we can harvest more from the sea than fish. ‘Blue biotechnology’ is exploring the potential to apply genetic engineering to marine lifeforms for use in food production, pharmaceuticals, cosmetics and other industrial compounds. It’s also becoming possible to mine the seabed for minerals, opening up new sources of supply and relieving the pressure on scarce resources. Both industries rely on sea robotics, using submarine ‘drones’ that can operate at depth and in extreme environments.

Comunidade de Países de Língua Portuguesa (CPLP) has in the ocean a huge economic development potential. In this document we present a summary of relevant matters about the economy of the sea of CPLP in the world.

Into the ‘Blue’: The value of an integrated approach

Into the ‘Blue’: The value of an integrated approach

Taking an integrated approach to the oceans ensures a proper balance between all those who have a stake in it: governments, academia, businesses, individuals, and the environment. It takes into account the differing and sometimes conflicting needs of employment, biodiversity, commerce, and national security, ensuring that decisions are made in the full knowledge of their wider impact.

The advantages of this ‘blue’ thinking are clear: it’s a more sustainable and inclusive approach, it promotes growth and employment, and it fosters innovation, both by supporting the development of new industries and by encouraging new ideas in established sectors like fishing. It allows mature economies to secure more value from their maritime zones, and opens up new opportunities for developing economies. And it’s a positive response to global megatrends like climate change, and demographic shifts. To take just two examples: the world will need to feed 9 billion people by 2050, and a growing number of them will want a protein-rich Western-style diet. We cannot hope to provide that from conventional farming or from meat alone: fishing and aquaculture will be vital in bridging the gap, with the by-products from seafood processing providing useful raw material for biotechnology. Likewise the world of 2050 will require around 50% more energy than it does now, and offshore wave and wind power will be important sustainable ways to meet that new demand.

There are some significant challenges in achieving an integrated approach. The first is to understand that the timescales at sea are longer than the new digital world is happy to tolerate. The resources of the sea are perhaps the ultimate example of ‘patient capital’: it’s an environment where change takes time, which demands a long-term perspective. It’s perhaps no surprise, therefore, that over 70% of the companies working on the sea are family businesses, which are able to plan in terms of generations rather than quarters.

The other significant challenges are a lack of awareness about the scale of the opportunity, which in turn means that investment in this area is seen as a low priority, both by governments and businesses alike. But the opportunities are there, and many of them will be more significant if they are managed holistically. For example, a more integrated and sustainable approach to fishing and marine conservation will create opportunities for sea-related tourism.

But because the seas are shared, the strategy must likewise be shared. In other words, the economy of the sea needs to be integrated not just across industries, but across countries and regions. We need international co-operation if we are to make the most of this vast resource.

So what would this approach look like in practice? Some countries are already taking this pioneering approach: Norway manages its extensive maritime industries holistically, from the production of gourmet seafood products, to tourist trips to aquaculture plants in the fiords. Ireland has an Integrated Marine Plan, ***Harnessing Our Ocean Wealth***, which covers seafood production, tourism, and **offshore** energy, and brings together the key **stakeholders** from all of these industries. In Germany, there’s a highly developed financial services sector offering marine insurance and other services for the shipping and shipbuilding sectors, while New Zealand is capitalising on its spectacular coastal locations to become a venue for international sailing events, and a centre for the building and maintenance of these specialist craft.

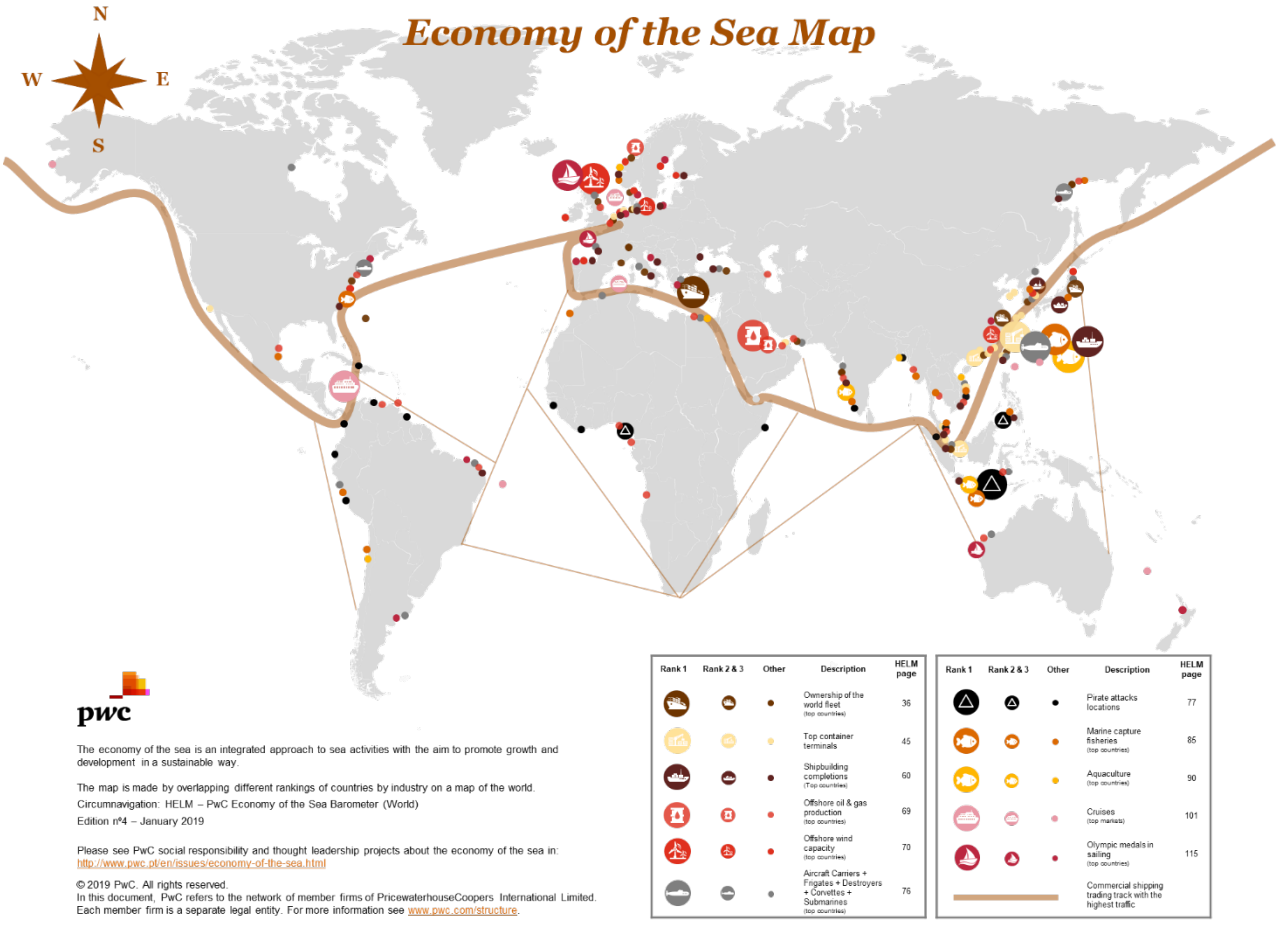
Strategy to execution

There are, at least, three essential elements required to put an integrated approach into action: the right **framework**, the right **people**, and the right **technology and equipment**.

