Anthropic impact on the Mediterranean Sea, other than climate change

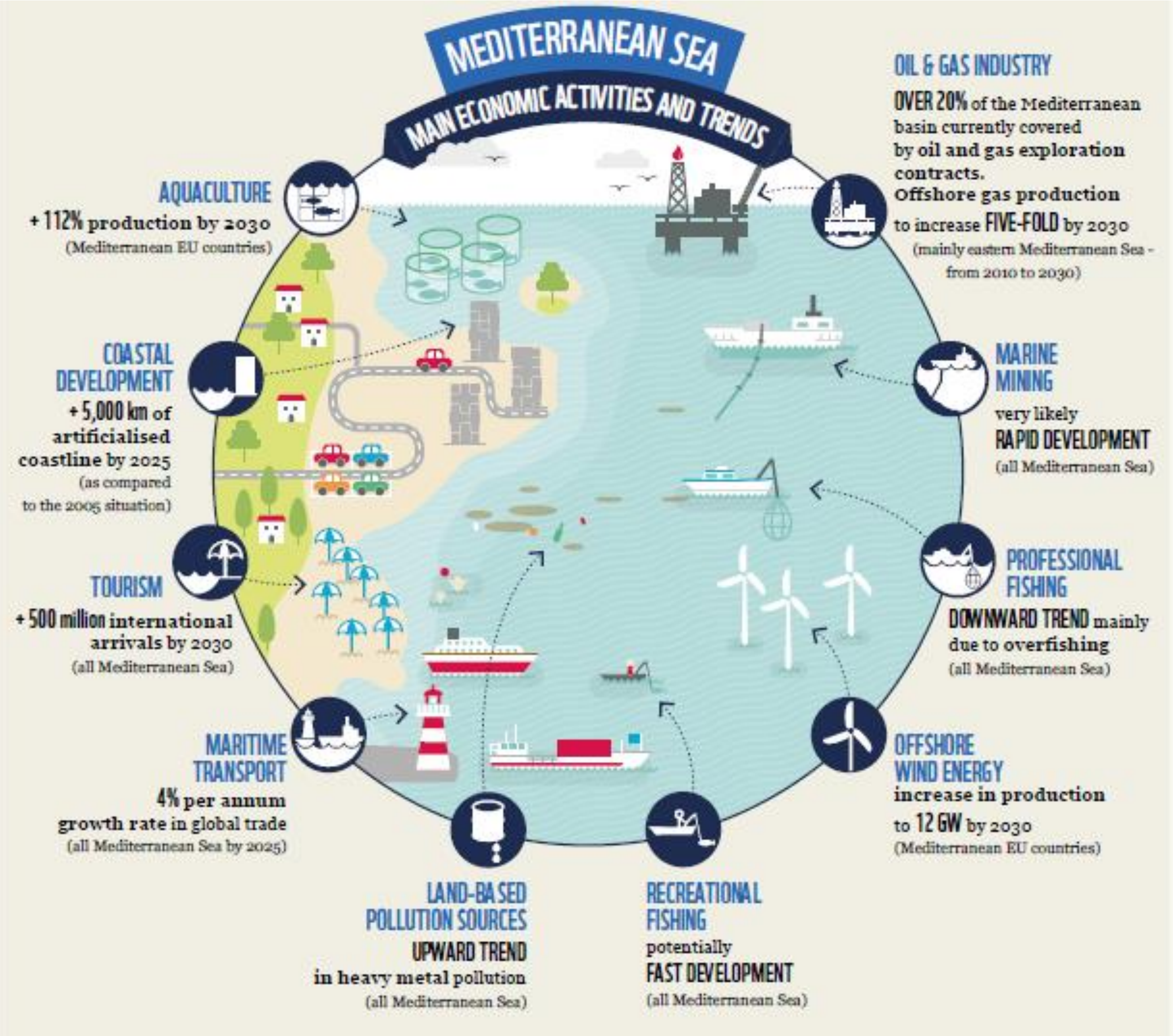
Presentation for MEDAC WG1, online meeting of 16 February 2021

Dr. George Triantaphyllidis, Greece

GeorgeTrianta@hotmail.com

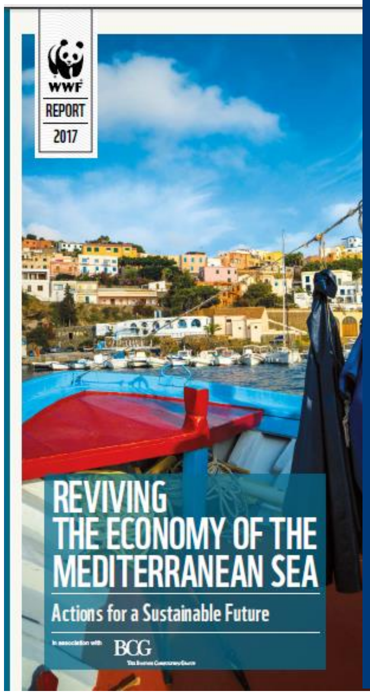
ΠΑΝΕΛΛΗΝΙΑ ΕΝΩΣΗ ΠΛΟΙΟΚΤΗΤΩΝ ΜΕΣΗΣ ΑΛΙΕΙΑΣ
PANHELLENIC UNION OF MIDDLE RANGE FISHERIES SHIP OWNERS

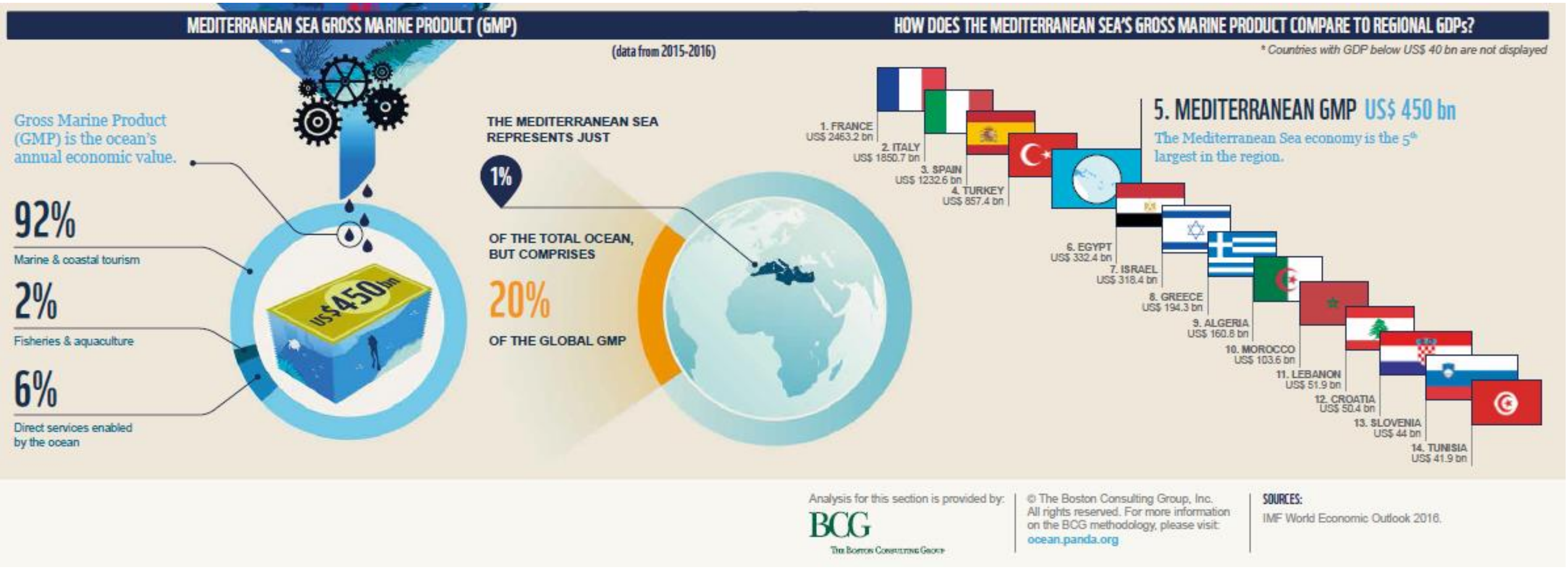
Mediterranean Sea: main economic activities and trends



1. Coastal development
2. Marine-based pollution sources
3. Maritime transport and ports
4. Offshore oil and gas exploration and extraction
5. Marine renewable energy
6. Marine mining
7. Marine aquaculture
8. Professional fisheries
9. Recreational fisheries
10. Tourism
11. Biotechnology

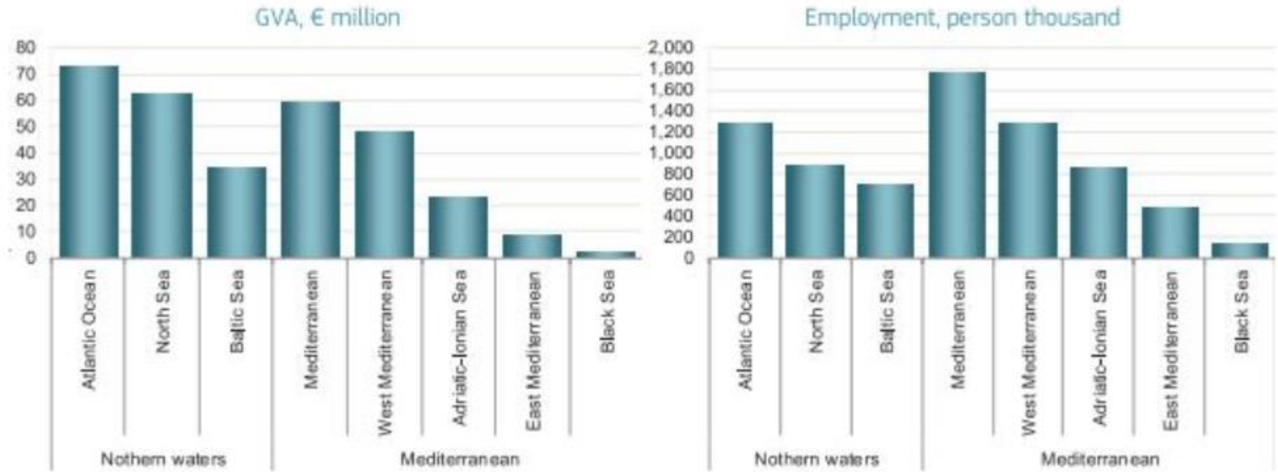
Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.





Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.

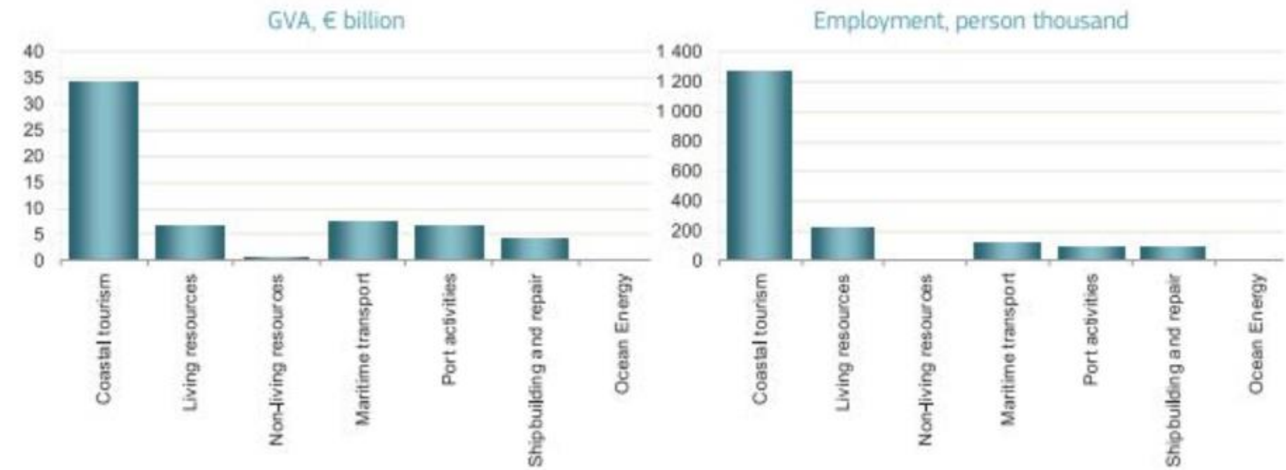
EU Blue Economy by sea basin, 2017: Gross Value Added (GVA) and employment



: Eurostat (SBS), DCF and Commission Services

EU Blue Economy by sea basin, 2017: Gross Value Added (GVA) and employment

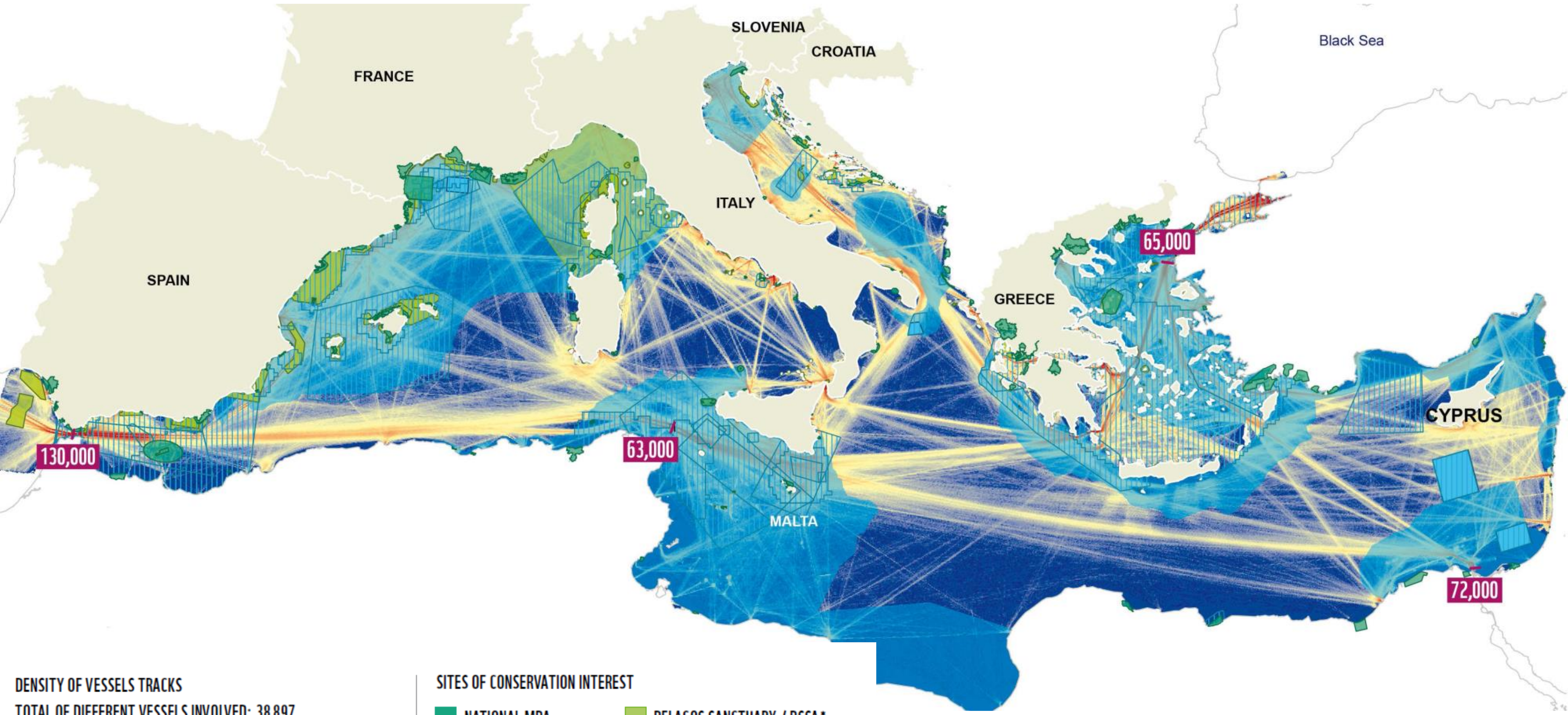
The Mediterranean Sea basin Blue Economy by sector, 2017: Gross Value Added (GVA) and employment



Source: Eurostat (SBS), DCF and Commission Services

Source: https://medblueconomyplatform.org/

Maritime transport and ports



DENSITY OF VESSELS TRACKS
TOTAL OF DIFFERENT VESSELS INVOLVED: 38 897
Interpolation / Log scaling / Year 2014
HIGH LOW
MAX = 169 966* MEDIAN = 418* MIN = 1*
*In 1 pixel of 1x1 km
Source: AIS density maps by navama technology for nature
APPROXIMATION OF NUMBER OF DENSITY TRACKS IN SHIP CHANNEL

SITES OF CONSERVATION INTEREST
- NATIONAL MPA
- PELAGOS SANCTUARY / PSSA*
- NATURA 2000 SITE
- ECOLOGICALLY AND BIOLOGICALLY SIGNIFICANT AREAS (EBSA)
- REPLACE BY FISHERIES RESTRICTED AREA (FRA)
- PRIORITY AREAS FOR CONSERVATION

