

РОССИЙСКИЙ ФОНД ФУНДАМЕНТАЛЬНЫХ ИССЛЕДОВАНИЙ

ΡΦΦИ





# «Caspian Sea environment and new threats »

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# **Ocean Literacy**

# Far and away, the greatest threat to the ocean, and thus to ourselves, is ignorance.





approximate number of marine species that could still be unknown to science





number of people who have explored the deepest known point of the ocean

# of the ocean floor has been

ONLY

mapped at high resolution

# The First World Ocean Assessment found that much of the Ocean is now seriously degraded. A continued

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The Global Ocean Science Report found that ocean science accounts for only between 0.04% and 4% of total research and development expenditures worldwide. **103** square miles of deep sea are in perpetual darkness



# 2021 United Nations Decade of Ocean Science 2030 for Sustainable Development



"Most people overestimate what they can do in one year and underestimate what they can do in ten years."

**Bill Gates** 

# THE GOALS

To provide ocean science, data and information to inform policy for a wellfunctioning ocean in support of all sustainable development goals of the Agenda 2030 To generate scientific knowledge and underpinning infrastructure and partnerships

### THE STRATEGIC OBJECTIVES

- To increase knowledge of the ocean system
- To generate evidence for ecosystems-based management and the blue economy
- To save lives and reduce risks from oceanrelated hazards
- To strengthen cooperation in observation, data and other infrastructure
- To increase scientific and technical capacity and Ocean literacy
- To enhance partnerships, cooperation, coordination and communication

2005-2009					
Country	Rank (& position)	Paper			
USA	1	81 723			
China	2 (+5)	28 325			
UK	3 (-1)	23 342			
Japan	4 [-1]	19 336			
Germany	5 (-1)	18 048			
Canada	6 (-1)	17 646			
France	7 (-1)	16 685			
Australia	8	14 154			
Spain	9	12 009			
Italy	10	11 023			
Brazil	11 (+4)	8 052			
India	12 (+2)	7 600			
Norway	13	7 134			
Russia	14 (-3)	7 0 4 7			
Netherlands	15 (-3)	6 4 4 3			
Rep. of Korea	16 (+2)	5 865			
Sweden	17 (-1)	4 666			
Portugal	18 (+6)	4 367			
Turkey	19 (+4)	4 3 1 4			
Denmark	20 (-3)	3 922			
Mexico	21 (-1)	3 805			
Belgium	22 (-1)	3 668			
New Zealand	23 (-4)	3 617			
Switzerland	24 (-2)	3 533			
Poland	25	3 502			
0	07(0)	0.0/0			

2010-2014					
Country	Rank ( <b>A</b> position)	Paper			
USA	1	96 088			
China	2	57 848			
UK	3	29 472			
Germany	4 [+1]	24 227			
France	5 (+2)	22 078			
Canada	6	21 073			
Australia	7 (+1)	20 937			
Japan	8 (-4)	20 516			
Spain	9	17 826			
Italy	10	15 083			
Brazil	11	13 211			
India	12	12 631			
Rep. of Korea	13 (+3)	10 688			
Norway	14 [-1]	9888			
Russia	15 (-1)	8 816			
Netherlands	16 (-1)	8 780			
Portugal	17 (+1)	6 606			
Sweden	18 (-1)	6 377			
Turkey	19	6 153			
Denmark	20	5 794			
Switzerland	21 (+3)	5 299			
Mexico	22 [-1]	5 278			
Poland	23 [+2]	5 0 4 1			
Belgium	24 [-2]	5 011			
New Zealand	25 (-2)	4 818			
	07 [.0]	1.107			

### Table 5.1. continued

Continent	Country	Papers	Citations
Asia		123 769	597 174
	China	57 848	283 431
	Japan	20 516	117 333
	India	12 631	54 753
	Rep. of Korea	10 688	53 480
	Turkey	6 153	24 358
	Iran 🗧	4 4 37	16 148
	Malaysia	3 315	13 640
	Israel	2 397	17 881
	Thailand	2 323	11 904
	Singapore	2 307	16 935
	Saudi Arabia	1 831	11 084
	Indonesia	1 116	5 725
	Pakistan	1 113	3 956
	Viet Nam	946	3 715

### Table 5.1. Number of published papers and citations received by continent and country in ocean science for the period 2010-2014 (Annex F).

Continent	Country	Papers	Citations
World		372 852	2 206 429
North America		116 708	925 691
	USA	96 088	801 788
	Canada	21 073	175 076









Meeting in Guilan environment protection department



Visit the Dinachal River and PRA



Workshop in the village with local fisherman

# **Planning and actions feedback**

Local community participate (monitoring and report)

Good

Guilan Provincial environment protection department support

Good

Military governmental official support\_\_\_\_\_

Illegal fishermen inhibition

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## • خاستگاه مهم دانش و فناوری تکثیر و بازسازی ذخایر ماهیان











# نفت و آلودگی نفتی اولین مکان بروز سطحی نفت و گاز جهان به عنوان سوخت – باکو - قرن دهم میلادی - گزارش شده توسط اعراب





# THE DECADE WILL ALSO SUPPORT KEY APPLICATIONS FOR SOCIETY INCLUDING:



Coastal zone management and adaptation



Marine spatial planning/blue economy



Establishment of marine protected areas



### Fisheries management

United Nations Framework Convention on Climate Change



Nationally determined contributions to UNFCCC



Development of national ocean policies



Development of national R & D strategies





# Regional and national capacity development planning

# Mnemiopsis leidyi

# Rhizosolenia



Your convenience is their **extinction** 



At the beginning of this century, the major environmental issues of the Caspian Sea (CS) were the impact of sea level fluctuations on coastal inhabitants, the drastic decline in sturgeon populations, and water pollution (Jafari, 2010). Oil and gas offshore and onshore operations, industrial, municipal and agricultural addition wastes, in to unregulated transport and equipment traffic, were the main sources of pollution.