The framework is the basic **governance** foundation, ensuring there is clarity on the different rights and responsibilities of those operating on the seas, and a shared commitment to standards of **safety** and **security**, especially at a time when piracy continues to exist. It should cover everything from regulatory systems to the legal status of specific assets and geographical areas (the land and mineral resources of the Antarctic, for example, are the subject of many competing claims). Such a framework is essential to ensure adequate protection, minimize bureaucracy, and give greater confidence to investors, especially in emerging industries.

The people dimension centres on training. The sea once generated thousands of relatively low-skilled jobs in industries like fishing. The new economy of the sea demands – and creates – jobs with much higher levels of skill, from engineers to scientists to information technologists. This is related to the third success factor: fully exploiting the potential of the sea requires highly specialized equipment, from oil rigs, to ships, to wind turbines. In the last twenty years we have seen a significant shift in both how and where such equipment is manufactured: shipbuilding, for example, was once led by Europe and Japan, but while the volume of output has moved to China and Korea, Europe and Japan still build the most technologically advanced vessels. And as shipping evolves, ports must evolve too – either by adapting to the needs of new, larger vessels, or by building new facilities.

The HELM tool is designed to help governments, industries, policy-makers and coastal communities move towards the goal of an integrated approach, by gathering together data and trend analysis, so they can plan for the long term. It's crucial to understand the mix of industries within a region, and the issues within each industry, before major decisions can be made.



Between 2005 and 2017, Asia – and in particular China – was the dominant region in terms of fisheries, aquaculture, cargo handling at ports, and shipbuilding. The world's top 10 container ports are in Asia and seven of these are in China. Only in offshore energy, merchant shipping, and seagoing tourism do America and Europe remain ahead of Asia. The ten years to 2017 also saw increasing environmental problems (particularly oil spills) and sea piracy (more than 3,800 people were taken hostage and 31 killed by pirates, mainly in Somalia, Nigeria and Indonesia). The US, China and Russia have the three main navies. South America and Africa are the most obvious examples of regions which are yet to explore the huge potential of the economy of the sea.

The economy of the sea is shifting from West to East

The world's top **10** container ports are in **Asia** and **Seven** of these are in **China**.

China represented ***19%*** of **fisheries** and ***62%*** of **aquaculture** of the total world output in **2016**

America and **Europe** remain ahead in **offshore energy**, **merchant ships**, **cruise tourism** and **sports**

Shipping and shipbuilding are moving from developed to developing markets

Tonnage of cargo **Transported by sea**

	Developed economies	Developing economies
2006	53%	46%
2016	35%	64%

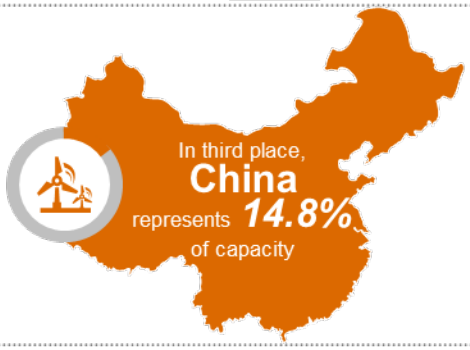
Greece, **Japan**, **China** and **Germany** have the greatest concentration of ship ownership

	Volume of orders for ships	Ship production completed
China	35.4%	34.3%
S.Korea	20.9%	30.4%
Japan	19.2%	19.6%

2017

Europe still leads the way on offshore renewable energy

UK, **Germany**, **Denmark** and **The Netherlands** represent ***78%***

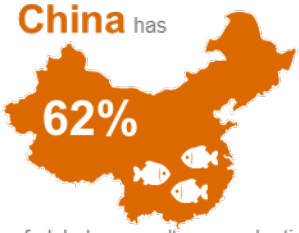


Fishing is under pressure, but aquaculture has huge promise

From **1974** to **2016** increased pressure on **fish stocks**, increased number of **species** that are in danger of **overfishing**

In **2016** ***89%*** of world aquaculture was in **Asia** which was responsible for the **significant** growth of aquaculture **globally**

Onshore aquaculture is the main contributor to this growth and **China** has



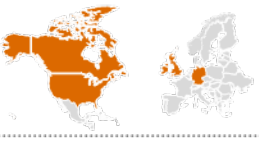
of global aquaculture production

Significant opportunity exists in **Africa** and **Latin America** with the lowest per capita consumption of fish and other sea products

Tourism is a major growth area

The **Caribbean** still holds the largest market share of **Cruise ships**

The largest number of cruise consumers are in **North America** and in **Europe**



The **USA**, **Australia**, **New Zealand**, **France**, **Italy** and the **UK** are the benchmark in recreational **boating** and **marinas business**

Tourism and marine sports are a fundamental part of an integrated approach to the seas because of the huge numbers of people involved.

Exclusive Economic Zones

Countries with larger exclusive economic zones have a greater potential for harnessing the extraordinary value of the oceans. Below is the ranking of the 25 countries with the largest exclusive economic zone.

Top 25 Exclusive Economic Zones (in millions of square kilometres), February 2018

	EEZ (Millions of Km2)		
USA	12.2	Federated States of Micronesia	3.0
France	10.1	Denmark	2.6
Australia	9.1	Norway	2.4
Russia	7.6	Papua New Guinea	2.4
United Kingdom	6.8	India	2.3
Indonesia	6.0	Marshall Islands	2.0
Canada	5.7	Philippines	1.8
New Zealand	4.1	Portugal	1.7
Japan	4.0	Solomon Islands	1.6
Brazil	3.7	South Africa	1.5
Chile	3.7	Republic of Mauritius	1.3
Kiribati	3.5	Seychelles	1.3
Mexico	3.3		

Source: Marineregions.org

Maritime transport, ports and logistics

Greece, Japan, China, Germany and Singapore are the countries that concentrate the majority of vessel ownership.

Ownership of the world fleet, as of 1 January 2017 (DWT and nº of ships)

Beneficial Owner Location [a]	Dead-weight tonnage (thousand DWT)	Number of ships
Greece	308,837	4,199
Japan	223,856	3,901
China	165,430	5,206
Germany	112,028	3,090
Singapore	104,414	2,599
Hong Kong SAR (China)	93,630	1,532
South Korea	80,977	1,656
USA	67,101	2,104
Norway	51,824	1,842
United Kingdom	51,151	1,360
Bermuda	48,059	440
Taiwan	46,865	926
Denmark	36,356	920
Monaco	31,630	338
Turkey	27,733	1,563
Switzerland	23,688	405
Belgium	23,550	263
India	22,665	986
Russia	22,050	1,707
Italy	20,610	768
Iran	18,839	238

Note: Vessels of 1,000 GT and above.
a "Beneficial ownership location" indicates the country/economy in which the company that has the main commercial responsibility for the vessel is located.
Source: UNCTAD – Review of Maritime Transport 2017

Ranking included in the economy of the sea map.

Maritime transport, ports and logistics

The ten largest container ports in the world are Asian, with 7 being Chinese.