Sources: MAPAMED (2014) / UNEP RAC/SPA (2010 - 2014) / ACCOBAMS (2010) / IHO-IOC GEBCO / GFCM (2006 - 2015)
*Particulary Sensitive Sea Area

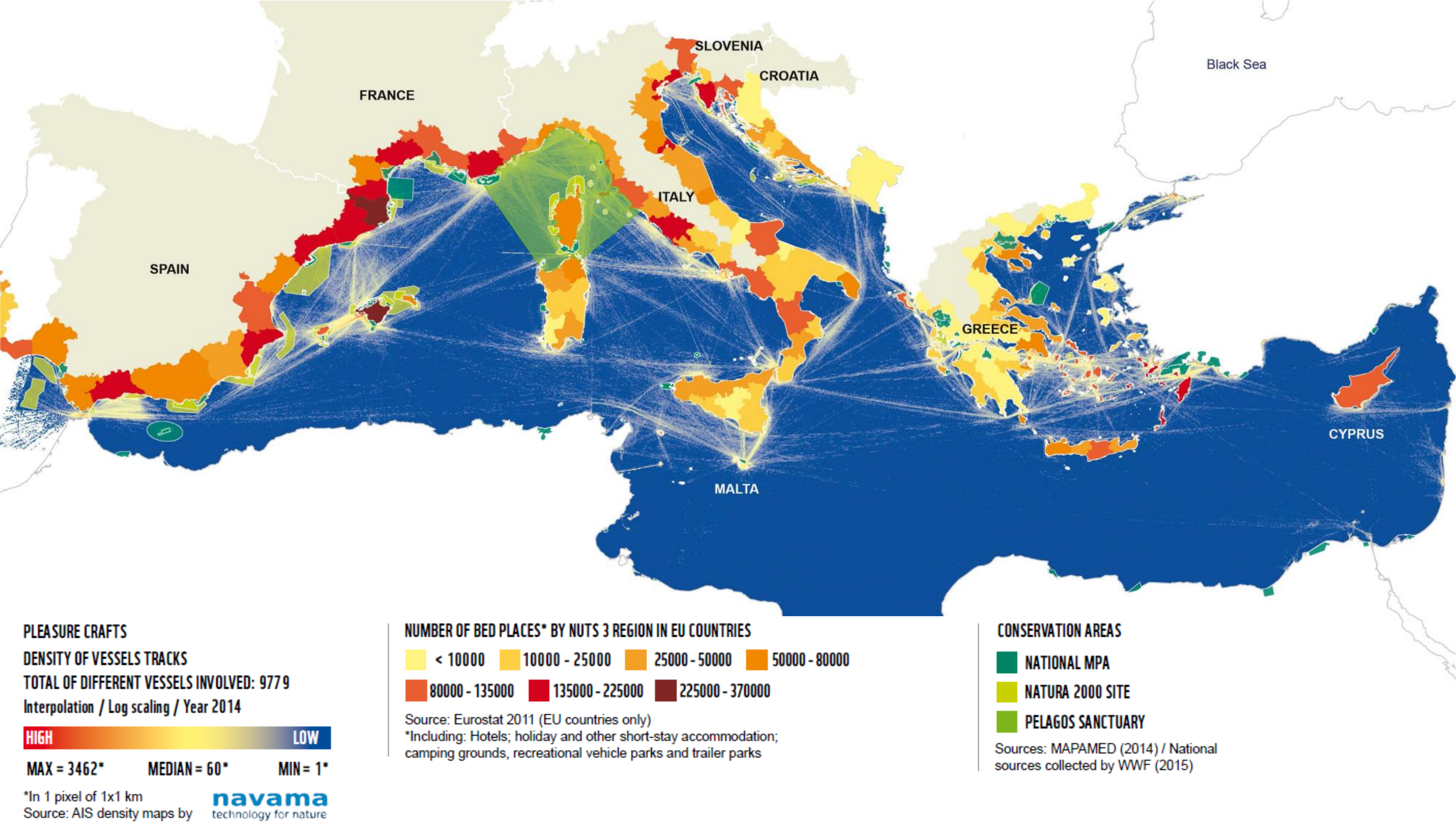
Density of all vessels equipped with AIS transmitters and areas of conservation (2014 – 38,897 vessels)

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Maritime transport and ports

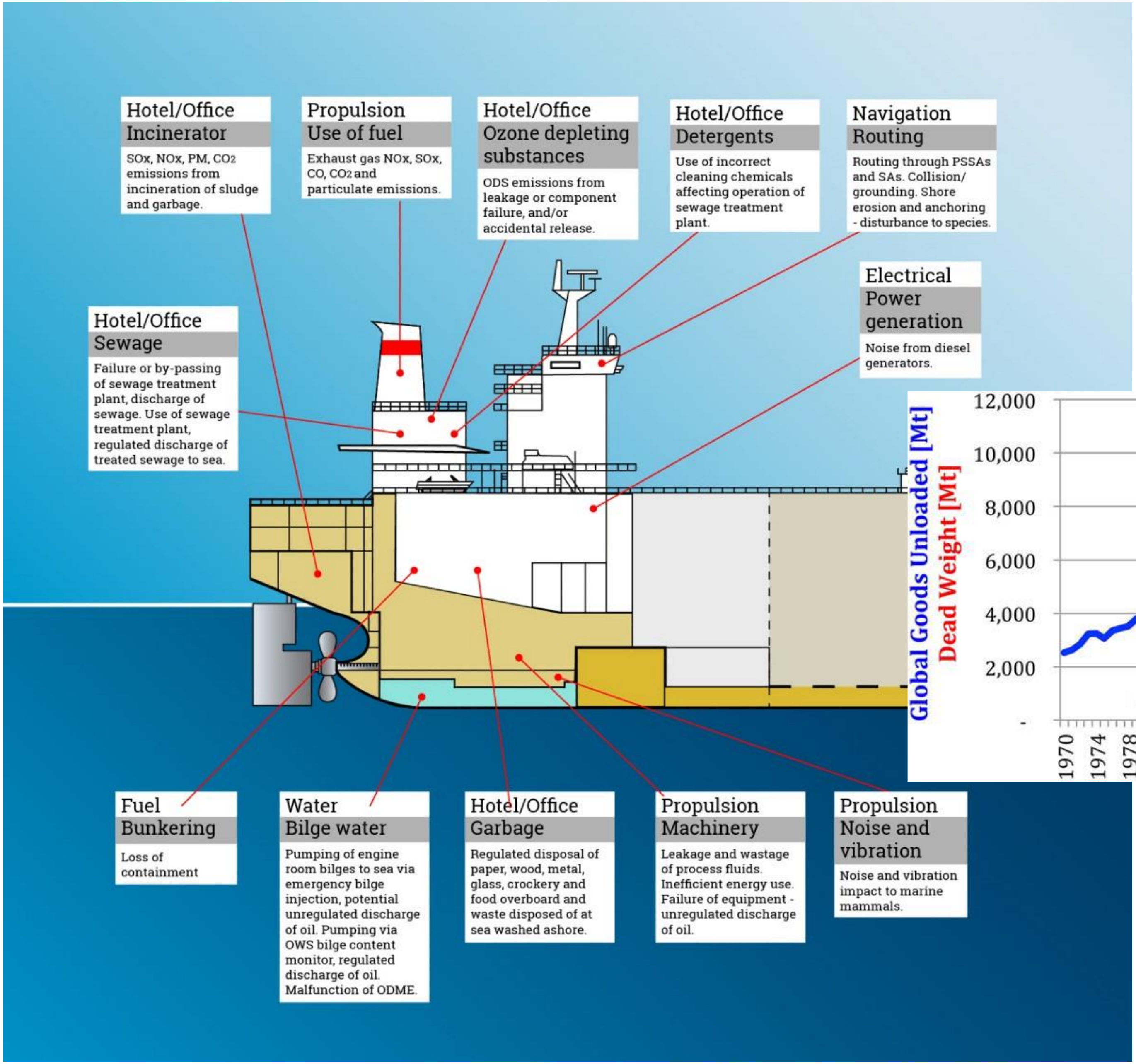
Tourism and MPAs

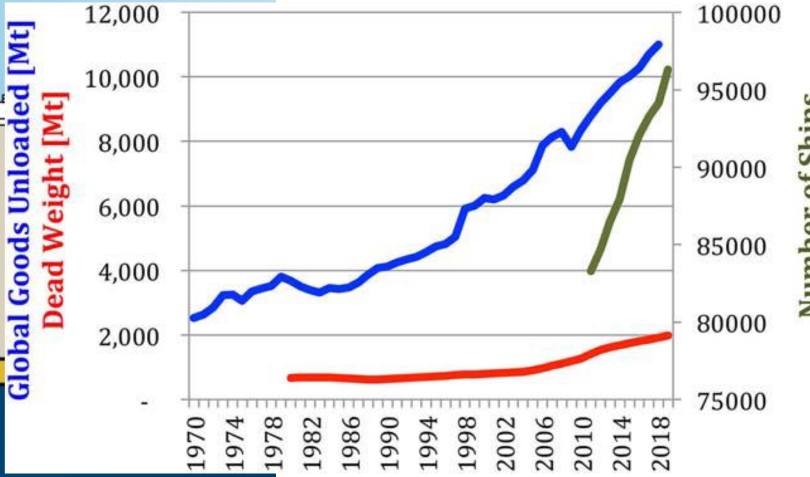
Pleasure crafts (2014 – 9,779 vessels)



Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Potential environmental effects from ships

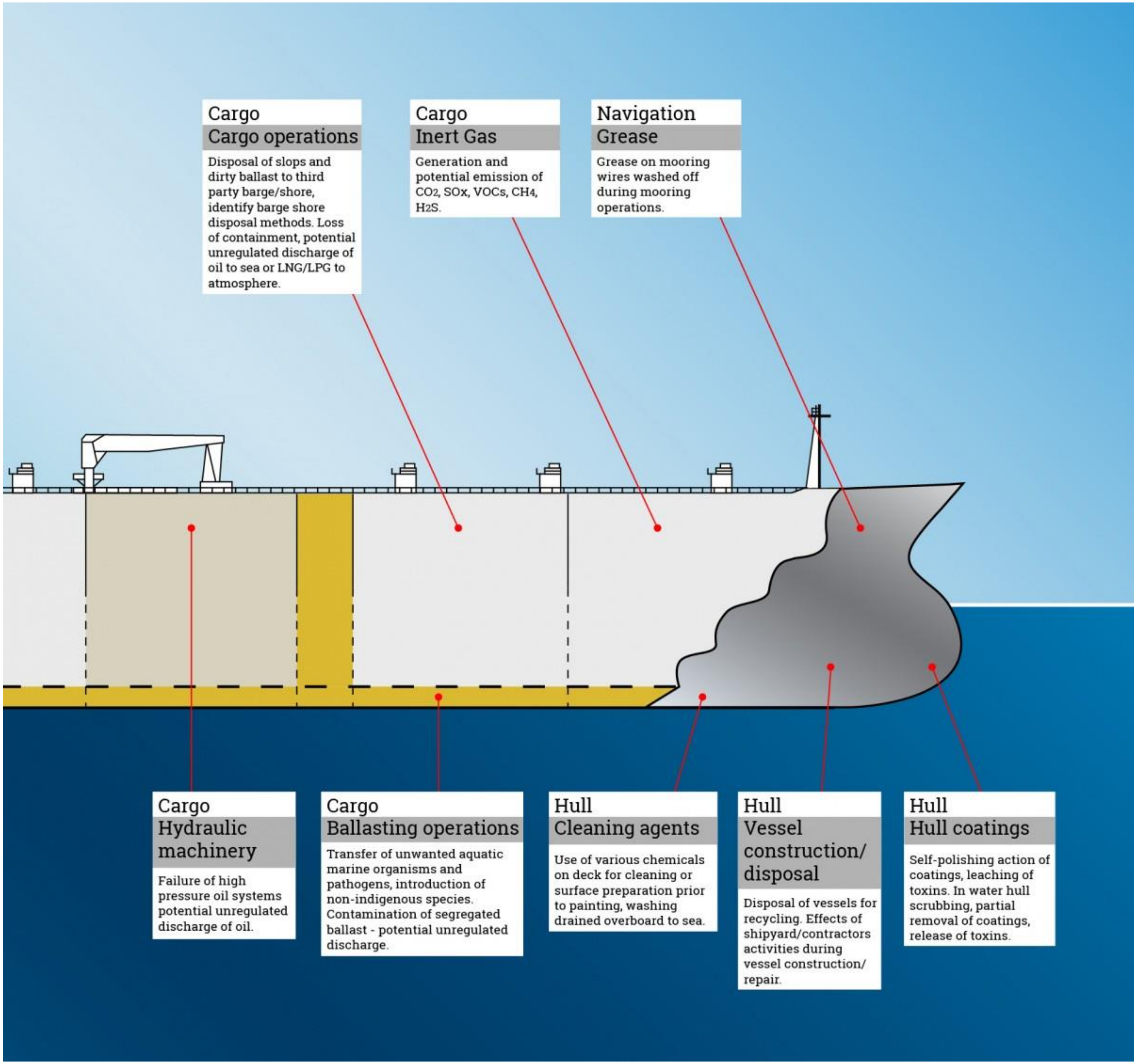




Volume of global goods unloaded from ships (in million tons), dead weight of ships (in million tons), and number of ships1

Source: https://www.capitalship.gr/environmental-impact

Potential environmental effects from ships



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Source: https://www.capitalship.gr/environmental-impact

Science of the Total Environment 695 (2019) 133637

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Review

A review on the environmental impacts of shipping on aquatic and nearshore ecosystems

Annika K. Jägerbrand [a,b,*], Andreas Brutemark [a], Jennie Barthel Svedén [a], Ing-Marie Gren [c]

[a] Calluna AB, Hästholmsvägen 28, SE-131 30 Nacka, Sweden
[b] Department of Construction Engineering and Lighting Science, School of Engineering, Jönköping University, P.O. Box 1026, SE-551 11 Jönköping, Sweden
[c] Department of Economics, Swedish University of Agricultural Sciences, Box 7013, SE-750 07 Uppsala, Sweden

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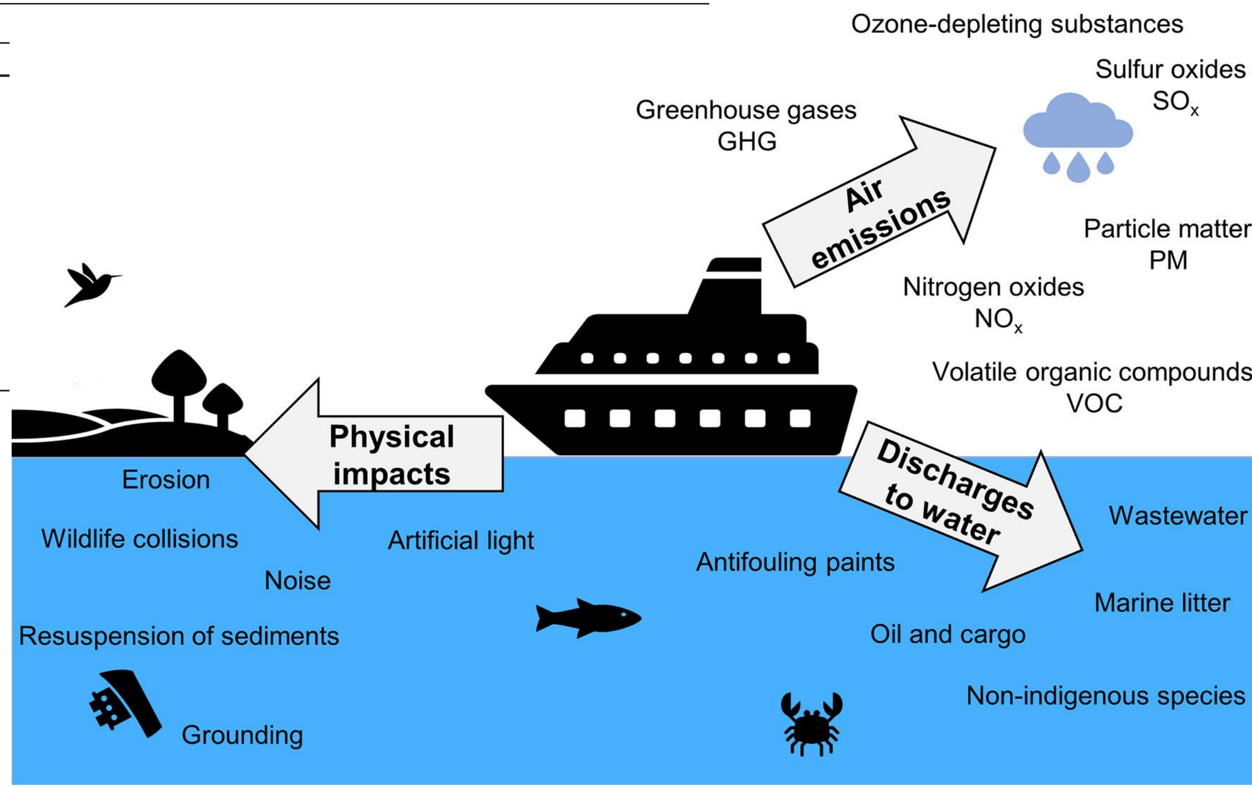
Search terms and groups used in the database literature search.