This image, acquired by Envisat's Medium Resolution Imaging Spectrometer (MERIS) instrument on 2 September 2006, shows the southern part of the Caspian Sea, the world's largest inland body of water.



Plastics have become crucial to many areas of modern life, used for manufacture to the transportation of almost all products (Isensee and Valdes, 2015).



Plastic Europe- 2013



### Along with an extreme increase in plastic production, plastics are the fastest growing component of waste.



European Plastics waste generation average from 2006-2012

Plastic Europe- 2013

Plastics enter the sea by wind blowing, directly through the poor waste management, shipping, fishing and illegal dumping. Furthermore, over 130 rivers, including enormous Volga River, provide inflow and debris to the Sea from the drained lands. Globally, almost 10% of the annual production ends up into the oceans, and plastic debris accumulation has been reported as a global scale phenomenon (Avio et al., 2015).



WATERWAYS POLLUTION- Volga river clean up project



Adverse effects of macro-sized plastics have been documented in terms of the decrease of aesthetic values of coastal areas, entanglement and physical damages to locomotory, respiratory or digestive appendages lead to death in marine mammals, turtles, seabirds, fish, and invertebrates (Wilcox et al., 2015; Isensee and Valdes, 2015).





Fisheries by-catch of Caspian Seal - Kaspika.org, 2013





In 2009 approximately 10% of 312 stranded carcasses of Caspian Seal showed direct evidence of entanglement in large mesh nets (Dmitrieva et al., 2013). Wilcox et al., 2015 predicted plastics ingestion increases in seabirds, and it will reach 99% of all species by 2050. Large floating pieces may act as habitat, or promote rafting by alien species representing an additional risk to local biodiversity or spread diseases (Browne et al., 2015; Avio et al., 2015).

Fouling of bryozoans and barnacles on a piece of plastic film, Lavandevil, Guilan.

Decreasing size, the plastic fragments are potentially available to an increasing number of marine species and the problems change when animals start to inhale or ingest it (Browne et al., 2015). They have been ingested by invertebrates such as zooplankton, polychaetes, bivalves, crustaceans, echinoderms, salps, etc. of different trophic levels and by marine vertebrates (Lusher et al., 2013; Nobre et al., 2015). There is also evidence of takeup microplastics via trophic transfer (Naji *et al.*, 2018).



rfrider foundation

Plastic fragments found in 5-week old rainbow runner caught at 23°05.35N, 147°12.86W on August 13, 2008.





It is also known that plastic polymers tend to accumulate persistent and toxic hydrophobic pollutants (POPs) such as PAHs, PCBs, and DDT at higher concentrations than seawater or sediments according to the time of exposure, type of resin and its characteristics (Nobre *et al.*, 2015).

A recent study carried on sediment and plastic wastes of Miankaleh (Eastern part of Southern CS) showed a much higher concentration of PAH compounds on the plastics than sediment (Rajabi and Riyahi, 2018). This might increase the risk of exposure to marine organisms, by which bioaccumulation and biomagnification could occur through the food chain (Naji *et al.*, 2018).



International Pellet Watch

Plastics are also made with several chemical pollutants known to be toxic and disrupt the functioning of the endocrine system (Rochman *et al.*, 2014). These chemical compounds such as **emollients**, **colorants**, **antioxidants**, **and UV-stabilizers** are usually added in order to enhance their performance.

Studies carried on the surface water and sediment of Anzali wetland (west of Southern CS) to determine the concentration of two plasticizers showed their amounts were higher than the environmental risk limit (Hassanzadeh *et al.*, 2014a, b). The additives can leach from ingested microplastics into the body of organisms and their biological effects can be severe (Rochman *et al.*, 2014)



A recent review of the United Nations Convention on Biological Diversity documented over 600 species, ranging from microorganisms to whales, affected by marine plastic waste (Wilcox *et al.*, 2015). Microplastics can accumulate in high numbers in the intestines, resulting in physical harm, promote a false sense of satiation, transfer plastic additive toxins and POPs causing carcinogenesis and endocrine disorders, and leave cellular alterations (Lusher *et al.*, 2013; Avio *et al.*, 2015).



The Caspian's ecosystem has already suffered from extensive pollution. A huge number of macroplastics and microplastics of different shape, color, size, and types are found on the shorelines and sea surface. Considering the other chemical pollutants of Caspian Sea, and absorbing behavior of microplastics, they can act as a vector of chemicals and microbes to fragile marine food chains and human.

This additional stress is a real threat to Caspian Sea Fauna and needs a regional monitoring program and strong acts to decrease the ecological and biological effects of plastic pollution.





### **Suspicious plastic fragments**



### Amount of suspicious items











# Thank you for your attention