Top 20 container terminals and their throughput for 2015 and 2016 (Million TEUs and percentage change)

Port Name	Country	2015	2016	Percentage change 2015/2016
		Million TEUs		
Shanghai	China	36.5	37.1	1.6%
Singapore	Singapore	31.0	30.9	-0.1%
Shenzhen	China	24.2	24.0	-0.9%
Ningbo	China	20.6	21.6	4.7%
Hong Kong	Hong Kong (China)	20.1	19.6	-2.7%
Busan	South Korea	19.3	19.4	0.4%
Guangzhou	China	17.5	18.9	8.0%
Qingdao	China	17.5	18.1	3.3%
Dubai	UAE	15.6	14.8	-5.3%
Tianjin	China	14.1	14.5	2.9%
Port Kelang	Malaysia	11.9	13.2	10.7%
Rotterdam	Netherlands	12.2	12.4	1.2%
Kaohsiung	Taiwan	10.3	10.5	1.9%
Antwerp	Belgium	9.7	10.0	4.0%
Xiamen	China	9.2	9.6	4.7%
Dalian	China	9.4	9.6	1.4%
Hamburg	Germany	8.8	8.9	0.8%
Los Angeles	USA	8.2	8.9	8.5%
Tanjung Pelepas	Malaysia	8.8	8.0	-8.8%
Cat Lai	Vietnam	6.9	7.5	10.0%
Total top 20		**312**	**317**	**1.8%**

Source: UNCTAD - Review of Maritime Transport 2017

Ranking included in the economy of the sea map.

Shipbuilding, maintenance and equipment

In 2017, Asia (China, South Korea and Japan) accounted for about 84.4% of vessel production completed that year, at levels of 34.3%, 30.4% and 19.6%, respectively.

Completions by Countries 2017

Country	NO.	1,000 GT	%	1,000 CGT	%
Croatia	8	97	0.15%	67	0.19%
Finland	5	173	0.26%	189	0.55%
France	11	175	0.26%	171	0.49%
Germany	11	439	0.66%	398	1.15%
Italy	10	469	0.70%	518	1.50%
Netherlands	27	49	0.07%	88	0.25%
Poland	45	137	0.21%	237	0.69%
Romania	33	615	0.92%	348	1.01%
Spain	33	53	0.08%	110	0.32%
Others UE-28	27	18	0.03%	53	0.15%
EU-28	**210**	**2,225**	**3.34%**	**2,179**	**6.30%**
Norway	16	45	0.07%	83	0.24%
Russia	17	90	0.14%	98	0.28%
Turkey	79	153	0.23%	304	0.88%
Others	3	3	0.00%	10	0.03%
Other European countries	**115**	**291**	**0.44%**	**495**	**1.43%**
Japan	**485**	**13,137**	**19.72%**	**6,794**	**19.64%**
South Korea	**293**	**23,418**	**35.16%**	**10,534**	**30.45%**
China	**769**	**23,741**	**35.64%**	**11,860**	**34.28%**
Brazil	21	221	0.33%	172	0.50%
India	19	97	0.15%	53	0.15%
Indonesia	84	100	0.15%	205	0.59%
Malaysia	56	37	0.06%	112	0.32%
Philippines	33	1,981	2.97%	861	2.49%
Singapore	19	31	0.05%	58	0.17%
Taiwan	37	569	0.85%	362	1.05%
USA	54	232	0.35%	282	0.82%
Vietnam	63	382	0.57%	322	0.93%
Others	93	148	0.22%	308	0.89%
Rest of the World	**479**	**3,798**	**5.70%**	**2,735**	**7.91%**
World Total	**2,351**	**66,610**	**100.00%**	**34,597**	**100.00%**

Source: Sea Europe, Shipbuilding Market Monitoring, Report No 44, 2018

Ranking included in the economy of the sea map.

Offshore energy

In 2017, Saudi Arabia, Qatar and Norway were the top three offshore oil and gas producers.

Producing countries of offshore Oil & Gas (Million bbl)

Country	2010	2011	2012	2013	2014	2015	2016	2017
Saudi Arabia	1,119.85	1,124.04	1,134.84	1,270.25	1,406.24	1,526.08	1,574.49	1,551.03
Norway	1,351.86	1,279.44	1,306.47	1,242.76	1,253.16	1,322.69	1,335.74	1,370.08
Qatar	1,155.13	1,314.76	1,354.03	1,356.70	1,335.25	1,348.33	1,323.62	1,319.82
Iran	668.19	665.88	655.01	684.91	714.70	885.15	976.88	1,113.30
Brazil	747.58	763.79	774.18	766.98	847.18	924.73	959.58	1,027.42
USA	1,001.37	845.28	767.15	735.82	777.31	809.26	826.39	823.32
Mexico	864.41	844.56	847.25	855.41	845.62	801.62	764.62	709.05
UAE	567.49	608.05	622.47	616.27	613.61	636.30	683.82	695.27
Nigeria	728.43	714.40	712.56	653.90	646.57	685.22	589.97	610.05
Angola	645.18	613.56	639.53	624.32	610.31	641.21	622.15	598.30
Malaysia	588.97	565.63	573.56	579.50	587.79	600.43	582.02	587.35
United Kingdom	749.63	615.12	522.64	481.33	483.79	551.15	563.17	556.19
Australia	424.93	388.83	407.01	403.65	423.45	410.71	435.2	508.90
China	379.08	363.36	350.21	341.63	357.78	422.18	409.21	402.81
Azerbaijan	463.27	417.4	409.84	409.45	411.47	408.12	398.72	382.42
Russia	196.50	209.58	210.74	214.63	224.2	251.81	290.05	326.64
Indonesia	427.54	400.73	379.33	363.90	355.52	355.44	336.57	311.22
India	425.85	385.5	339.83	289.14	277.79	282.91	296.80	307.02
Thailand	236.52	221.11	250.56	249.29	247.57	252.58	257.79	248.73
Egypt	353.8	341.13	314.49	302.16	271.54	237.39	200.32	213.12
Trinidad and Tobago	276.95	262.97	263.55	267.63	251.10	228.22	202.32	202.19
Venezuela	253.83	240.09	231.97	223.20	214.50	204.75	197.02	161.53
Vietnam	148.52	142.21	160.46	157.75	166.00	176.33	162.36	154.03
Equatorial Guinea	156.88	148.57	162.19	150.17	150.93	143.52	133.22	130.21
Myanmar	74.88	75.69	75.35	78.81	100.77	114.70	109.65	107.43
Other Countries	1,425.79	1,366.28	1,365.80	1,377.94	1,312.90	1,209.18	1,234.22	1,313.24
Total	**15,432.43**	**14,917.96**	**14,831.02**	**14,697.50**	**14,887.05**	**15,430.01**	**15,465.90**	**15,730.67**

Source: Rystad Energy Ucube (consulted on August 1, 2018)

Ranking included in the economy of the sea map.

Offshore energy

Offshore wind power capacity in the world is led by European countries (UK and Germany), representing 65% of total installed capacity in the world. Third, China represents 15% of capacity.