Group I	Group II	Group III	
Maritime	Inland	Environment*	Scrubber*
Shipping	Water	Pollut*	Bilge*
Transport	Marine	Vibration*	Invasive*
Cargo	Freshwater	Light*	Noise*
Carrier	Coast	Ash*	Antifouling*
Tanker	Estuarine	Debris*	Paint*
Ferries	Baltic	Waste*	Diversi*
Cruise	Canal	Nitrogen AND oxide	Grey AND water
Vessel	Nearshore	Nitrogen*	Wildlife
Shuttle		SOx	Black AND water
Boat		Sulphur	Emission*
Yacht		Particle*	Erosion*
		Oil*	Plastic*
		Sewage*	



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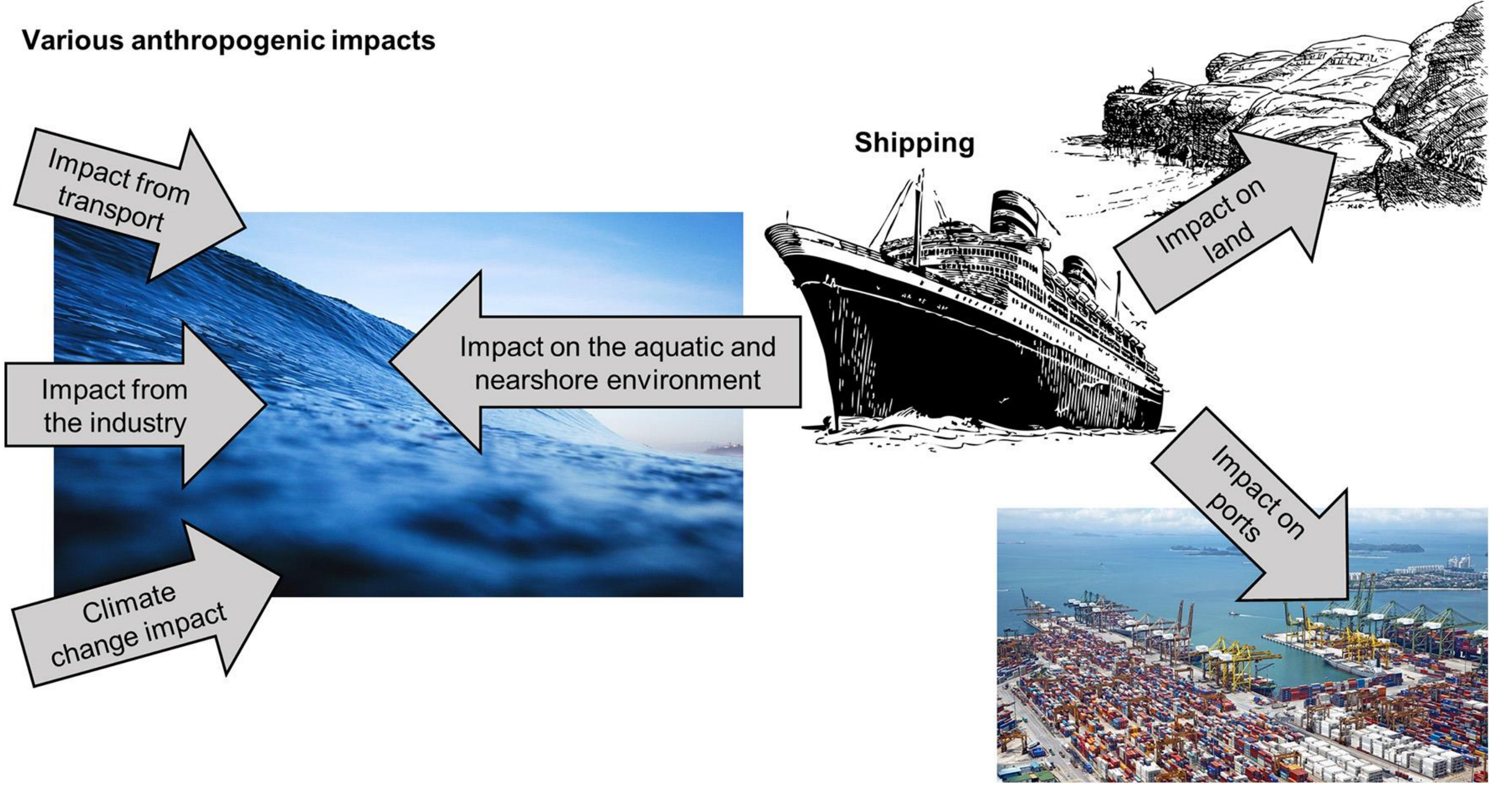
HIGHLIGHTS

- There is a plethora of environmental and ecological effects of shipping.
- Main impact categories are water discharges, physical impacts and air emissions.
- A general lack of quantitative data on shipping derived environmental effects.
- The shipping contribution to acidification has been quantified.
- A holistic approach and synergistic effects of parameters are missing.



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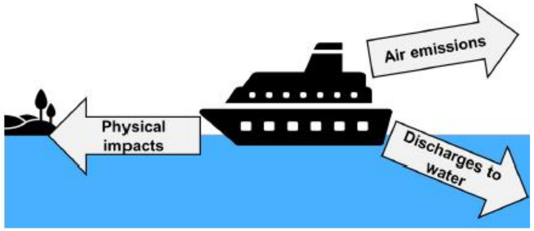
GRAPHICAL ABSTRACT



	Environmental and ecological consequences
Water discharges	
Oil	Broad, from DNA-damage to changes in community structure
Bilge water	Reproduction failure, changes in community structure
HNS	Toxicity, indirect ecological effects (e.g., changes in behavior)
Dry bulk	Habitat destruction, eutrophication
Wastewater	Pollution, eutrophication, anoxia
Marine litter (plastic)	Population decline, pollution
NIS	Loss of biodiversity, changes in community structure
Antifouling paints	Reproduction failure, reduced growth
Physical impacts	
Noise	Affected navigation, communication, prey detection, etc.
Artificial light	Affected migration patterns, disorientation
Wildlife collisions	Loss of biodiversity, threat to endangered species
Erosion & resuspension	Habitat loss, eutrophication
Grounding	Loss (or gain) of habitat, pollution
Air emissions	
GHG (mainly CO_2)	Climate change (warming), acidification
SO_x	Acidification, pollution, climate change (cooling)
NO_x	Acidification, eutrophication, climate change (net cooling)
PM	Air pollution, climate change (cooling)
VOC	Air pollution, climate change (warming)
ODS	Changes in community structure (through increased UVB)

DOI: 10.3389/978-2-88966-085-8

A dead whale estimated to be 46 feet (14 meters) long was carried into New Zealand’s Port of Tauranga on the bow of a Maersk container ship (Oct 2017)

World Health Organization
REGIONAL OFFICE FOR Europe

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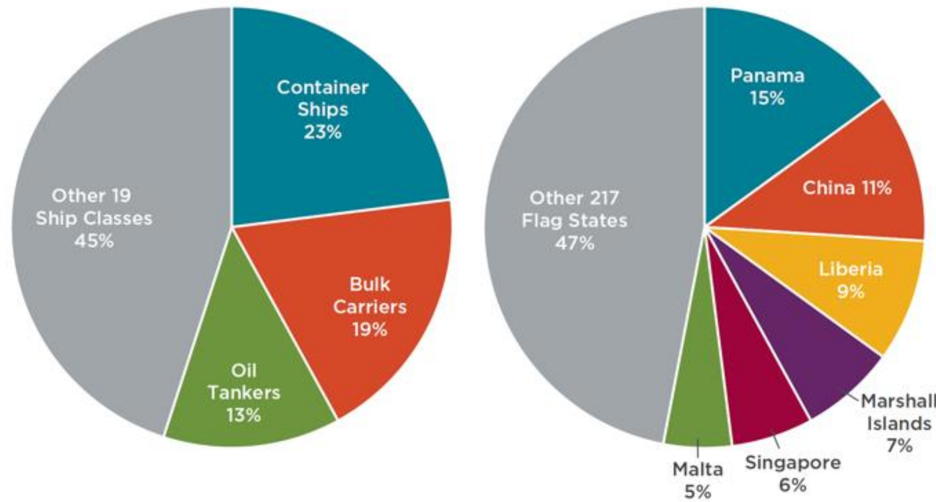
Health risks of air pollution in Europe – HRAPIE project

New emerging risks to health from air pollution – results from the survey of experts



Share of CO_2 emissions by ship class (left) and flag state (right), 2013–2015 **(source: https://theicct.org/)**

Main findings

A total of 100 respondents completed the survey, completing 113 sets of questions.

The top six emission source categories (of a total of 16) posing an emerging health risk identified by respondents were:

1. road transport (40.7%)
2. space heating and air conditioning (15.0%)
3. shipping (8.8%)
4. energy production and distribution (6.2%)
5. industrial processes (metal industries) (6.2%)
6. agriculture (5.3%).

Source: https://www.euro.who.int/__data/assets/pdf_file/0017/234026/e96933.pdf

Environment International 138 (2020) 105670

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

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Estimated health impacts from maritime transport in the Mediterranean region and benefits from the use of cleaner fuels

M. Viana[a,*], V. Rizza[b], A. Tobías[a], E. Carr[c], J. Corbett[d], M. Sofiev[e], A. Karanasiou[a], G. Buonanno[b,f], N. Fann[g]

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[d] College of Earth, Ocean, and Environment, University of Delaware, Newark, DE, United States
[e] Finnish Meteorological Institute (FMI), Helsinki, Finland
[f] Queensland University of Technology, Brisbane, Australia
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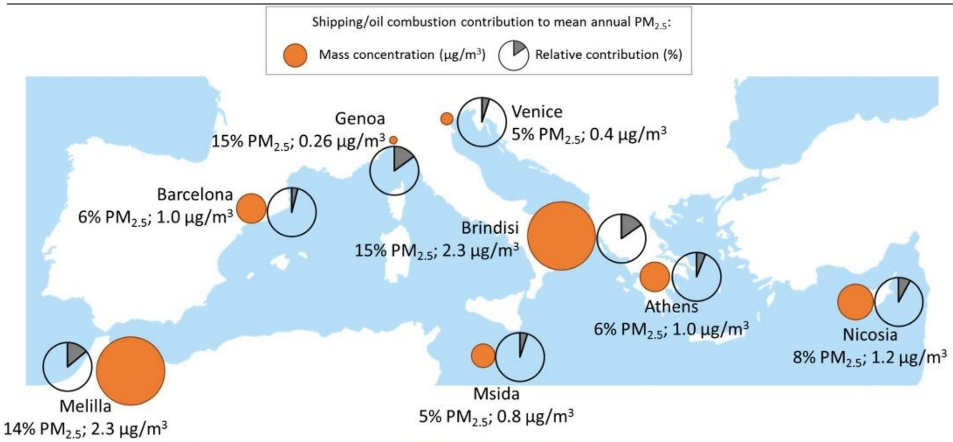

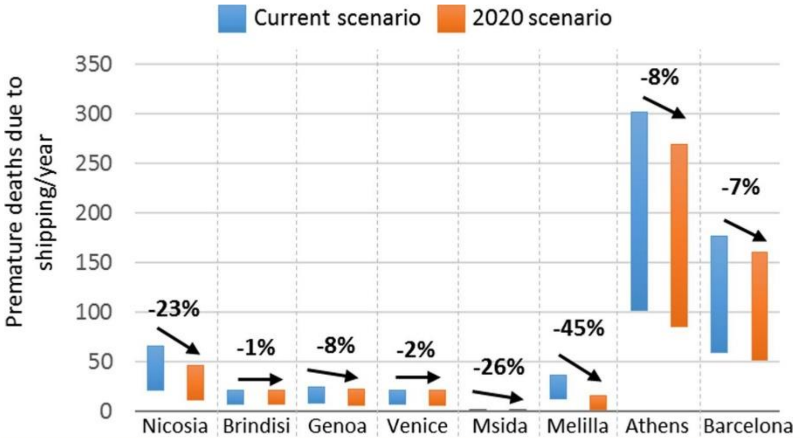

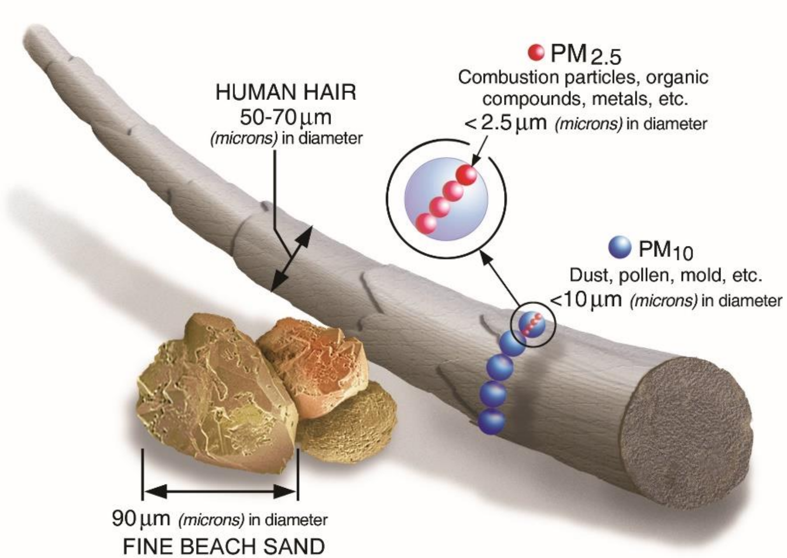

Source: EPA

https://www.epa.gov/pm-pollution/particulate-matter-pm-basics

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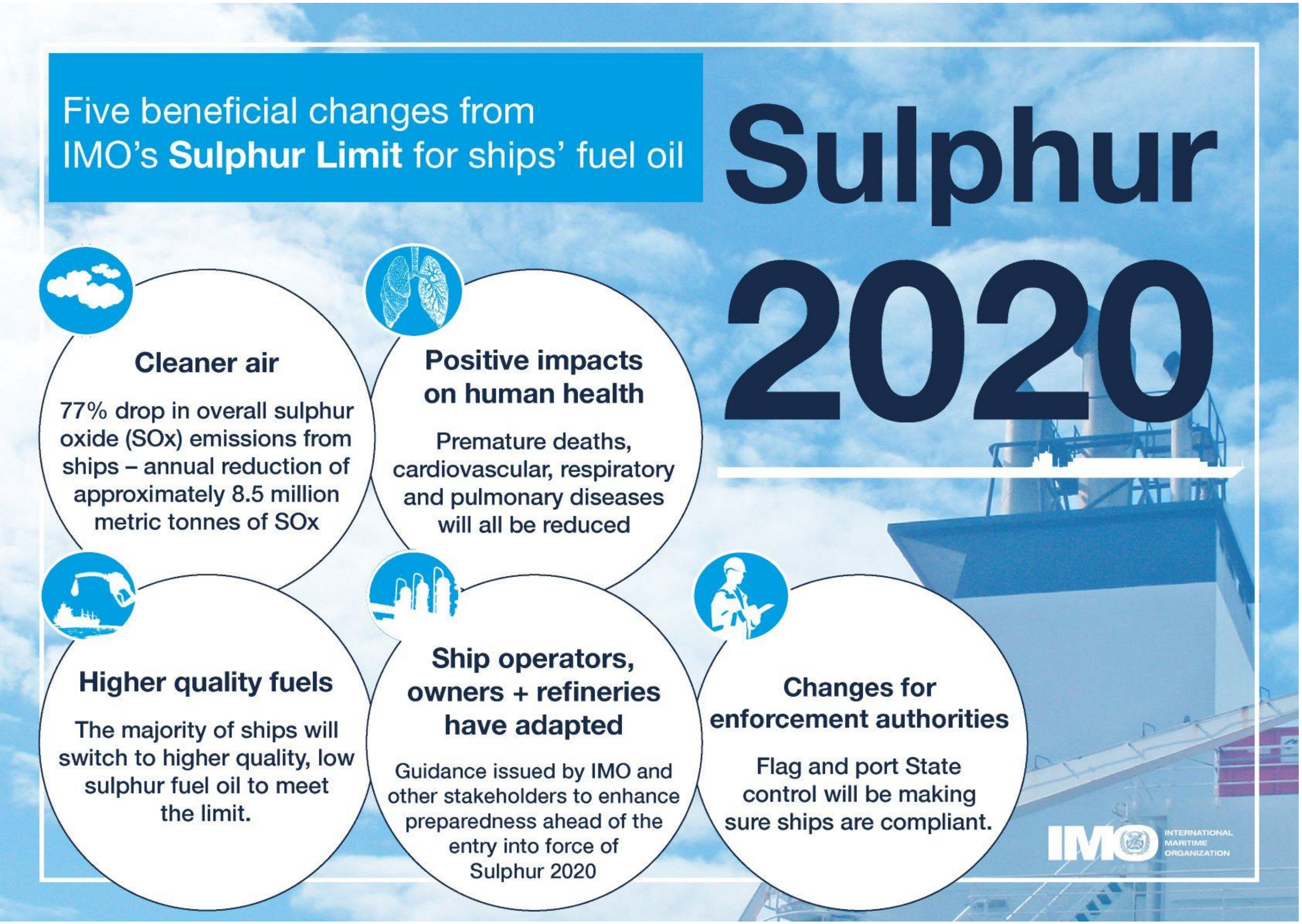

Source: IMO

https://www.imo.org/en/MediaCentre/HotTopics/Pages/Sulphur-2020.aspx

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In total, of the **95,402** ships in the UNCTAD maritime database, 7.66 % have installed or ordered a ballast water treatment system, 1.58 % have installed or ordered a system to reduce sulphur-oxide emissions, and 0.53 % have installed or ordered a system to reduce nitrogen-oxide emissions as of 1 January 2019.

Selected environmental indicators by vessel type, 2019

Vessel type	Percentage of vessels fitted with ballast water treatment systems	Percentage of vessels fitted with scrubbers	Percentage of vessels compliant with tier III regulations to reduce nitrogen-oxide emissions
Bulk carriers	23.32	4.03	0.05
Chemical tankers	10.72	1.15	0.86
Container ships	18.88	5.05	0.19
Ferries and passenger ships	1.36	2.13	0.57
General cargo ships	2.16	0.65	0.21
Liquefied natural gas carriers	28.76	1.45	1.45
Offshore supply vessels	2.37	0.03	0.96
Oil tankers	11.99	3.71	0.46
Other/not available	2.82	0.30	0.19
Total	**7.66**	**1.58**	**0.53**

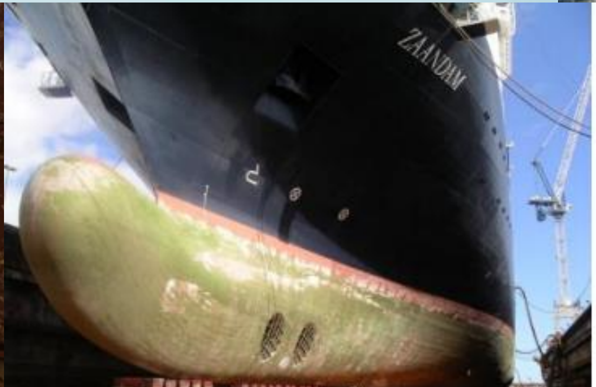
Source: Review of Maritime Transport 2019
https://unctad.org/system/files/official-document/rmt2019_en.pdf

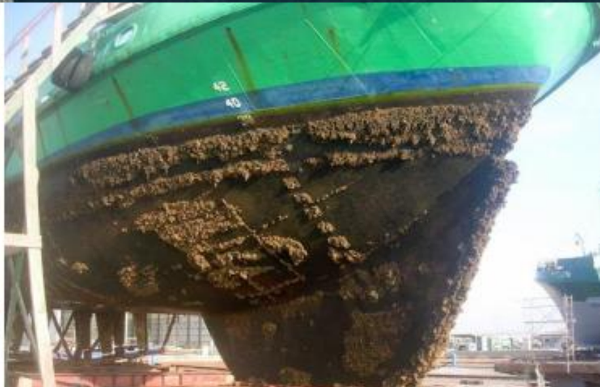
Ports impacts - Biofouling

Ports impacts - Biofouling

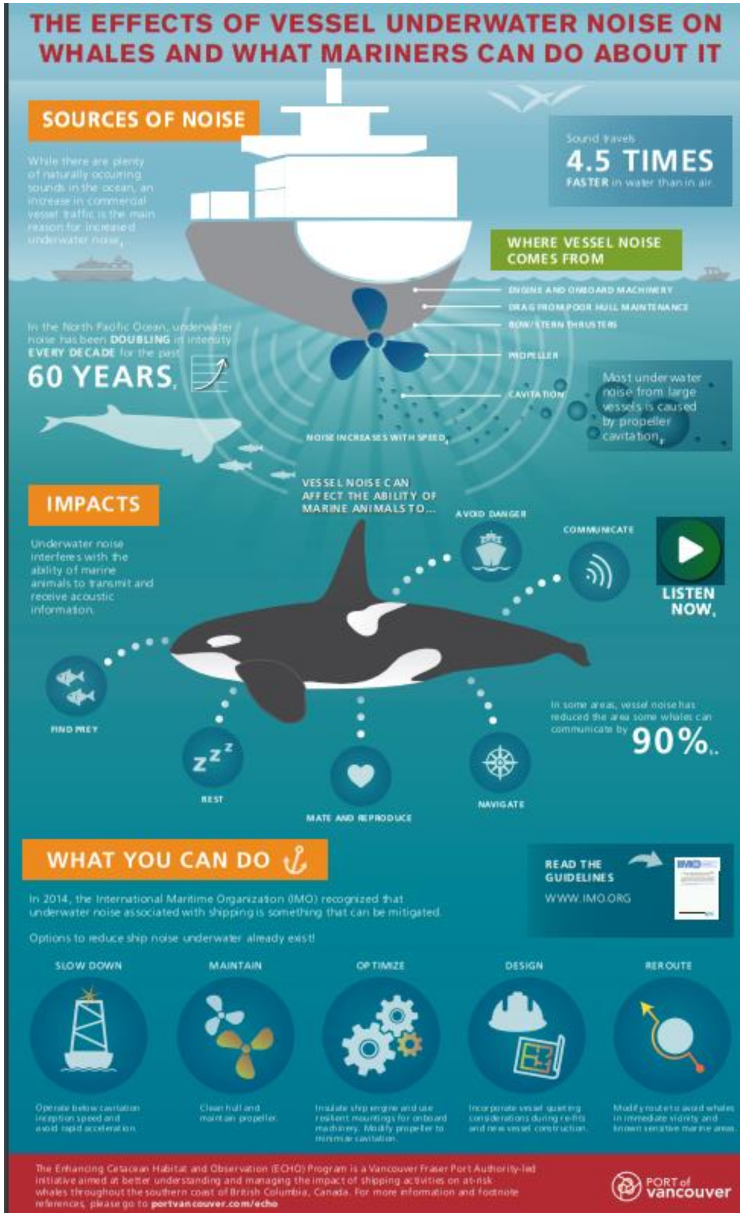
Toxicity

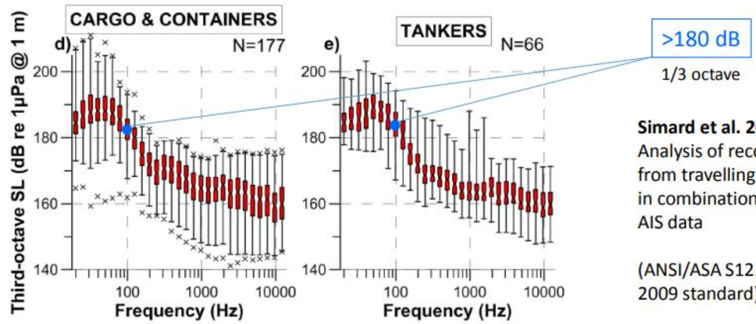
- Effects of TBT products on humans: irritated skin, headaches, colds, flu, fatigue dizziness, stomach ache, irritation of the eye and mucous membranes and prolonged exposure may cause liver and kidney damage.
- High levels of TBTO can affect the endocrine glands, upsetting the hormone levels in the pituitary, gonad and thyroid glands.
- Large doses of TBT have been shown to damage the reproductive and central nervous systems, bone structure and the gastrointestinal track of mammals.
- Studies have been conducted showing that TBTO causes depression of immune functions





Shipping noise





Simard et al. 2016
Analysis of recordings from travelling vessels in combination with AIS data

(ANSI/ASA S12.64-2009 standard)

St. Lawrence Seaway, 255 ships

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An indication of the relative merits of the different management and mitigation options

Source Type	Metric	Demand reduction	Alternative technology	Modify existing gear	MPAs and similar	Early planning options	Safety zones & shut-downs	Ramp-up	Mitigation sources	Isolation techniques	Operational measures
Seismic survey airguns	Viability	H	H	H	M-H	M-H	M-H	H	H	L	H
	Effectiveness	VH	M-H	L-M	M	M	(L-M)?	?	L?	L	L-M
	Availability	S-F	I-S	I	I	I	I	I	I	S	I
Navy sonar	Viability	L-M	?	M-H	M	M-H	M-H	H	M-H*	N	M
	Effectiveness	VH	?	H?	H?	H?	(L-M)?	?	?	N/A	M
	Availability	S?	F?	S?	I	I	I	I	I	N/A	I
Piledriving	Viability	?	M	H	M-H	M-H	M-H	H	L	H	N
	Effectiveness	VH	H	M-H	M	M	(L-M)?	M?	?	H	N/A
	Availability	?	I-S	I	I	I	I	I	I	I	N/A
Shipping	Viability	M	N	M-H	M	M	N	N	N	H	H
	Effectiveness	M-H	N/A	H	M	M	N/A	N/A	N/A	?	L-M
	Availability	I-S	N/A	I-S	I	I	N/A	N/A	N/A	S	I
Explosions	Viability	L?	?	N	H	H	H	H*	H*	V	N
	Effectiveness	VH	?	N/A	H	H	M-H	M?	M?	?	N/A
	Availability	I	?	N/A	I	I	I	I	I	I-S	N/A
Pleasure craft propellers	Viability	H?	M-H	N	H	N	N	N	N	N	M
	Effectiveness	L	H	N/A	H	N/A	N/A	N/A	N/A	N/A	(L-M)?
	Availability	I	S	N/A	I	N/A	N/A	N/A	N/A	N/A	I
Echo-sounders	Viability	H	N	N	H	N	N	N	N	N	L
	Effectiveness	VH	N/A	N/A	H	N/A	N/A	N/A	N/A	N/A	L
	Availability	I	N/A	N/A	I	N/A	N/A	N/A	N/A	N/A	I
Multi-beam sonar	Viability	?	?	?	H	H	M-H	H	H	N	L
	Effectiveness	VH	?	?	H	H	(L-M)?	?	L?	N/A	L
	Availability	?	?	?	I	I	I	I	I	N/A	I

Source: WWF 2014.
Reducing Impacts of Noise from Human Activities on Cetaceans

Source: https://www.portvancouver.com/wp-content/uploads/2016/04/ECHO-Program-Underwater-Noise-Infographic-April-2016.pdf.

Impacts of maritime transport on GES

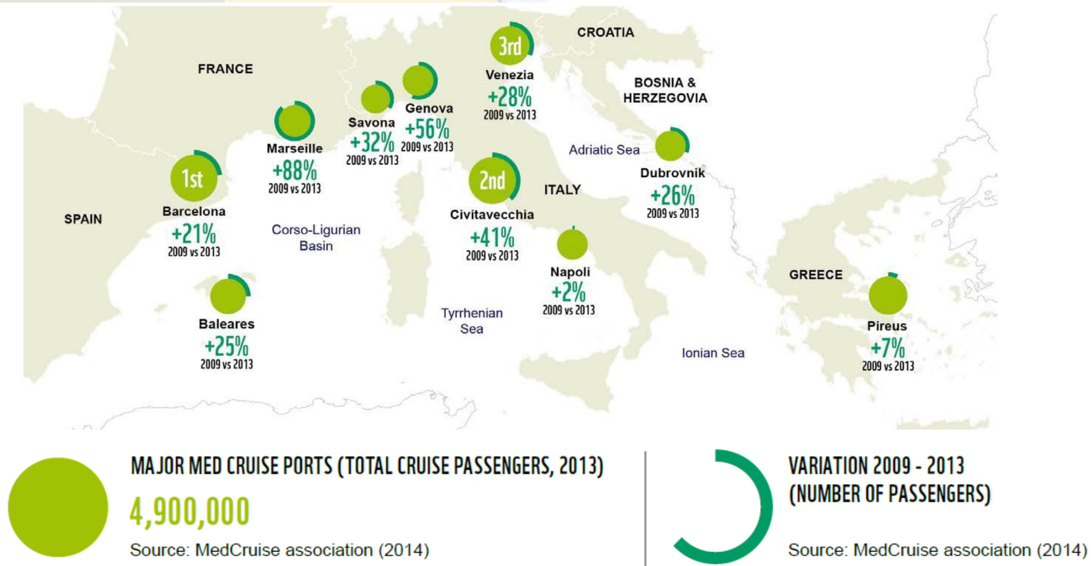
MSFD Descriptor	Impacts on GES	Future trends
D1 Biodiversity	Collisions with marine mammals and turtles, antifouling biocide effects on marine fauna, oil/pollutant toxic effects on marine organisms/top predators, effects of litter in marine organisms	↗
D2 Non-indigenous species	Ballast waters, fouling	↗
D3 Commercial species		
D4 Foodwebs		
D5 Eutrophication	Sewage discharge (non-treated used water)	↗
D6 Sea-floor integrity	Direct physical effects of vessels on benthic habitats and species, abrasion	↗
D7 Hydrographical conditions		
D8 Contaminants	Oil pollution (releases/discharges), eventual or chronic, shipping-derived antifouling biocides	↗
D9 Contaminants in seafood		
D10 Marine litter	Littering, waste discharge	↗
D11 Energy	Shipping noise (damage, disturbance to/of marine mammals and fish	↗

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Impacts of coastal tourism, cruise tourism and recreational boating on GES

Source: https://www.medqsr.org/tourism

Growth of Med Cruise ports in number of passengers between 2009 and 2013



Source: Piante C., Ody D.,2015

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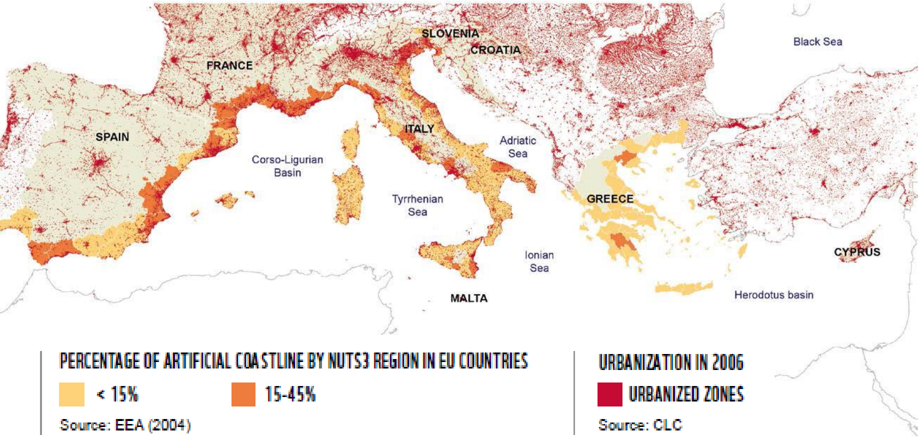

MSFD Descriptor	Coastal and cruise tourism, and recreational boating	Trends
D1 - Biodiversity	The construction of infrastructures (hotels, ports, marinas) affects marine biodiversity and habitat. Recreational boating cause also damage to species through collisions.	↗
D2 - Non-indigenous species	Cruise tourism and recreational boating can lead to voluntary or non-voluntary introduction of non-indigenous species	↗
D3 - Commercial species	Pollution from tourism and recreational boating can impact seafood	↗
D4 - Foodwebs	Pollution from tourism and destruction of habitat can impact foodwebs	↗
D5 - Eutrophication	Discharges from untreated wastewater	↗
D6 - Sea-floor integrity	Sealing due to coastal urbanisation	↗
D7 - Hydrographical conditions	Development of marinas can cause changes in currents and coastlines	↗
D8 - Contaminants	Release of oil and contaminants	↗
D9 - Contaminants in seafood	Pollution from tourism and recreational boating can impact seafood	↗
D10 - Marine litter	Beach/marine litter	↗
D11 - Energy	Recreational boating creates underwater noise affecting marine species	↗

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Impacts of the development of marine wind farms on GES

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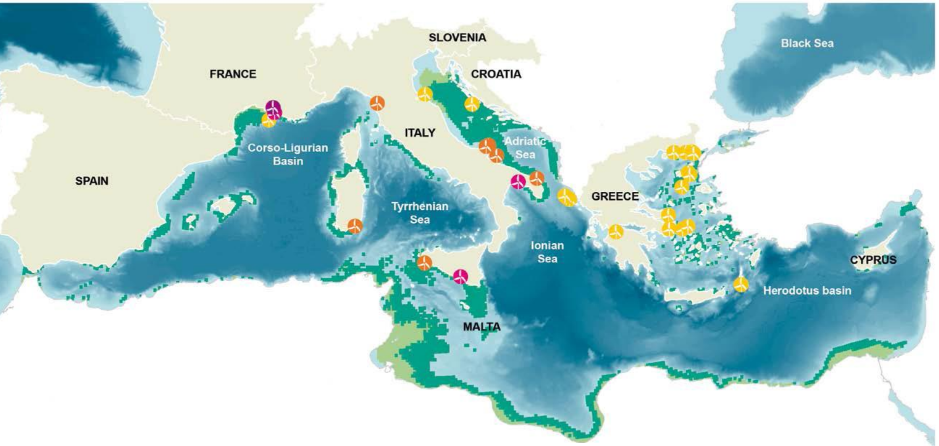


POTENTIAL LOCATIONS FOR OFFSHORE WIND FARM
The points are characterized by annual wind speeds greater than 5m/sec at 80 m height above sea level.