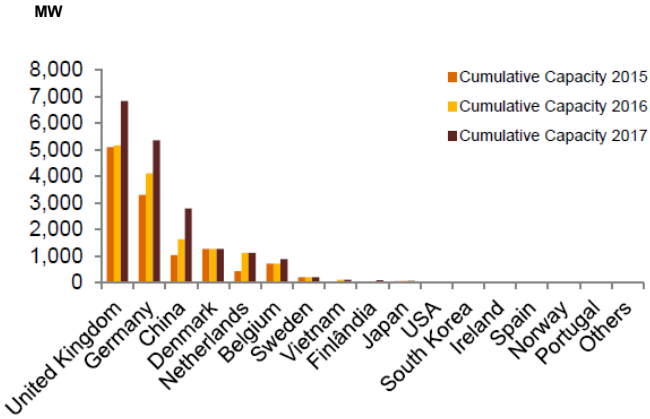
Global cumulative offshore wind capacity

	Total 2012	Total 2013	Total 2014	Total 2015	Total 2016	Total 2017	Share of the total
	(MW)						
United Kingdom	2,948	3,681	4,500	5,100	5,156	6,836	36.34%
Germany	280	520	1,012	3,295	4,108	5,355	28.46%
China	390	429	654	1,035	1,627	2,788	14.82%
Denmark	921	1,271	1,271	1,271	1,271	1,271	6.76%
Netherlands	247	247	247	427	1,118	1,118	5.94%
Belgium	380	572	712	712	712	877	4.66%
Sweden	164	212	212	202	202	202	1.07%
Vietnam	-	-	-	-	99	99	0.53%
Finland	26	26	26	32	32	92	0.49%
Japan	25	50	50	53	60	65	0.35%
USA	0.02	0.02	0.02	0.02	30	30	0.21%
South Korea	5	5	5	5	35	38	0.20%
Ireland	25	25	25	25	25	25	0.13%
Spain	0	5	5	5	5	5	0.03%
Norway	2	2	2	2	2	2	0.01%
Portugal	2	2	2	2	0	0	-
Others	-	-	1	1	0	10	0.53%
Total	**5,415**	**7,047**	**8,724**	**12,167**	**14,482**	**18,183**	**100.00%**

Source: Global Wind Report Market update 2013, 2015 and 2017

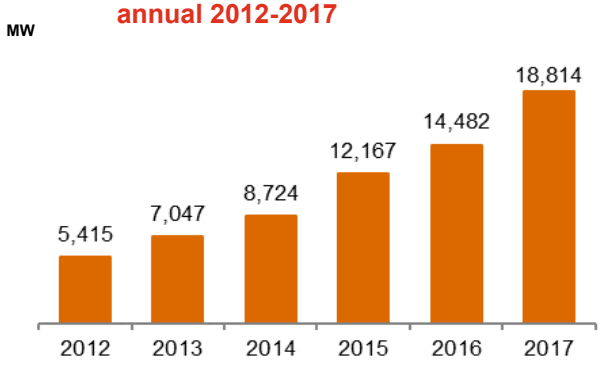
Ranking included in the economy of the sea map.

Global cumulative offshore wind capacity



Source: Global Wind Report Market update 2013, 2015 and 2017

Accumulated offshore global capacity, annual 2012-2017



Source: Global Wind Report Market update 2013, 2015 and 2017

Naval security power, piracy and maritime disasters

In 2018, the country with the largest number of large-scale naval equipment (aircraft carriers, frigates, destroyers, corvettes and submarines) is China with 192, followed immediately by Russia with 163. The United States of America occupy the third place with 161 large naval equipment.

Total Naval Ship Power by Countries (Sum of the number Aircraft Carriers, Frigates, Destroyers, Corvettes and Submarines)

Top 25		Total (Aircraft Carriers + Frigates + Destroyers + Corvettes + Submarines)			
	Year	2015	2016	2017	2018
1	China	163	175	190	192
2	Russia	146	161	166	163
3	USA	164	162	160	161
4	North Korea	76	75	89	98
5	India	66	66	66	64
6	Japan	61	63	69	63
7	South Korea	55	57	57	55
8	Iran	41	42	41	41
9	Turkey	37	37	37	38
10	France	35	36	29	37
11	Indonesia	34	18	35	35
12	United Kingdom	30	30	32	31
13	Italy	31	30	31	30
14	Taiwan	30	29	29	29
15	Algeria	13	20	27	29
16	Vietnam	19	23	26	29
17	Greece	25	24	24	24
18	Germany	20	20	21	21
19	Egypt	19	21	18	21
20	Australia	19	22	19	19
21	Peru	19	19	20	18
22	Brazil	21	19	18	17
23	Canada	17	17	16	16
24	Argentina	16	16	16	15
25	Singapore	18	18	18	12

Source: Global Firepower – June 2018

Ranking included in the economy of the sea map.

Naval security power, piracy and maritime disasters

In 2017, Indonesia was the country with the highest number of pirate attacks.

Locations of actual and attempted attacks (2010-2017)

Region	Countries	2010	2011	2012	2013	2014	2015	2016	2017	Total
Southeast Asia	Indonesia	40	46	81	106	100	108	49	43	573
	Malaysia	18	16	12	9	24	13	7	7	106
	Singapore Straits	3	11	6	9	8	9	2	4	52
	Philippines				3	6	11	10	22	52
	Others Asia	9	7	5	1	3	6	0	0	31
Far East	South China Sea	31	13	2	4	1	0	0	0	51
	Vietnam	12	8	4	9	7	27	9	2	78
	Others Far East	1	2	1	0	0	4	7	2	17
Indian Sub-Continent	Bangladesh	23	10	11	12	21	11	3	11	102
	India	5	6	8	14	13	13	14	4	77
South America	Brazil	9	3	1	1	1	0	0	0	15
	Colombia	3	4	5	7	2	5	4	6	36
	Equator	3	6	4	3	0	0	0	2	18
	Guyana	2	1	0	2	1	0	2	1	9
	Haiti	5	2	2	0	0	2	4	1	16
	Peru	10	2	3	4	0	0	11	2	32
	Venezuela	7	4	0	0	1	1	5	12	30
	Others South America	1	3	2	1	0	0	1	0	8
Africa	Benin	0	20	2	0	0	0	1	0	23
	Egypt	2	3	7	7	0	1	0	0	20
	Guinea	6	5	3	1	0	3	3	2	23
	Gulf of Aden [a]	53	37	13	6	4	0	1	3	117
	Ivory Coast	4	1	5	4	3	1	1	1	20
	Nigeria	19	10	27	31	18	14	36	33	188
	Red Sea [a]	25	39	13	2	4	0	0	1	84
	Somalia [a]	139	160	49	7	3	0	1	5	364
	Togo	0	6	15	7	2	0	6	0	36
	The Congo	1	3	4	3	7	5	1	1	25
	Others Africa	10	9	12	11	14	11	12	11	90
Rest of the World		4	2	0	0	2	1	1	4	14
Total		**445**	**439**	**297**	**264**	**245**	**246**	**191**	**180**	**2,307**

Source: ICC International Maritime Bureau - Piracy and Armed Robbery Against Ships
Note: All Incidents with “a” above are attributed to Somali pirates

Ranking included in the economy of the sea map.

Fishing and aquaculture

The top 10 countries at the fisheries level, led by China with 19.2% of catches, account for about 60% of total global fisheries, and have significantly increased their catch in the last 10 years.