WATER DEPTHS <50M 50 TO 200M

Source: FP7 Collaborative project - Towards COast to COast NETworks of marine protected areas (from the shore to the high and deep sea), coupled with sea-based wind energy potential (CoCoNET 2015)

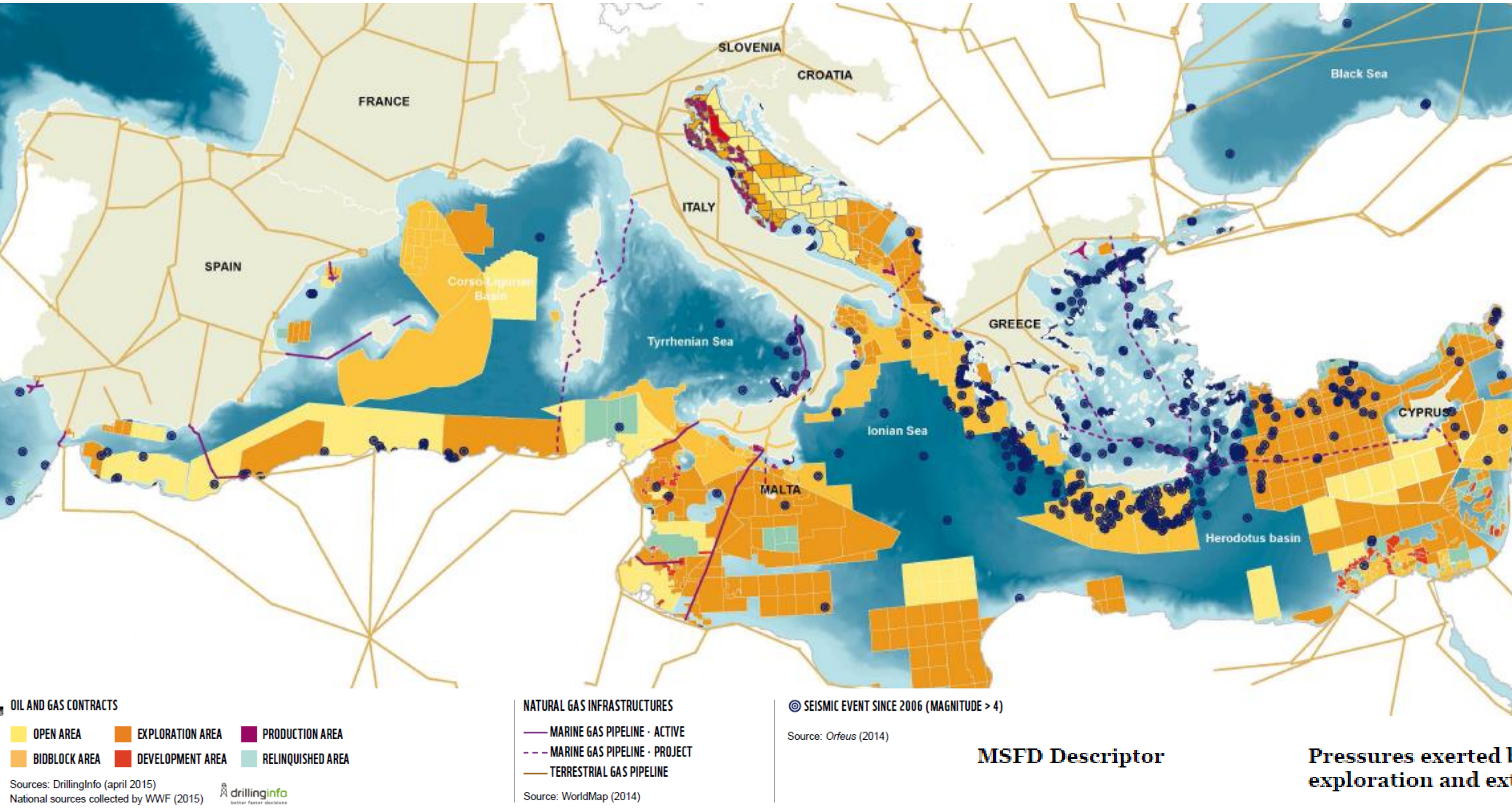
WIND FARMS PROJECTS
- CONCEPT/EARLY PLANNING
- CONSENT APPLICATION SUBMITTED
- CONSENT AUTHORISED
- PARTIAL GENERATION/UNDER CONSTRUCTION

Source: Offshore4C (2014)

MSFD Descriptor	Impacts on GES	Future trends
D1 Biodiversity	The construction stage leads to negative impacts on marine biodiversity (abrasion, substrate loss, smothering, death or injury by collision, etc.). At the operational stage, possible environmental benefits (artificial reef role, exclusion of some or all types of fishing) might increase biodiversity around wind turbines.	↗
D2 Non-indigenous species		
D3 Commercial species	At the operational stage, wind farms might act as an artificial reef that could benefit commercial species.	↗
D4 Foodwebs		
D5 Eutrophication		
D6 Sea-floor integrity	The construction stage affects seafloor integrity and habitats (sealing, laying cables, smothering, substrate loss, changes in siltation, abrasion)	↗
D7 Hydrographical conditions	Sediment resuspension, change of water flow rate	↗
D8 Contaminants	The construction of wind farms may lead to the introduction of synthetic and non-synthetic compounds in the sea.	↗
D9 Contaminants in seafood		
D10 Marine litter		
D11 Energy	Underwater noise mainly at the construction stage.	↗

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Potential impacts of offshore oil & gas



MSFD Descriptor	Pressures exerted by Oil and gas exploration and extraction	Future trends
D1 Biodiversity	Smothering, sealing, Introduction of other substances, whether solid, liquid or gas	↗
D2 Non-indigenous species	Introduction of non-indigenous species and translocations	↗
D3 Commercial species	Potential impacts through contaminants and released polluted water	↗
D4 Foodwebs	Potential impacts through contaminants and released polluted water	↗

MSFD Descriptor	Pressures exerted by Oil and gas exploration and extraction	Future trends
D6 Sea-floor integrity	Physical damages	
D7 Hydrographical conditions	–	↗
D8 Contaminants	Introduction of other substances, whether solid, liquid or gas	
D9 Contaminants in seafood	–	↗
D10 Marine litter	–	
D11 Energy	Underwater noise	↗

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Potential impacts of marine mining on GES

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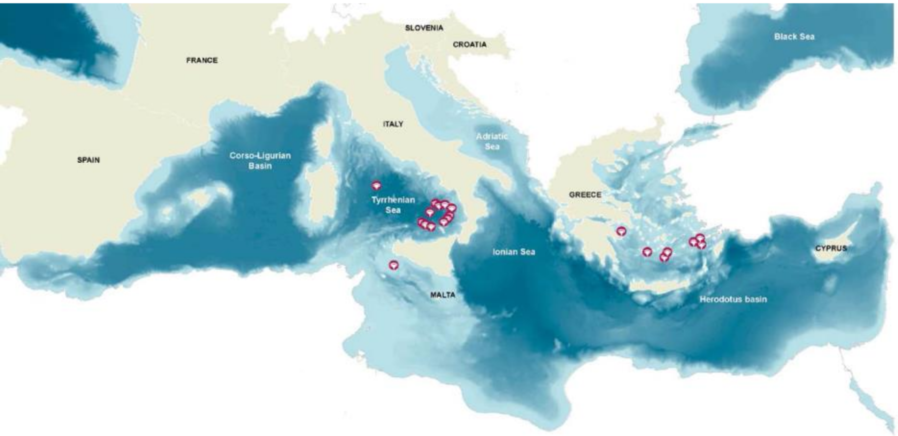


MEDITERRANEAN EU COUNTRY

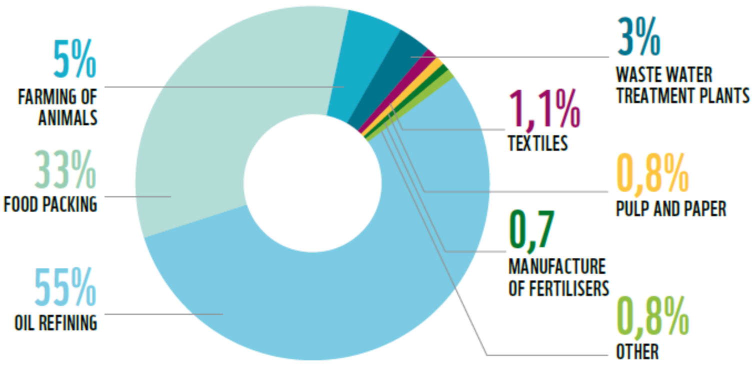
SULPHIDE DEPOSITS

Source: International Seabed Authority (2015)

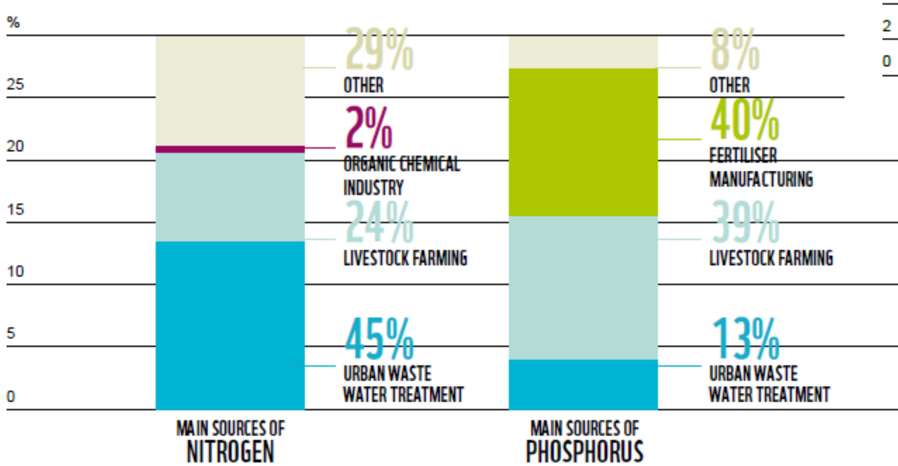
MSFD Descriptor	*Deep-sea mineral resources pressures in the Med*	Future trends
D1 Biodiversity	Large-scale loss of habitat due to the extraction techniques, disrupted life habits of some organisms, impacts on pelagic organisms	↗
D2 Non-indigenous species		
D3 commercial species		
D4 Foodwebs	Chemical toxicity affecting foodwebs	↗
D5 Eutrophication		
D6 Sea-floor integrity	Disturbance of the largely unknown benthic layer	↗
D7 Hydrographical conditions		
D8 Contaminants	Increasingly toxic water column	↗
D9 Contaminants in seafood		
D10 Marine litter		
D11 Energy	Marine noise caused by extraction activities	↗

Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

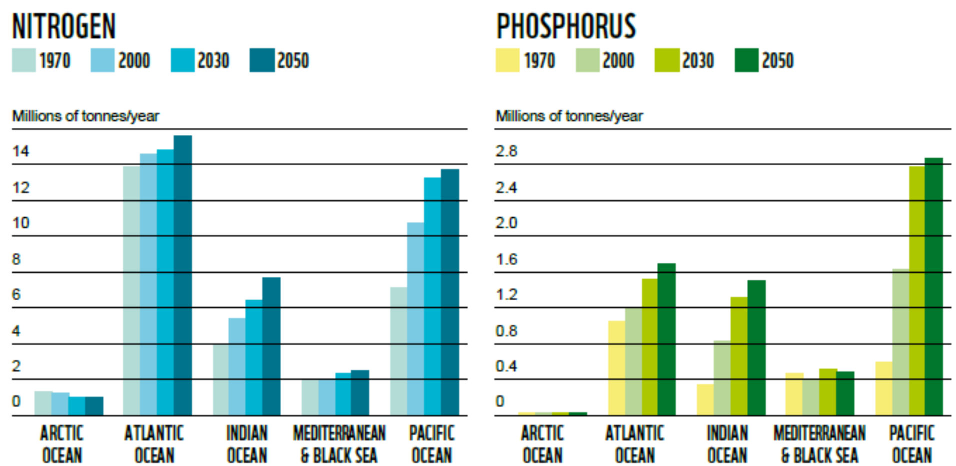
Land-based pollution sources



Major point sources of organic water pollutants in the Mediterranean



Main sources of nitrogen and phosphorous in the Mediterranean Sea



River discharges of nitrogen and phosphorus into the sea, 1970-2050

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Source: Piante C., Ody D.,2015. Blue Growth in the Mediterranean Sea: the Challenge of Good Environmental Status. MedTrends Project. WWF-France. 192 pages

Land-based pollution sources

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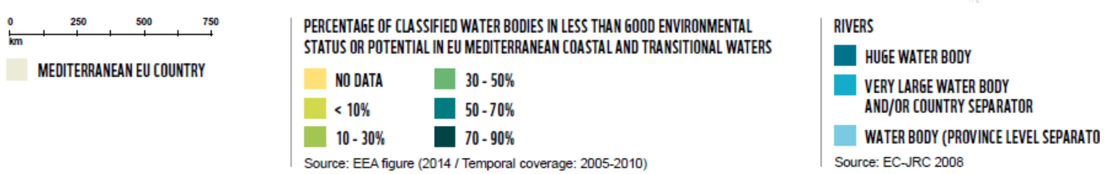
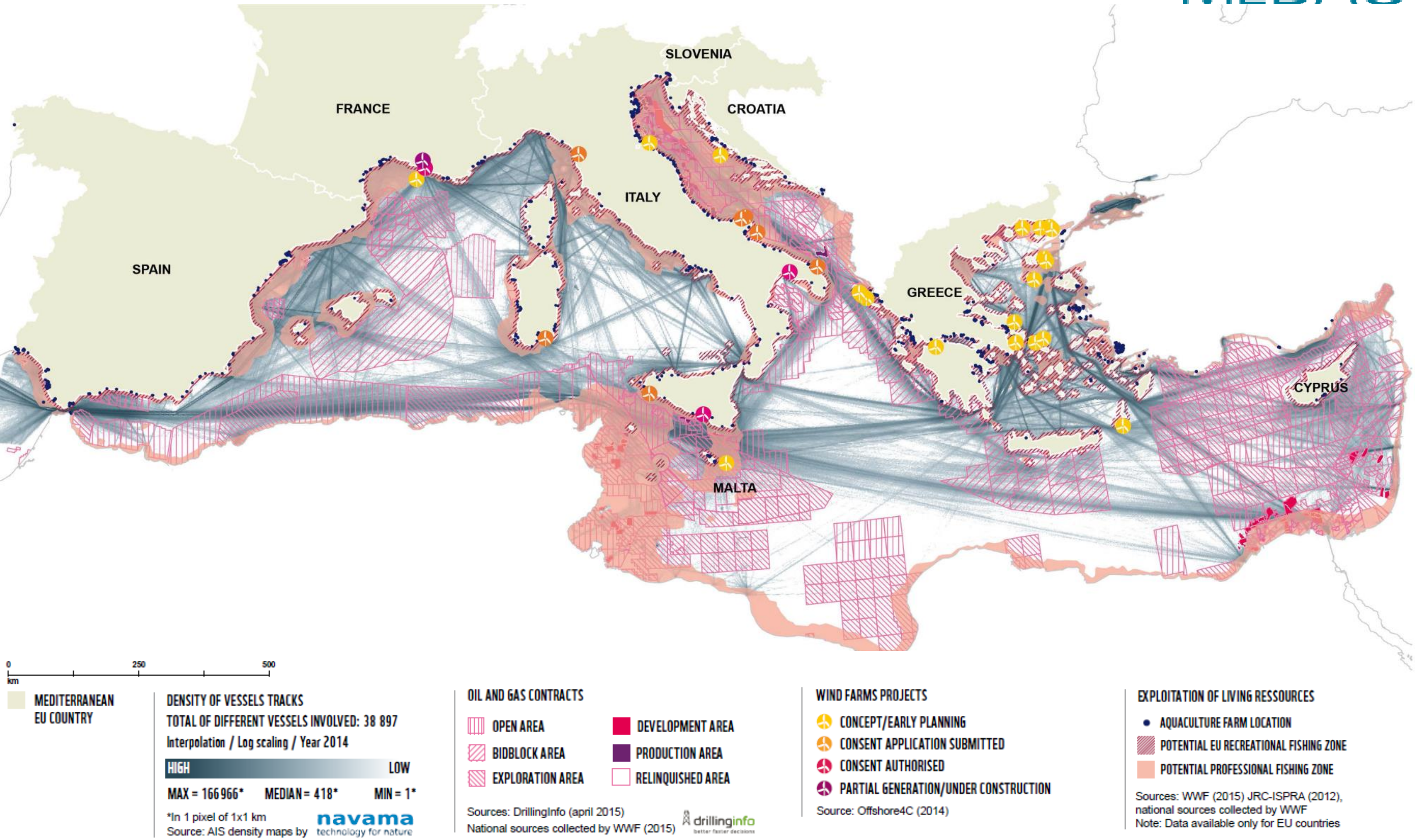
Percentage of water bodies classified as “less than Good Environmental Status or potential” in European coastal and transitional waters (Temporal coverage 2005-2010)



MSFD Descriptor	Impacts on GES	Future trends
D7 Hydrographical conditions		
D8 Contaminants	Land-based releases of heavy metals, nutrients, POPs.	
D9 Contaminants in seafood	Filter feeders such are vulnerable to toxic elements that they concentrate by filtering. POPs and heavy metals can accumulate in animal tissues which can be toxic for human health and the environment.	
D10 Marine litter	Entanglement or ingestion caused by marine litter, especially plastics. More attention is now being given to the impact of microplastics that can have also negative effects on organisms.	