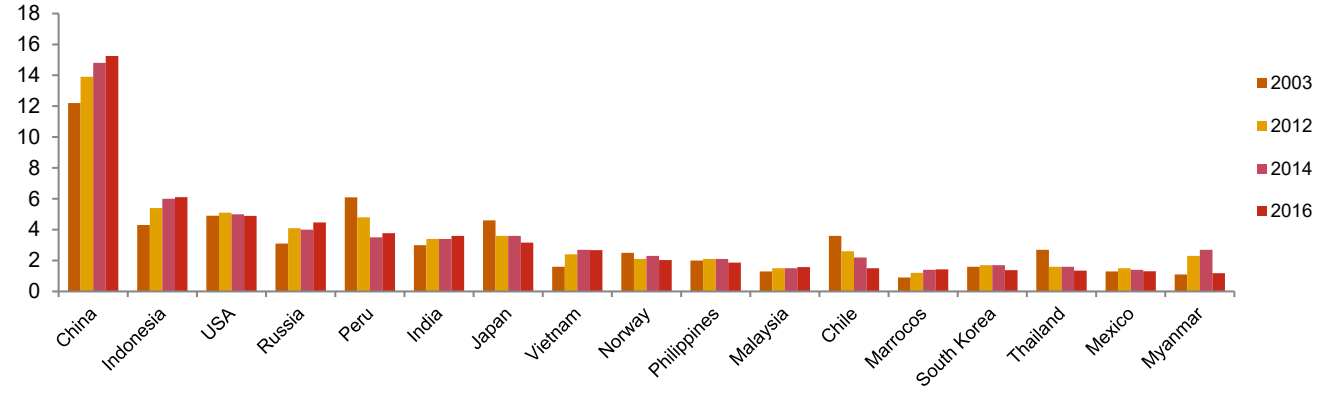
Marine capture fisheries: major producer countries

2016 Ranking	Country	2003	2011	2012	2013	2014	2015	2016	Weight 2016	Percentage Change 2015/2016	Percentage Change 2003/2016
		(million tonnes)							(percentage)		
1	China	12.20	13.50	13.90	14.00	14.80	15.31	15.25	19.23%	-0.44%	24.97%
2	Indonesia	4.30	5.30	5.40	5.60	6.00	6.22	6.11	7.71%	-1.72%	42.07%
3	USA	4.90	5.10	5.10	5.10	5.00	5.02	4.90	6.18%	-2.43%	-0.06%
4	Russia	3.10	4.00	4.10	4.10	4.00	4.17	4.47	5.63%	7.05%	44.06%
5	Peru	6.10	8.20	4.80	5.80	3.50	4.79	3.77	4.76%	-21.15%	-38.13%
6	India	3.00	3.30	3.40	3.40	3.40	3.50	3.60	4.54%	2.92%	19.97%
7	Japan	4.60	3.70	3.60	3.60	3.60	3.42	3.17	3.99%	-7.48%	-31.15%
8	Vietnam	1.60	2.30	2.40	2.60	2.70	2.61	2.68	3.38%	2.72%	67.38%
9	Norway	2.50	2.30	2.10	2.10	2.30	2.29	2.03	2.56%	-11.34%	-18.68%
10	Philippines	2.00	2.20	2.10	2.10	2.10	1.95	1.87	2.35%	-4.26%	-6.75%
11	Malaysia	1.30	1.40	1.50	1.50	1.50	1.49	1.57	1.99%	5.92%	21.08%
12	Chile	3.60	3.10	2.60	1.80	2.20	1.79	1.50	1.89%	-16.07%	-58.36%
13	Morocco	0.90	1.00	1.20	1.20	1.40	1.35	1.43	1.81%	6.08%	59.00%
14	South Korea	1.60	1.70	1.70	1.60	1.70	1.64	1.38	1.74%	-16.04%	-13.94%
15	Thailand	2.70	1.60	1.60	1.60	1.60	1.32	1.34	1.69%	1.97%	-50.26%
16	Mexico	1.30	1.50	1.50	1.50	1.40	1.32	1.31	1.65%	-0.30%	0.85%
17	Myanmar	1.10	2.20	2.30	2.50	2.70	1.11	1.19	1.49%	7.05%	7.73%
Total 17 major countries		**56.80**	**62.40**	**59.30**	**60.10**	**59.90**	**59.28**	**57.55**	**72.60%**	**-2.90%**	**1.33%**
Rest of the World		**22.90**	**20.20**	**20.40**	**21.20**	**21.60**	**21.97**	**21.72**	**27.40%**	**-1.14%**	**-5.14%**
World total		**79.70**	**82.60**	**79.70**	**81.00**	**81.50**	**81.25**	**79.28**	**100.00%**	**-2.43%**	**-0.53%**
Share 17 major countries (%)		**71.30**	**75.50**	**74.40**	**73.80**	**73.50**	**72.96**	**72.60**			

Source: FAO - The State of the World Fisheries and Aquaculture in 2018

Ranking included in the economy of the sea map.

Marine capture fisheries: major producer countries (in Million Tonnes)



Source: FAO - The State of the World Fisheries and Aquaculture in 2018

Fishing and aquaculture

Inland aquaculture is the main contributor to aquaculture growth, with China being the most relevant country, accounting for 62% of global aquaculture production.

Main producers of farmed aquatic animals (thousand tonnes and total world share)

Producer	Total aquatic animals production				Share in total world
	2010	2012	2014	2016	2016
China	36,734	41,108	45,469	49,244	62%
India	3,786	4,210	4,881	5,700	7%
Indonesia	2,305	3,068	4,254	4,950	6%
Vietnam	2,683	3,085	3,397	3,625	5%
Bangladesh	1,309	1,726	1,957	2,204	3%
Norway	1,020	1,321	1,333	1,326	2%
Egypt	920	1,018	1,137	1,371	2%
Chile	701	1,071	1,215	1,035	1%
Top 8 subtotal	**49,458**	**56,607**	**63,643**	**69,455**	**87%**
Rest of the World	9,504	9,859	10,141	10,576	13%
World	**58,962**	**66,466**	**73,784**	**80,031**	**100%**

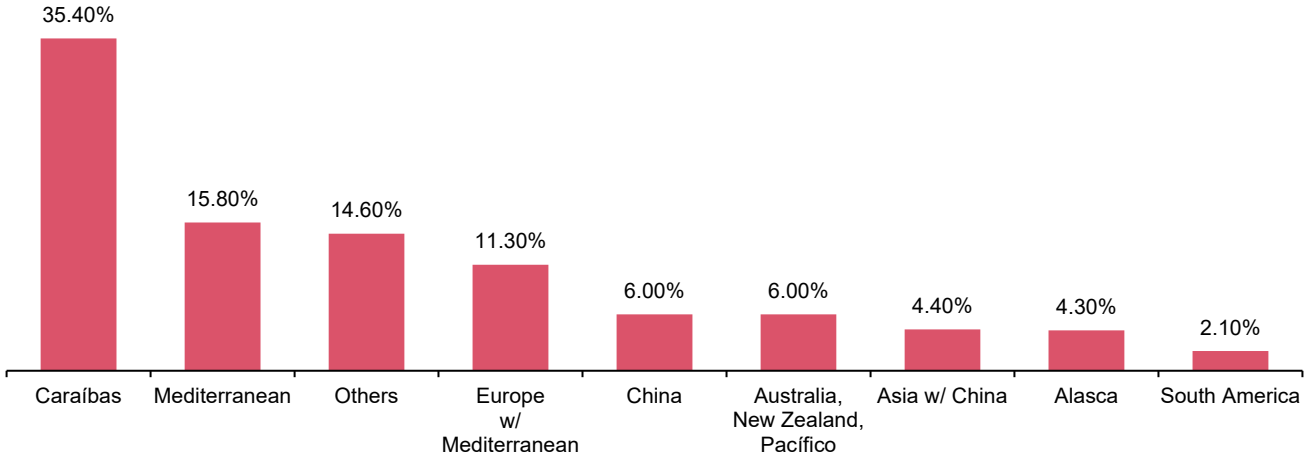
Source: FAO - The State of the World Fisheries and Aquaculture in 2018

Ranking included in the economy of the sea map.

Entertainment, sports, tourism and culture

The Caribbean still holds the largest market share in the business of cruise ships, closely followed by the Mediterranean and the rest of Europe.

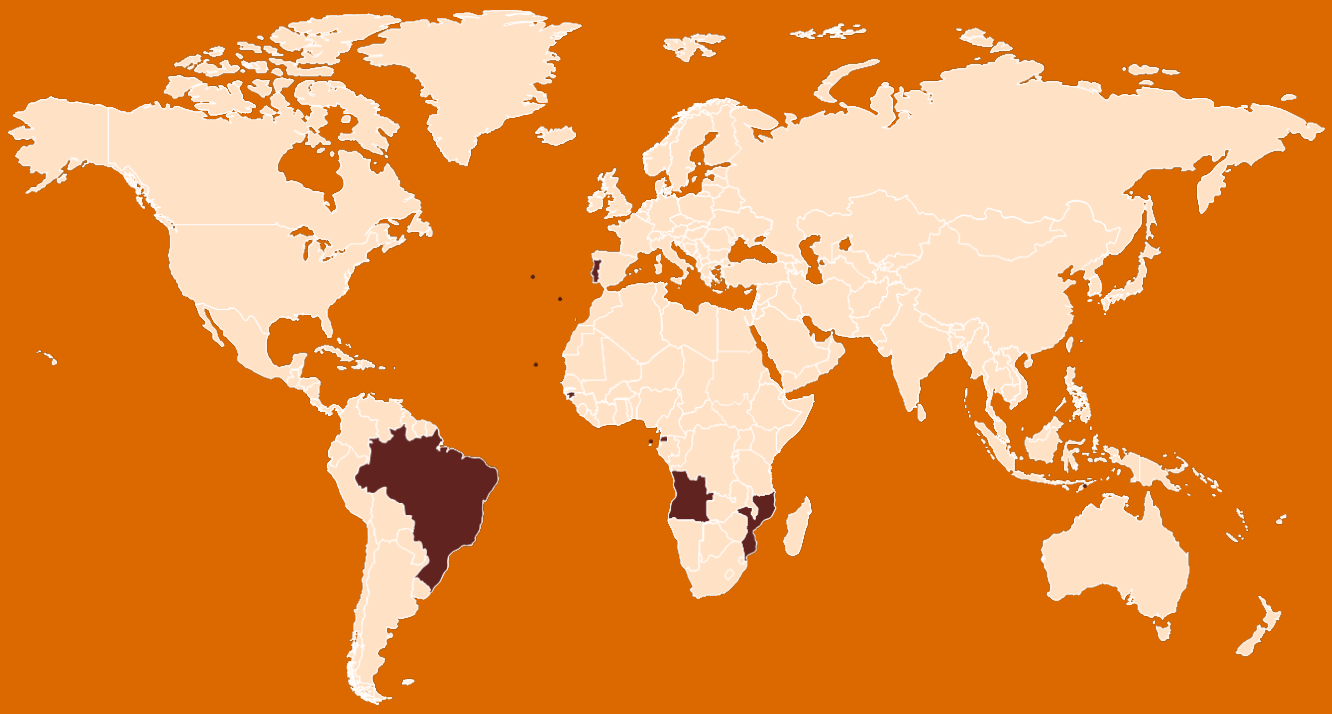
Global cruise industry deployment market share in 2017, by region

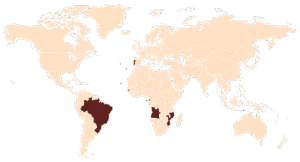


Source: CLIA - Cruise Lines International Association, 2017

Ranking included in the economy of the sea map.

CPLP in the world





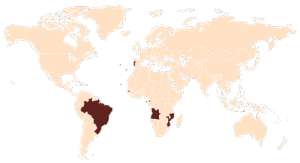
PwC's social responsibility project, HELM - PwC Economy of the Sea Barometer (World), systematizes, in a summarized form, quantitative information on various industries of the sea, enabling the identification of trends of ocean-related industries, and rankings, overlapped on a world map, to help identify the intensity of ocean use in every region of the world. With this exercise of building rankings of countries by industry it was possible to present in the previous chapter and in the document "Circumnavigation: HELM – PwC Economy of the Sea (World) – In depth" the global synthesis of quantitive data. In this chapter, we will address matters about the Economy of the Sea in CPLP, in a worldwide context, that were identified in this exercise.

With an area of about 7.9 million Km2, CPLP countries are the fourth EEZ in the world. The ocean is one of the strongest identity pillars of this community of countries. All the countries that are in CPLP are coastal countries and three of them are archipelagos. We present bellow the EEZ weight of each member state in the CPLP total.

Região/País	% ZEE CPLP
Angola	6%
Brazil	47%
Cape Verde	10%
Guinea-Bissau	1%
Guinea Equatorial	4%
Mozambique	8%
Portugal	22%
Sao Tome and Principe	1%
Timor-Leste	1%
	100%

Source: Marineregions.org

The major part of the CPLP ZEE is considered deep waters.



The economy of the sea is a significant part of the world economy and, as such, is affected by the general evolution of the macroeconomics. Taking into account growth rate of various countries, it may be said that recent years have not been easy. In particular, the year of 2009 was a particularly negative year in which the growth rate of global gross national products was negative (-2.1%), and the major contributors to this poor result were the developed economies (their gross domestic product fell in the order of -3.8%). In 2009, the low growth rate of gross domestic products in developing countries (2.4%) was not enough to offset the negative growth in developed countries. The high growth rates of GDP recorded in 2007 (4.0%) have not yet been restored; the growth rate in 2015 was a mere 2.6%.

The economic performance of the CPLP countries is diversified. However all countries were affected by the global economic instability.