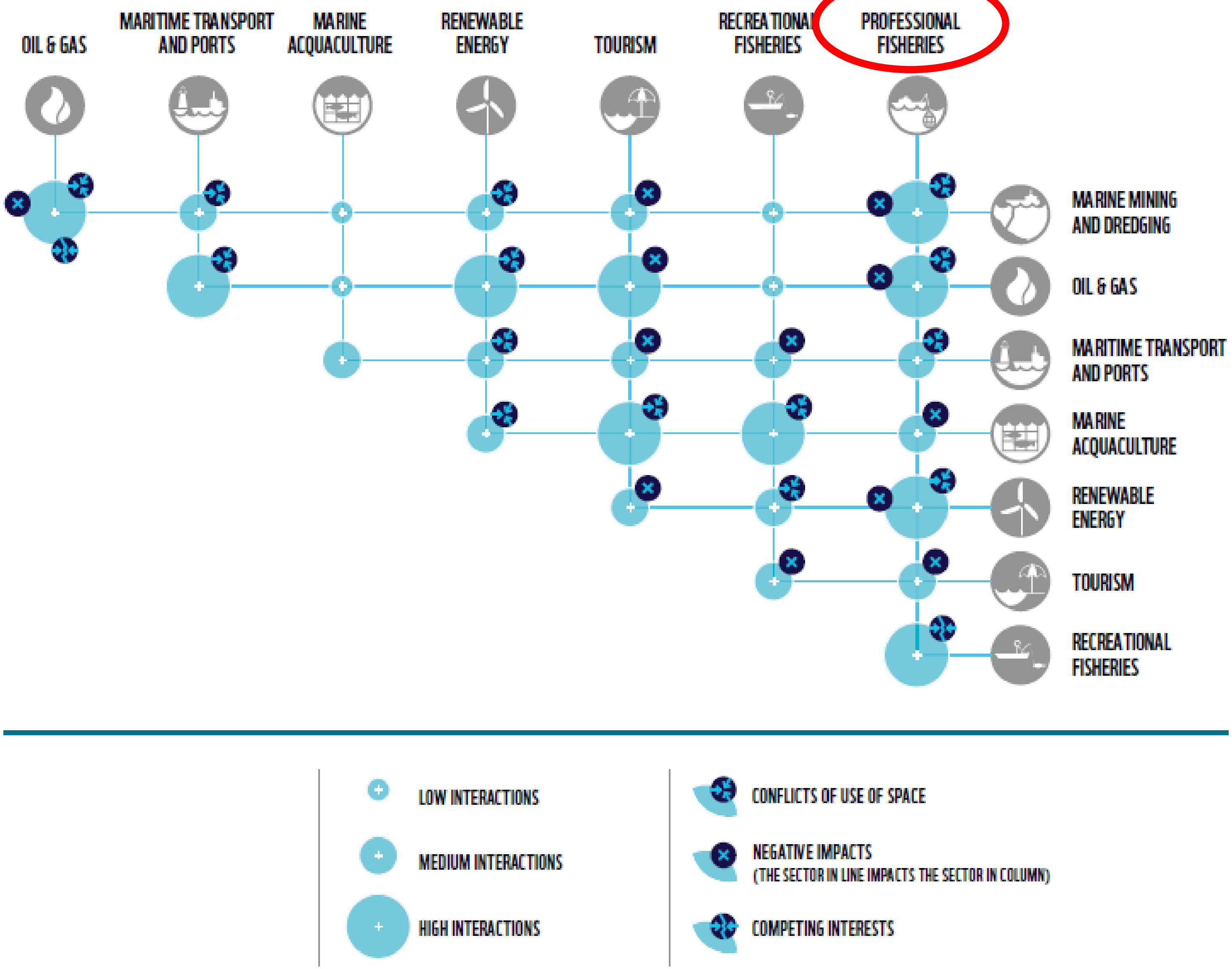
Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.

Potential spatial interactions between sectors



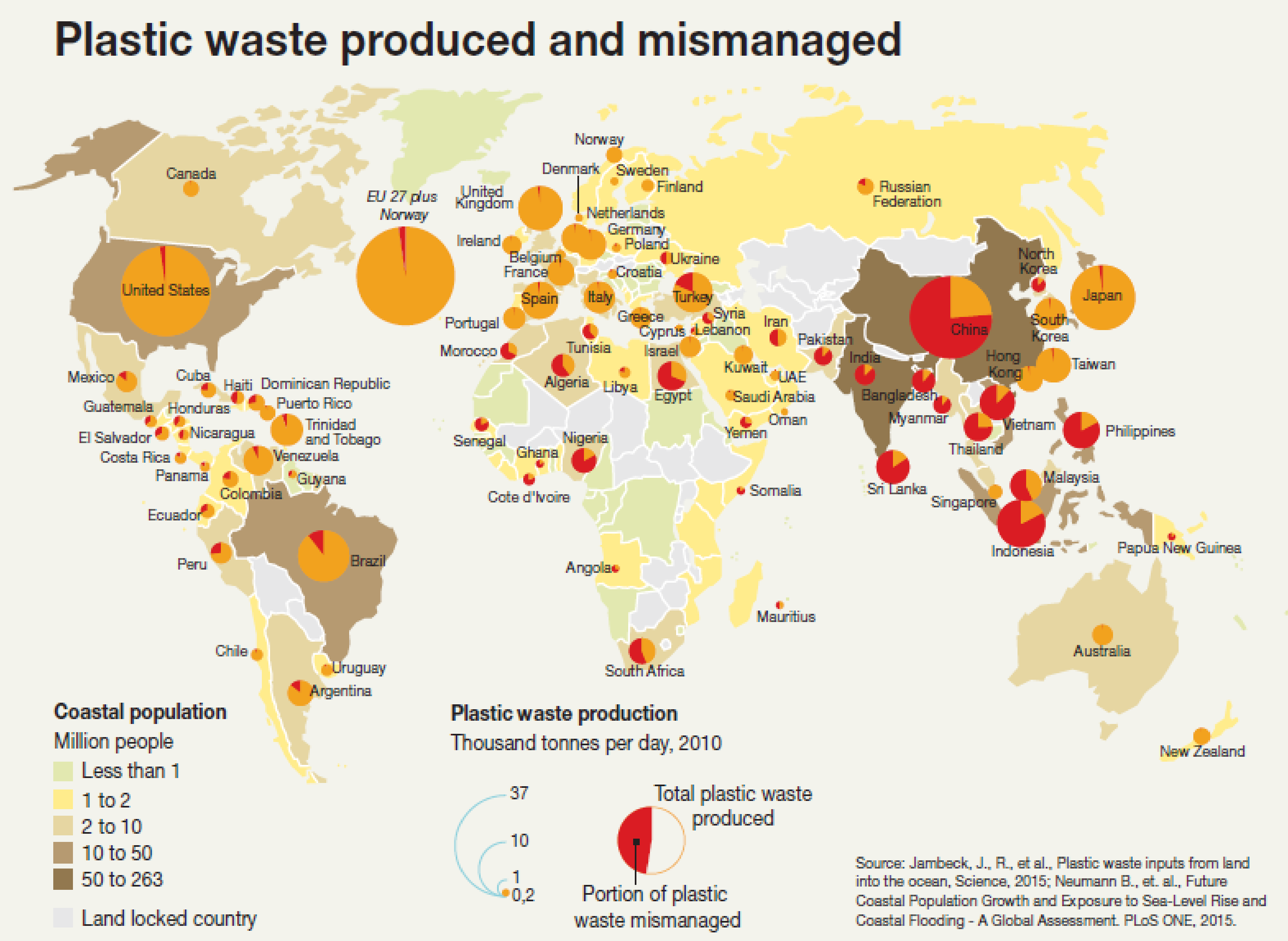
Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.

Compatibility between sectors and potential risks of conflicting interests



Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.

Marine litter



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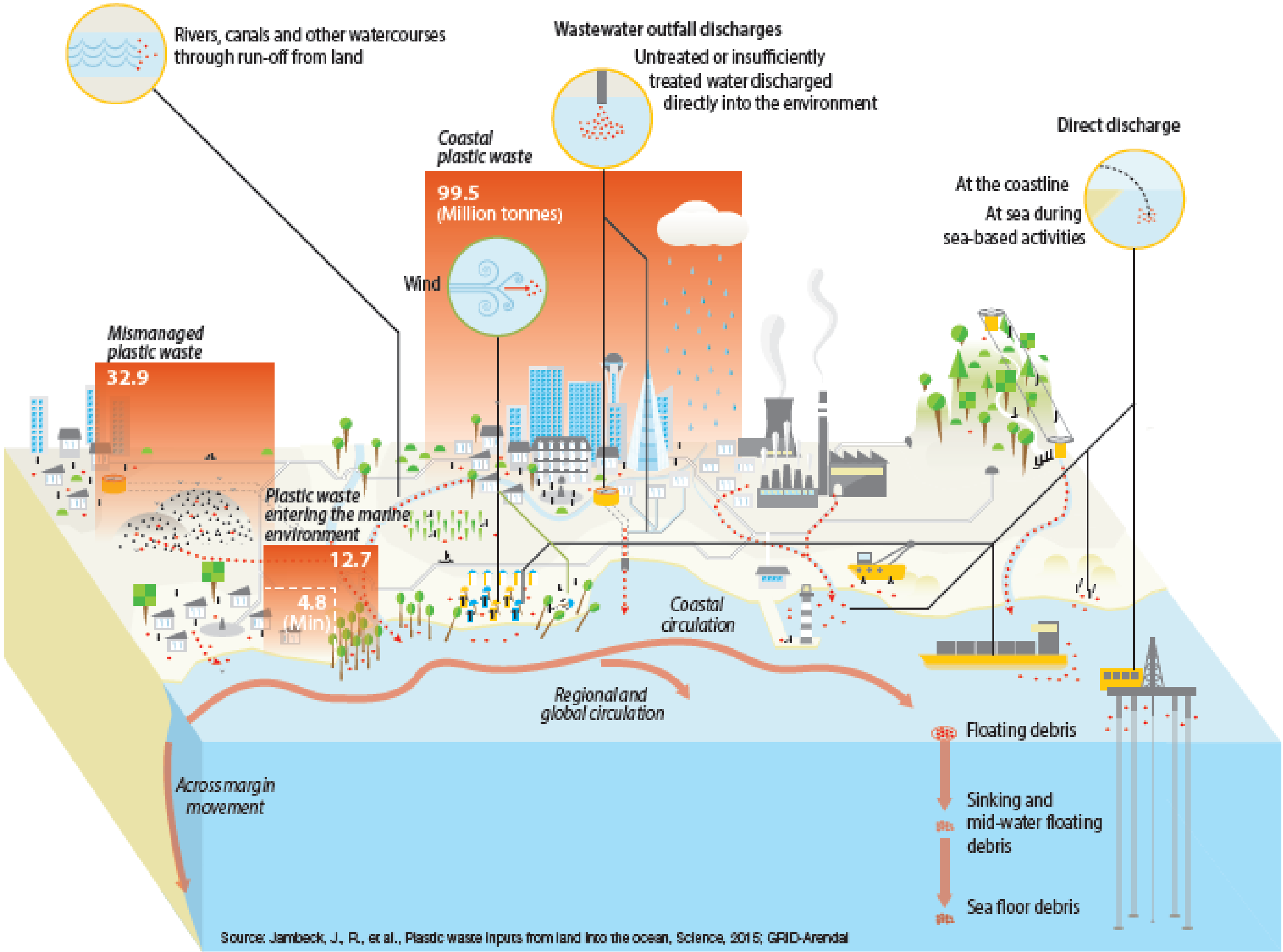
Marine litter has been defined by UNEP as "any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment. Marine litter consists of items that have been made or used by people and deliberately discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; accidentally lost, including material lost at sea in bad weather (fishing gear, cargo); or deliberately left by people on beaches and shores".

Marine litter: Vital graphics

Marine litter: Pathways and fluxes of plastics into the oceans



Marine litter: Vital graphics

Marine litter

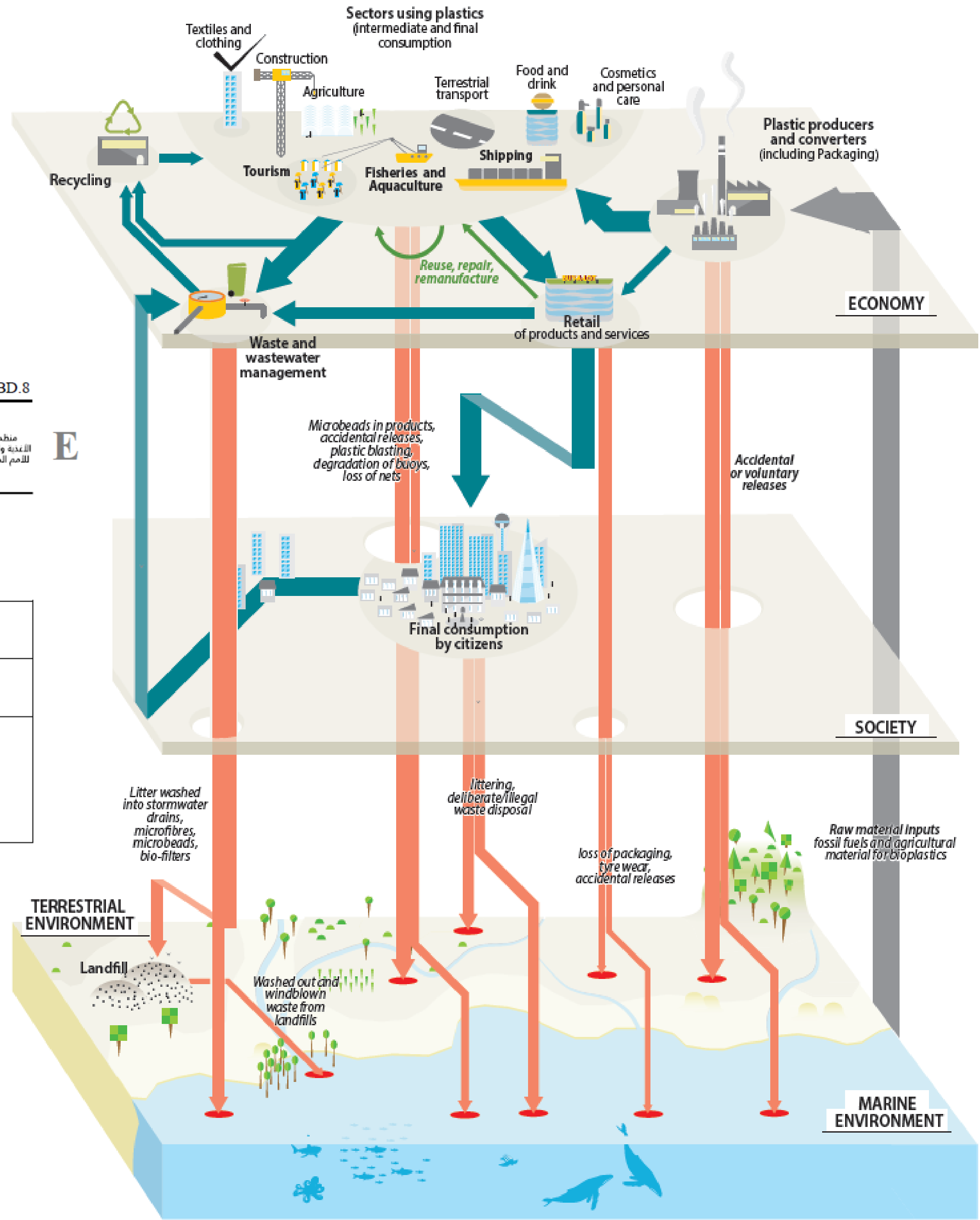
August 2020 COFI/2020/SBD.8

联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Alimentación y la Agricultura | منظمة الأغذية والزراعة للأمم المتحدة

E

COMMITTEE ON FISHERIES

Thirty-Fourth Session
Rome, 1-5 February 2021 (TBC)
SEA-BASED SOURCES OF MARINE LITTER – A REVIEW OF CURRENT KNOWLEDGE AND ASSESSMENT OF DATA GAPS (SECOND INTERIM REPORT OF GESAMP WORKING GROUP 43, 4 JUNE 2020)



 Marine litter: Vital graphics

Marine litter - Solutions

Main characteristics of marine litter monitoring devices

Litter monitoring device	Technology	Target	TRL
Litter Drone	Aerial drone	Beach	7 - System prototype demonstration in operational environment
Marine Litter Dronet	Aerial drone	Sea surface, water column, sea floor	8 - Technology demonstrated in relevant environment
Phantom 4 Pro and Sensefly eBee	Aerial drone	Beach	6 - Technology demonstrated in relevant environment
3DR Solo	Aerial drone	Riverine environment	6 - Technology demonstrated in relevant environment
DJI Phantom 3 Advanced (Adv)	AUV	Beach	7 - System prototype demonstration in operational environment
LIDAR	Litter detection and ranging device	Beach	6 - Technology demonstrated in relevant environment
Sealittercam	Visual Technology	Sea surface	6 - Technology demonstrated in relevant environment
Vessel-based photography survey	Vessel device with visual technology	Beach, water surface	7 - System prototype demonstration in operational environment
DJI Mavic Pro	Aerial Drone	Beach	7 - System prototype demonstration in operational environment

Source: CLAIM Project https://www.claim-h2020project.eu/

Marine litter - Solutions

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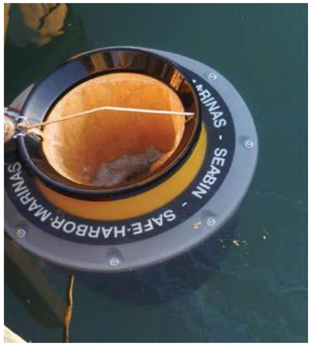
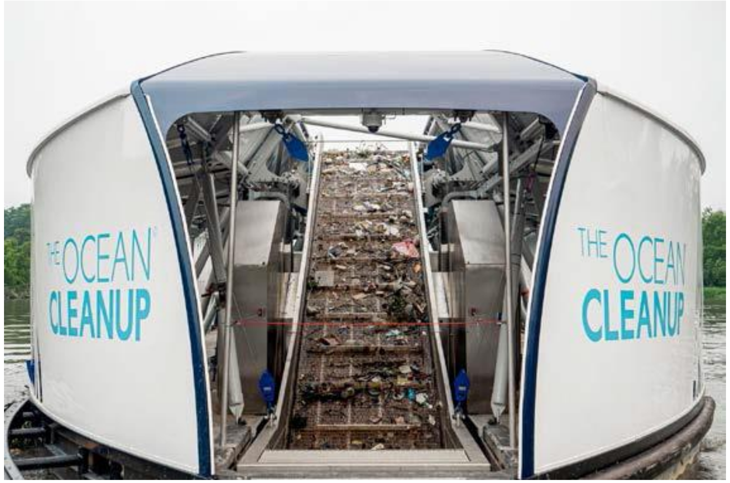
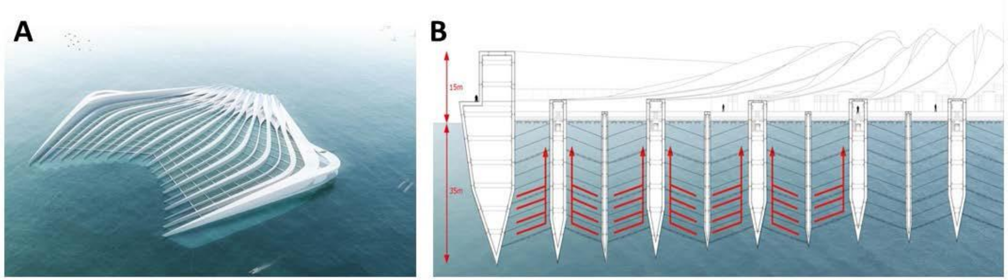
Marine litter collection devices







Source: CLAIM Project https://www.claim-h2020project.eu/

Marine litter - Solutions

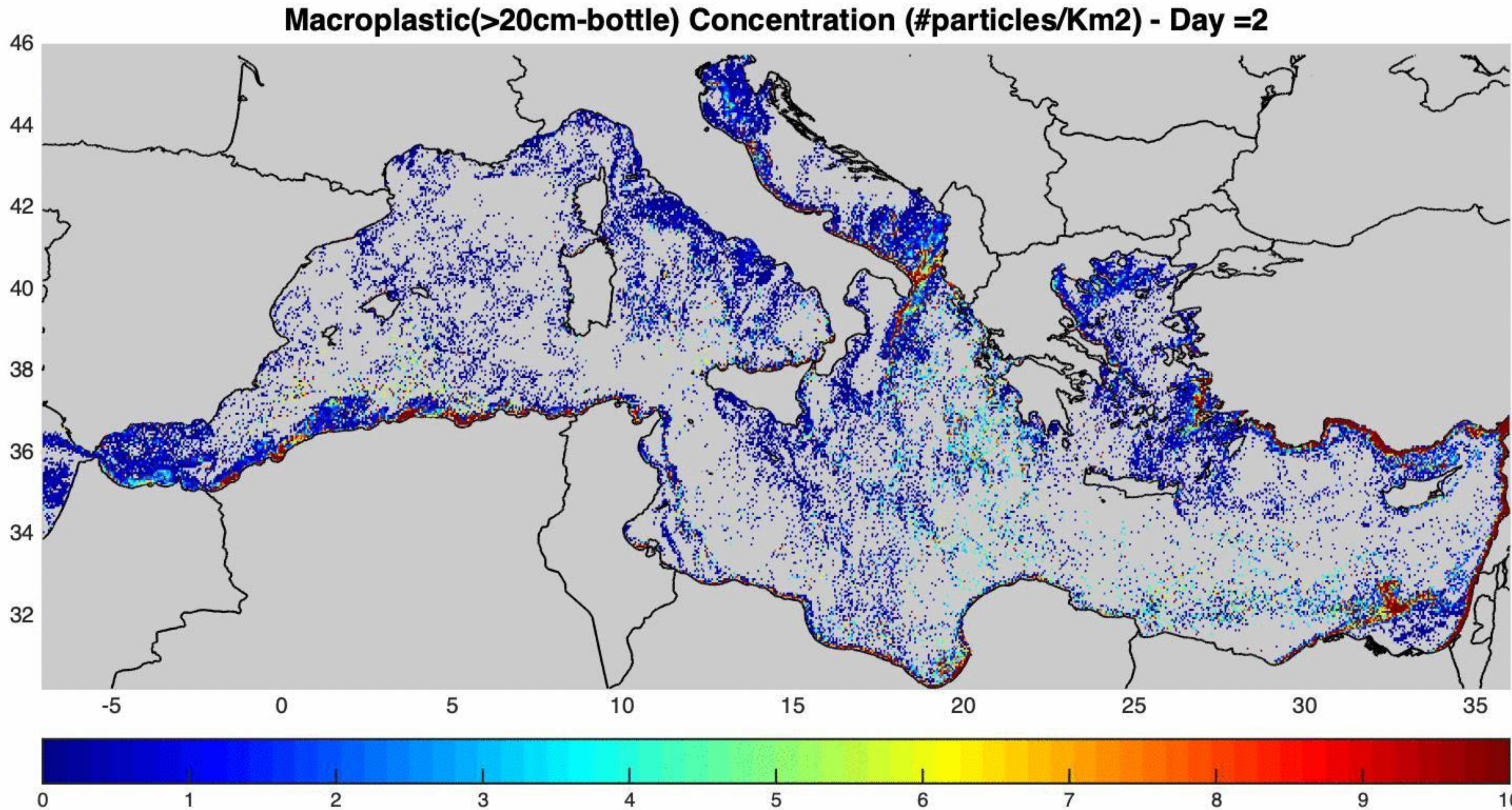
Technologies for litter treatment/transformation

Litter Treatment/ Transformation	Technology	Target	TRL
Agilyx Company	Polystyrene to styrene monomer technology	Land-based waste management	7-System prototype demonstration in operational environment
Recycled park	Floating platforms to retrieve plastic waste	Rivers, water bodies, harbor	7-System prototype demonstration in operational environment
Lindenau WRS-System	Onboard waste recycling technology	Islands, large coastal and river cities where no modern waste treatment plants can be installed	9-actual system proven in operational environment
Bioclean	Naturally derived polymers technologies	Waste water treatments, sea	3 - Experimental proof of concept
Sea Litter Critters	thermally treatment device with plasma technology	Near shores, tourist facilities, on board waste treatment	5- Technology validated in relevant environment
Plastic Odyssey	Boat	on board waste treatment	2 – technology concept formulated.
Seawer	Recycling	Ocean, open waters	2- Technology concept formulated
SeeElefant	Collecting and Recycling	Ocean, open waters	3 - Experimental proof of concept
PacMan	Collecting and recycling	Ocean, open waters	3 - Experimental proof of concept

Source: CLAIM Project https://www.claim-h2020project.eu/

Drift-dispersion models

- **Forecasting plastic pollution (micro/macro)**
- **Identify hot-spot areas (micro/macro)**
- **Contribute to Fostering an ecosystem approach**



Source: CLAIM project *https://www.claim-h2020project.eu/*

CLEAN TRASH system

CLAIM's Litter Entrapping Autonomous Network
Tactical Recovery Accumulation System Hellas

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Source: CLAIM project *https://www.claim-h2020project.eu/*

CLAIM's pyroliser

Source: CLAIM project *https://www.claim-h2020project.eu/*

CLAIM's pyroliser

Source: CLAIM project *https://www.claim-h2020project.eu/*

Thank you very much!

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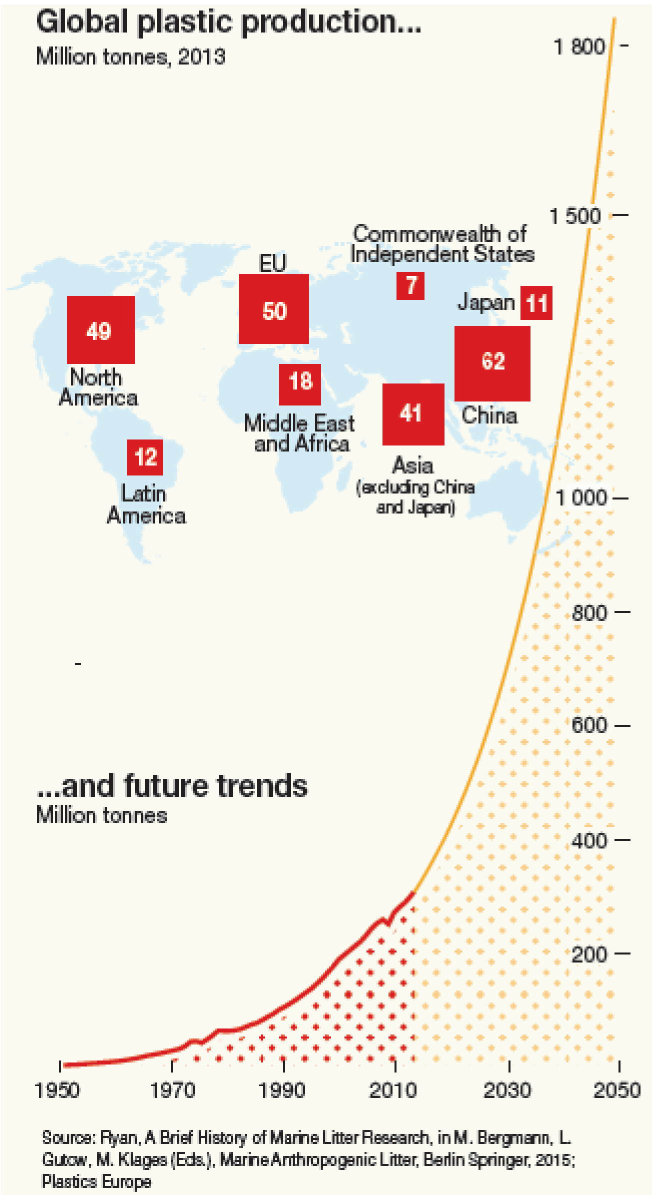
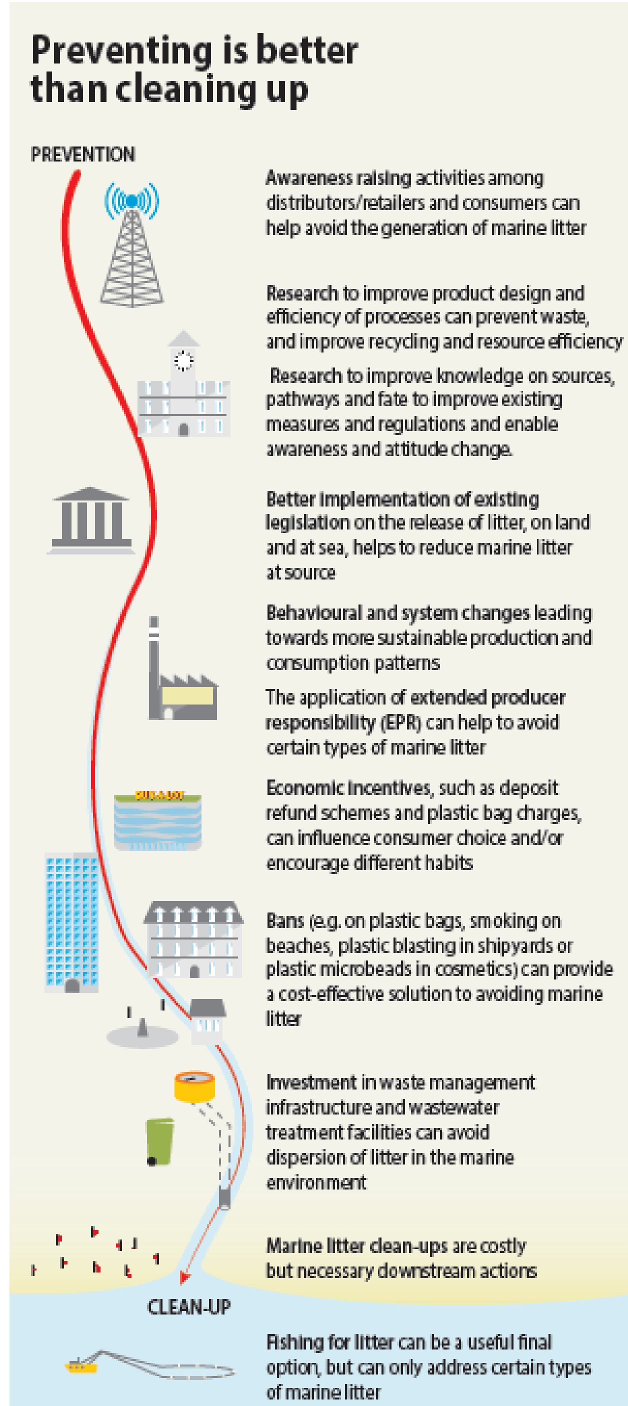
ΠΑΝΕΛΛΗΝΙΑ ΕΝΩΣΗ ΠΛΟΙΟΚΤΗΤΩΝ ΜΕΣΗΣ ΑΛΙΕΙΑΣ
PANHELLENIC UNION OF MIDDLE RANGE FISHERIES SHIP OWNERS