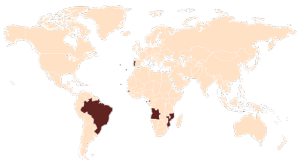
World GDP growth, 2009-2017 (annual percentage change)

Region/Country	2009	2010	2011	2012	2013	2014	2015	2016	2017 a)
World	**-2.1%**	**4.1%**	**2.8%**	**2.2%**	**2.3%**	**2.6%**	**2.6%**	**2.2%**	**2.6%**
Developed countries	**-3.7%**	**2.6%**	**1.5%**	**1.1%**	**1.2%**	**1.8%**	**2.2%**	**1.7%**	**1.9%**
of which:									
Japan	-5.4%	4.2%	-0.1%	1.5%	2.0%	0.3%	1.2%	1.0%	1.2%
United States	-2.8%	2.5%	1.6%	2.2%	1.7%	2.4%	2.6%	1.6%	2.1%
European Union (EU-28)	-4.4%	2.2%	1.7%	-0.4%	0.3%	1.7%	2.3%	1.9%	1.9%
South-East Europe and CIS	**-6.6%**	**4.7%**	**4.7%**	**3.3%**	**2.0%**	**0.9%**	**-2.2%**	**0.4%**	**1.8%**
Developing countries	**2.4%**	**7.8%**	**5.9%**	**4.9%**	**4.8%**	**4.4%**	**3.8%**	**3.6%**	**4.2%**
Angola	2.4%	3.4%	3.9%	5.2%	6.8%	4.8%	3.0%	-0.7%	1.5%
Brazil	-0.1%	7.5%	3.9%	1.9%	3.0%	0.1%	-3.8%	-3.6%	0.7%
Cape Verde	-1.3%	1.5%	4.0%	1.1%	0.8%	1.9%	1.0%	3.8%	4.0%
Guinea-Bissau	3.3%	4.4%	9.4%	-1.8%	0.8%	2.5%	5.1%	5.1%	5.0%
Equatorial Guinea	1.3%	-8.9%	6.5%	8.3%	-4.1%	-0.5%	-9.1%	-9.7%	-7.4%
Mozambique	6.4%	6.7%	7.1%	7.2%	7.1%	7.4%	6.6%	3.8%	4.7%
Portugal	-3.0%	1.9%	-1.8%	-4.0%	-1.1%	0.9%	1.5%	1.6%	2.7%
São Tomé and Príncipe	4.0%	4.5%	4.8%	4.5%	4.0%	4.5%	4.0%	4.1%	5.0%
Timor-Leste	13.0%	10.2%	8.3%	5.8%	2.9%	5.9%	4.3%	5.0%	4.0%

Note: Calculations based on GDP at constant 2005 dollars

a) Forecasts

Source: UNCTAD – Trade and Development Report 2017 and FMI – World Economic Outlook, October 2017



Being CPLP a community of coastal countries Maritime Transport, Ports and Logistics is vital for economic growth and development. There are examples like Brazil that is not located in the commercial shipping trading track with the highest global traffic. However, it's huge dimension, it's high weight in terms of source of important raw materials, like iron for example, and the fact of being in the top 20 of ownership of the world fleet, give to Brazil an enormous potential in terms of maritime transport, ports and logistics. Countries like Angola and Mozambique have also the opportunity to develop their maritime transport, ports and logistics industry, using their huge coast and because of having big volumes of raw material to transport. In the case of Portugal where raw materials are not abundant, the opportunity is the location in the commercial shipping trading track with the highest traffic. The archipelago countries of Cape Verde, São Tomé and Príncipe and Timor-Leste have a good opportunity in the development of inter islands maritime transport and ports. Guinea- Bissau and Equatorial Guinea also want to develop their port system and maritime transport.

Iron: Main exporters and importers, 2016 (Percentage world market share)

Iron Ore Exporters	%	Iron Ore Importers	%
Australia	57%	China	71%
Brazil	26%	Japan	9%
South Africa	5%	Europa	7%
Canada	3%	South Korea	5%
Sweden	2%	Others	8%
Others	7%		

Source: UNCTAD - Review of Maritime Transport 2017

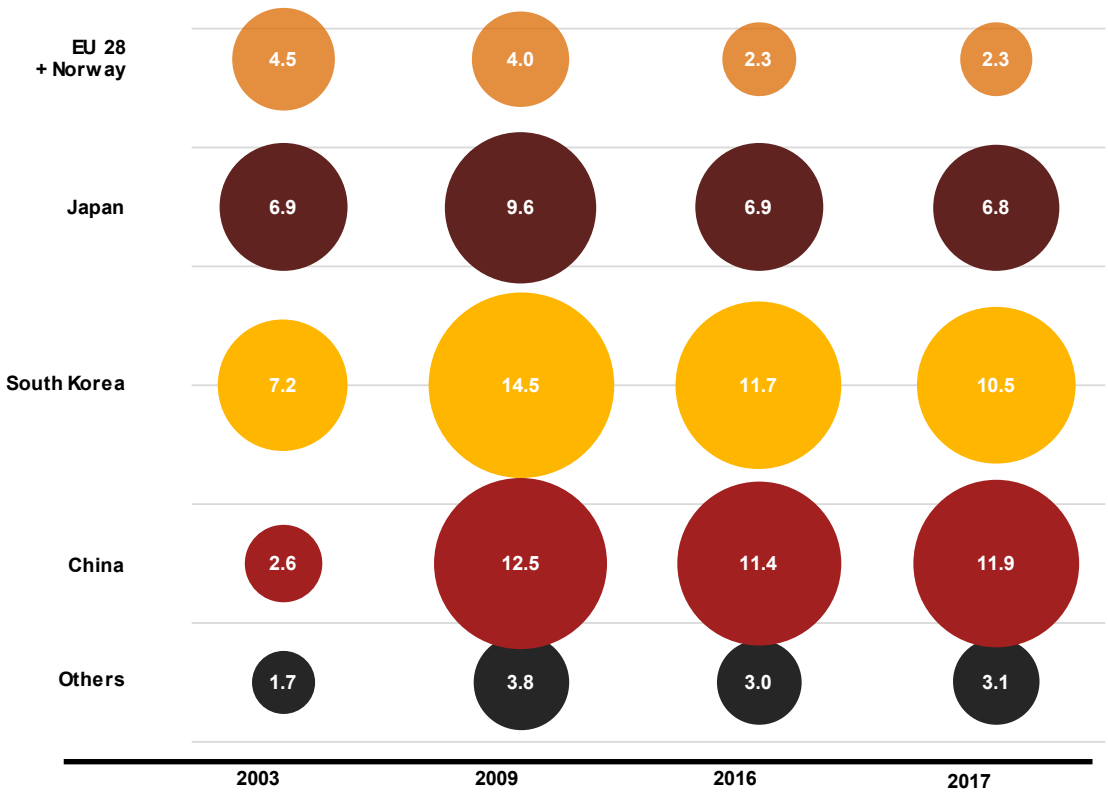
Steel: Main producers and consumers, 2016 (Percentage world market share)

Steel Producers	%	Steel Consumers	%
China	50%	China	45%
Japan	6%	USA	6%
India	6%	India	6%
USA	5%	Japan	4%
Russia	4%	South Korea	4%
South Korea	4%	Germany	3%
Germany	3%	Russia	3%
Turkey	2%	Turkey	2%
Brazil	2%	Mexico	2%
Others	18%	Others	25%

Source: UNCTAD - Review of Maritime Transport 2017

Asia is the continent with the biggest production in terms of Shipbuilding industry.