Marine litter





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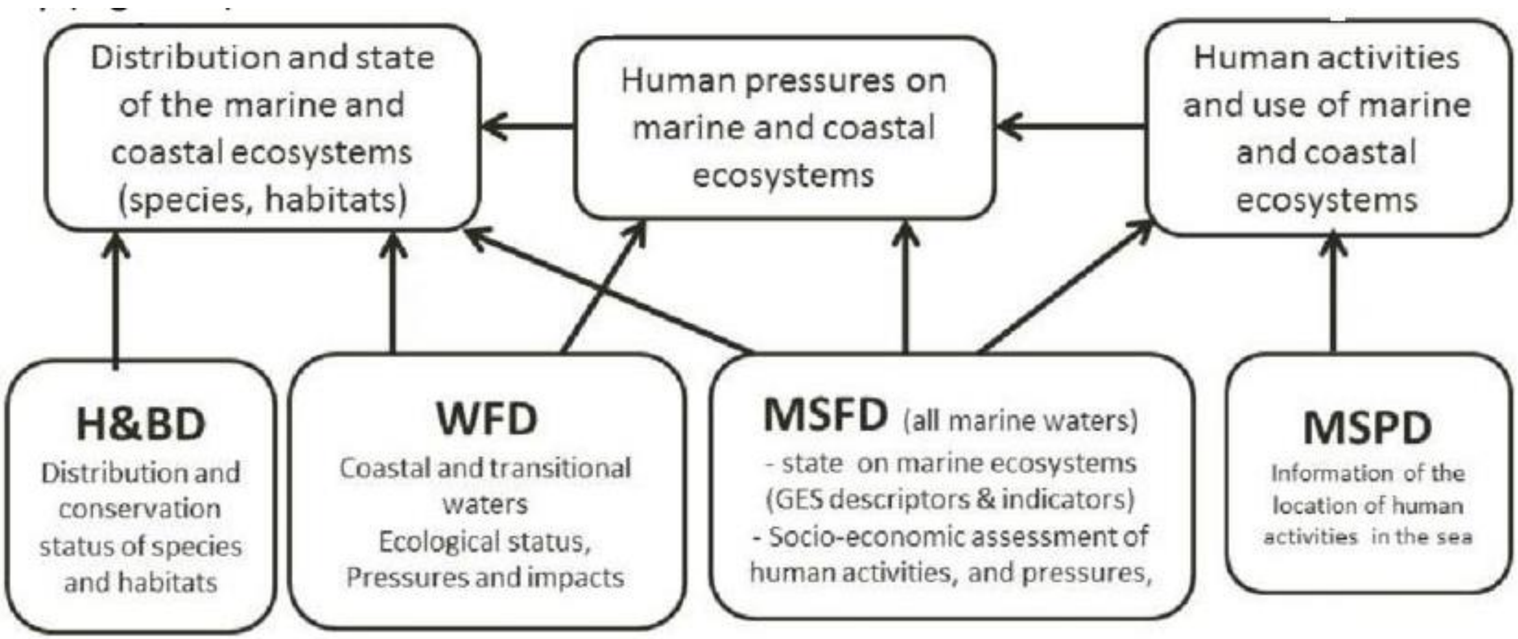
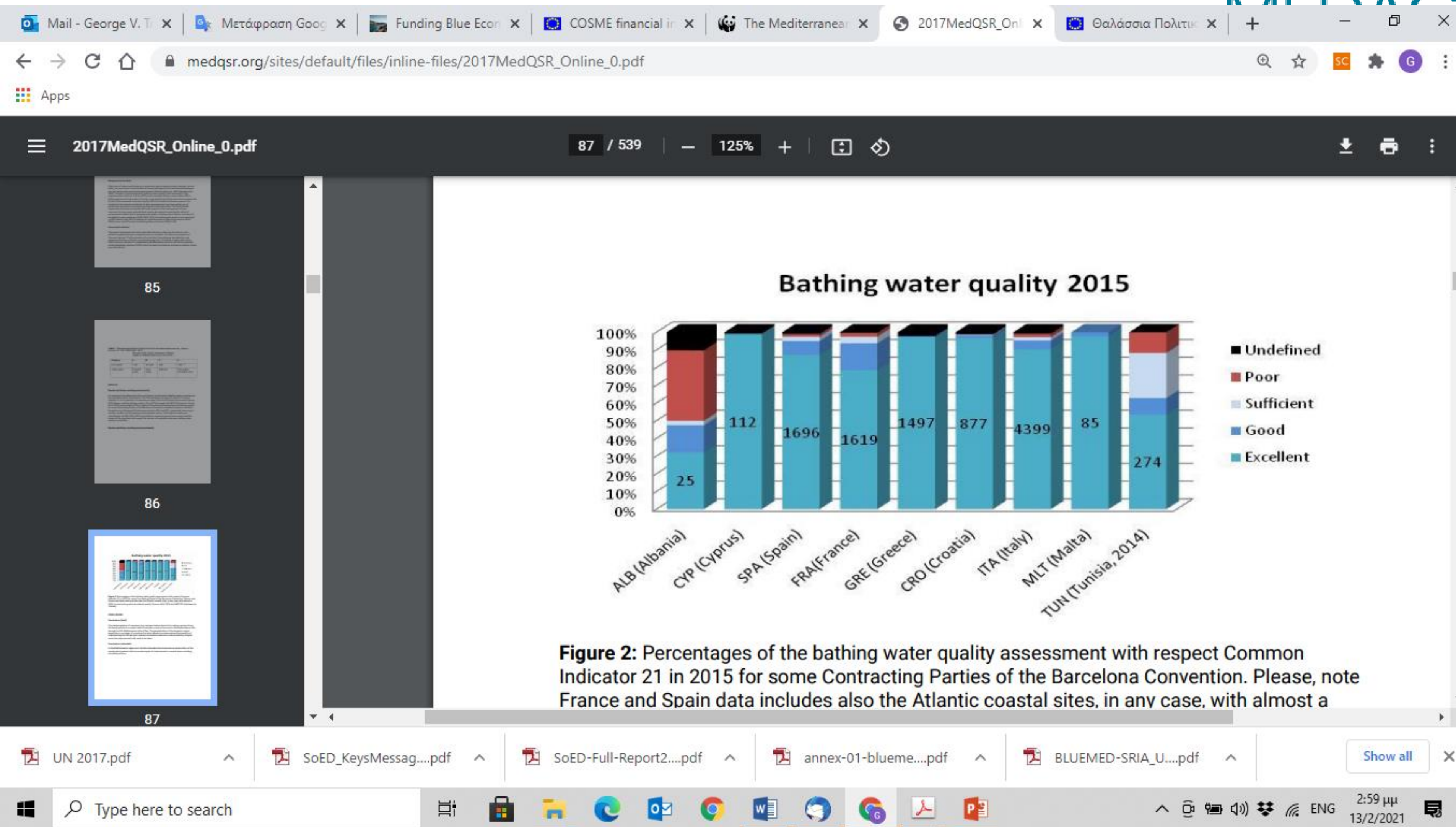
 Marine litter: Vital graphics



: Overview of the linkages between the MSFD, WFD, the H&BD and the MSPD illustrating how the assessments and data produced by these directives can feed into each other (source: Boon et al, 2015).


medqsr.org/sites/default/files/inline-files/2017MedQSR_Online_0.pdf
2017MedQSR_Online_0.pdf
87 / 539
125%
Bathing water quality 2015
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
25
112
1696
1619
1497
877
4399
85
274
Undefined
Poor
Sufficient
Good
Excellent
ALB (Albania)
CYP (Cyprus)
SPA (Spain)
FRA(France)
GRE (Greece)
CRO (Croatia)
ITA (Italy)
MLT (Malta)
TUN (Tunisia, 2014)
Figure 2: Percentages of the bathing water quality assessment with respect Common Indicator 21 in 2015 for some Contracting Parties of the Barcelona Convention. Please, note France and Spain data includes also the Atlantic coastal sites, in any case, with almost a
UN 2017.pdf
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SoED-Full-Report2....pdf
annex-01-blueme....pdf
BLUEMED-SRIA_U....pdf
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Type here to search


bluemed-initiative.eu/wp-content/uploads/2020/07/BM-infografica-priorità-hor-1.png
blueMed
Mediterranean Sea top priorities for research and innovation
sustainable food production
linking tourism, tourists and environment
towards an observing system of systems
exploring the potential of blue biotech
from traditional maritime economic to blue growth activities
understanding pollution impacts, mitigation and remediation
effective maritime spatial planning
open data, open science, open innovation
promote the role of marine renewable energies in the energy transition phase
13 priority goals were selected by countries of the Basin from the BlueMed Strategic Research and Innovation Agenda: their implementation will foster sutainable, non-conflicting Blue Growth in the Mediterranean.
preparing to climate change and define adaptation and mitigation measures
greening vessels, facilities and services
building capacities, blue skills and blue professionals
strengthen synergies among science, industry, policy-makers and society
On the basis of this selection of priorities, the countries prepared an Implementation Plan with the actions to address the identified challenges.
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BLUEMED-SRIA_U....pdf
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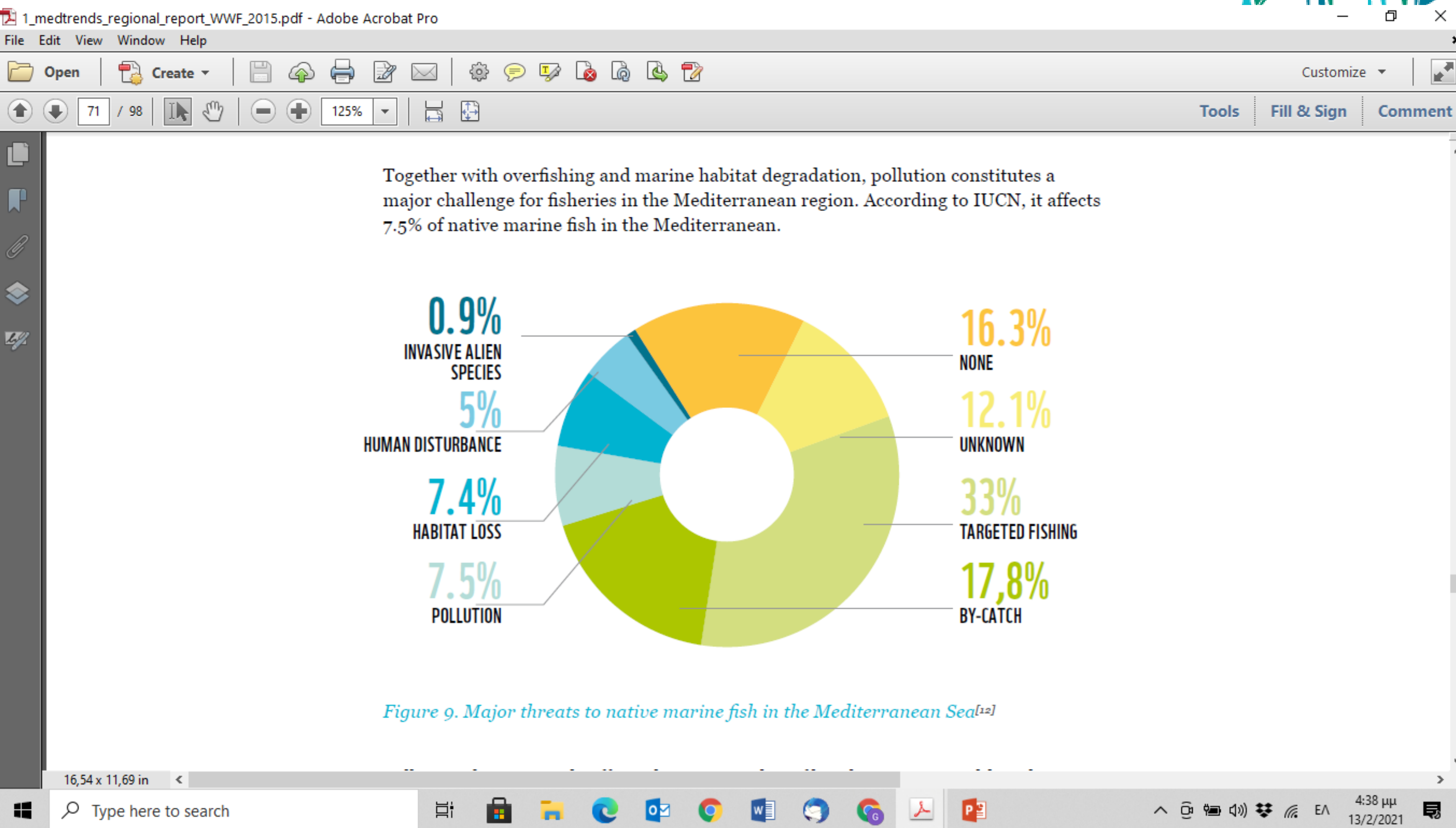
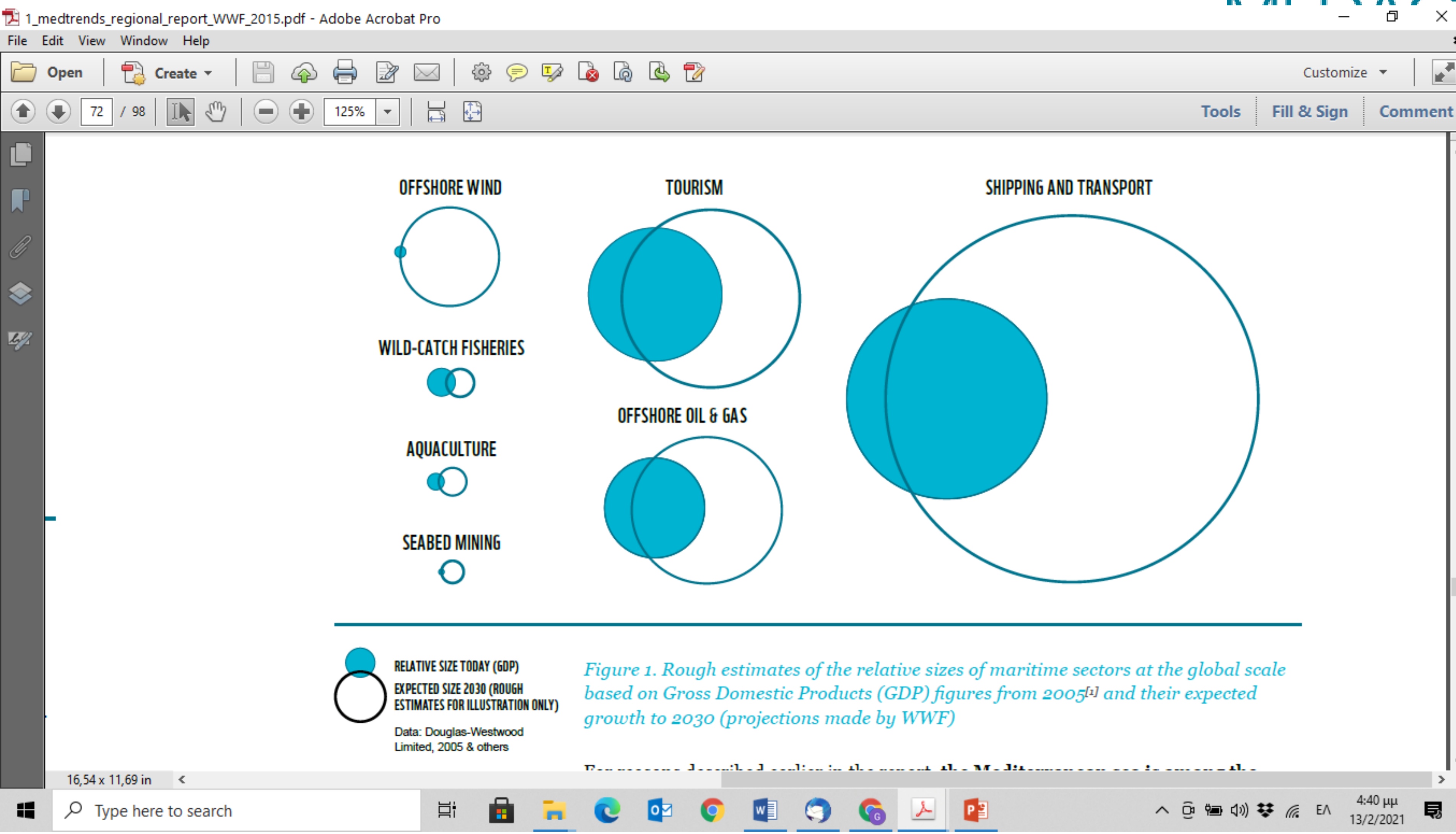


Major threats to native marine fish in the Mediterranean Sea



Rough estimates of the relative sizes of maritime sectors at the global scale based on Gross Domestic Products (GDP) figures from 2005[1] and their expected growth to 2030 (projections made by WWF)

Future trends of maritime sectors

Compatibility between sectors and potential risks of conflicting interests

Sector	Expected development trend of sector	Quantified estimates
Oil and gas exploration and extraction	↗	**Offshore oil production could increase by 60% between 2010 and 2020** at the Mediterranean regional level, rising from 0,7 mbd to 1,12 mbd. **Offshore gas production could increase five-fold from 2010 to 2030**, from 55 Mtoe/year to 250 Mtoe/year at the Mediterranean regional level.
Maritime transport and ports	↗	**4% per annum growth rate in global trade over the next decade** can be anticipated and will be reflected on international maritime traffic routes at the Mediterranean regional level (Suez-Gibraltar axis, Aegean Sea, Adriatic Sea, and to a lesser extent the North-Western Mediterranean)
Professional fishing	↘	A **downward trend** is expected at an uncertain rate at the Mediterranean regional level.
Recreational fishing	↗	An **upward trend** is expected at an uncertain rate in the Mediterranean countries of the EU.
Marine aquaculture	↗	Forecast of fish aquaculture production in the Mediterranean countries of the EU anticipates a **112% increase between 2010 and 2030**. Production should jump from 280 000 tonnes to nearly 600 000 tonnes.
Tourism (coastal tourism, cruise tourism, recreational boating)	↗	**International tourist arrivals in the Mediterranean should increase by 60% between 2015 and 2030** to reach 500 million arrivals in 2030 at the Mediterranean regional level. France, Italy and Spain will remain the three biggest destinations.
Renewable energy	↗	While no marine renewable energy was produced in 2014, predicted production of electricity by offshore wind farms could reach **12 gigawatts (GW) in 2030** in the Mediterranean countries of the EU.
Marine mining	↗	**An upward trend** is expected at an uncertain rate in the mid-term, mainly in the Mediterranean countries of the EU
Coastal development	↗	**5,000 km of additional coastline will be artificialised by 2025 as compared to the 2005** situation at the Mediterranean regional level.
Land-based pollution sources	↗ ↘	In the Mediterranean countries of the EU: • Pollution from wastewater is expected to keep decreasing over the next 15 years. • Persistent Organic Pollutants (POPs) are expected to slowly decline. • An upward trend in heavy metal pollution can be observed for mercury and lead. • Nutrient discharges are expected to increase slightly over the next 15 years.

Source: Randone et al., 2017. Reviving the Economy of the Mediterranean Sea: Actions for a Sustainable Future. WWF Mediterranean Marine Initiative.