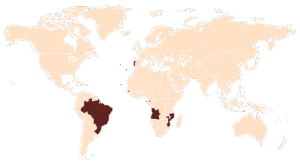
Completions in global shipyards (in millions of CGT)



Source: Sea Europe, Shipbuilding Market Monitoring, Report No 44, 2018

CPLP needs to develop its shipbuilding because of its huge maritime area, wants to develop its shipping and has excellent conditions to build naval shipbuilding and maintenance. Maritime areas defence complies to the development of military navies that need naval equipment.

As an example, in 2017 Brazil shipbuilding represented 0.5% of the global production (completions). In the same year Brazil represented 0.2% of the world shipbuilding order book.



In 2017, total production of CPLP countries offshore fossil energy (oil & gas) was about 1,925 million Kbbl/d. This level of production overcame the level of production of the biggest offshore world producer that is Saudi Arabia with 1,551 million Kbbl/d. The percentage of CPLP production by country is:

Offshore Oil & Gas 2017	
Angola	33%
Brazil	57%
Cabo Verde	0%
Guiné-Bissau	0%
Equatorial Guinea	7%
Mozambique	0%
Portugal	0%
Sao Tome and Principe	0%
Timor-Leste	2%
	100%

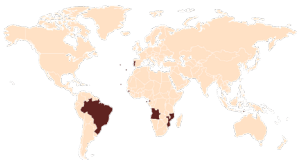
Source: Rystad Energy Ucube

In 2018, the total of CPLP aircraft carriers, frigates, destroyers, corvettes and submarines was 32 that means position 12 in the ranking of navy's heavy equipment. The percentage by CPLP country is:

Total (Aircraft Carriers + Frigates + Destroyers + Corvettes + Submarines)	
Angola	0%
Brazil	70%
Cabo Verde	0%
Guinea Bissau	0%
Equatorial Guinea	0%
Mozambique	0%
Portugal	30%
Sao Tome and Principe	0%
Timor-Leste	0%
	100%

Source: Global Firepower - June 2018

As refered in the previouse chapter, between 2010 and 2017, several pirate attacks were registered all over the worls and many of them in CPLP waters or nearby CPLP waters.



About sea food, fish protein always was a relevant source of protein for all CPLP countries, reason why always traditional fishing was active. There are also other countries that have huge opportunities in their inland waters for fishing and aquaculture. The diversity of fish species is high, but the quantity is relatively low. In this context none of the CPLP countries is in the list of main fishing countries.

Aquaculture and aquatic animals, by type of production in 2016

Producer	Fish		Other species[a]	Total aquatic animals production	Share of world total
	Inland aquaculture	Marine/Coastal aquaculture			
	(thousand tonnes)				(%)
Africa	1.954	17	11	1.982	2.48%
Americas	1.072	906	1.370	3.348	4.18%
Asia	43.983	3.739	23.823	71.545	89.40%
Europa	502	1.830	613	2.945	3.68%
Oceania	5	82	124	211	0.26%
World	**47.516**	**6.575**	**25.941**	**80.031**	**100.00%**

a The column other species includes crustaceans, bivalves, molluscs and other species.
Source: FAO - The State of the World Fisheries and Aquaculture in 2018

Main producers of farmed aquatic animals (thousand tonnes and total world share)

	Total aquatic animals production				Share in total world
Producer	2010	2012	2014	2016	2016
China	36,734	41,108	45,469	49,244	62%
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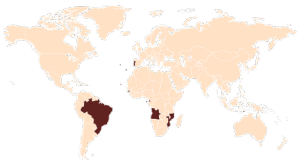
Norway	1,020	1,321	1,333	1,326	2%
Egypt	920	1,018	1,137	1,371	2%
Chile	701	1,071	1,215	1,035	1%
Top 8 subtotal	**49,458**	**56,607**	**63,643**	**69,455**	**87%**
Rest of the World	9,504	9,859	10,141	10,576	13%
World	**58,962**	**66,466**	**73,784**	**80,031**	**100%**

Source: FAO - The State of the World Fisheries and Aquaculture in 2018



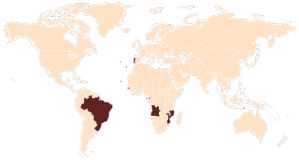
The per capita fish consumption varies from CPLP country to country.

Per capita food fish supply by continent and economic grouping in 2010, 2013 and 2015

	Per capita sea food supply		
	2010	2013	2015
	(kg/year)		
World	**18.9**	**19.7**	**20.2**
World (except China)	15.4	15.3	15.5
Africa	9.7	9.8	9.9
North America	21.8	21.4	21.6
Latin America and the Caribbean	9.7	9.4	9.8
Asia	21.6	23.0	24.0
Europe	22.0	22.2	22.5
Oceania	25.4	24.8	25.0
Developed countries	27.4	26.8	24.9
Least Developed Countries	11.5	12.4	12.6
Others Developing Countries	18.9	20.0	20.5
LIFDCs - Low-income food-deficit countries.	10.9	7.6	7.7

Source: FAO - The State of the World Fisheries and Aquaculture in 2018

In CPLP the tourism potential related to the sea is enormous. In the ranking of the world best water sports athletes, as sailing or surf for example, Brazil has athletes. Portugal is located in between the second and the third cruise markets in the World and profited from cruise industry growth. Cape Verde, São Tomé and Príncipe and Mozambique have been investing in costal tourism.



CPLP in the World

Relevant matters identified by Circumnavigation: HELM World:

- With an area of about 7.9 million Km^2, CPLP countries are the fourth EEZ in the world;
- The ocean is one of the strongest identity pillars of this community of countries;
- The major part of the CPLP ZEE is considered deep waters.
- Maritime Transport, Ports and Logistics is vital for economic growth and development of this countries;
- Needs to develop its shipbuilding;
- In 2016, due to the contributions of Brazil, Angola and Timor-Leste total production of CPLP countries offshore fossil energy (oil & gas) overcame the level of production of the biggest offshore world producer, Saudi Arabia;
- Because of the contribution of Brazil and Portugal, CPLP is in the position 12 of the heavy navy equipment ranking;
- Between 2010 and 2016, several pirate attacks were registered all over the world and many of them in CPLP waters or nearby CPLP waters;
- About sea food, fish protein always was a relevant source of protein for all CPLP countries, reason why always traditional fishing was active. There are also other countries that have huge opportunities in their inland waters for fishing and aquaculture. The diversity of fish species is high, but the quantity is relatively low. In this context none of the CPLP countries is in the list of main fishing countries.
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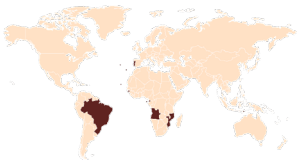

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is a PwC social responsibility and thought leadership initiative that includes three documents:

- Circumnavigation: HELM – PwC Economy of the Sea Barometer (World) Summary
- Circumnavigation: HELM – PwC Economy of the Sea Barometer (World) In-depth
- Economy of the Sea Map

The economy of the sea is an integrated approach to sea activities with the aim to promote growth and development in a sustainable way.

Please see PwC social responsibility and thought leadership projects about the economy of the sea in
http://www.pwc.pt/en/issues/economy-of-the-sea.html