



# MARINE @UGENT by Ghent University

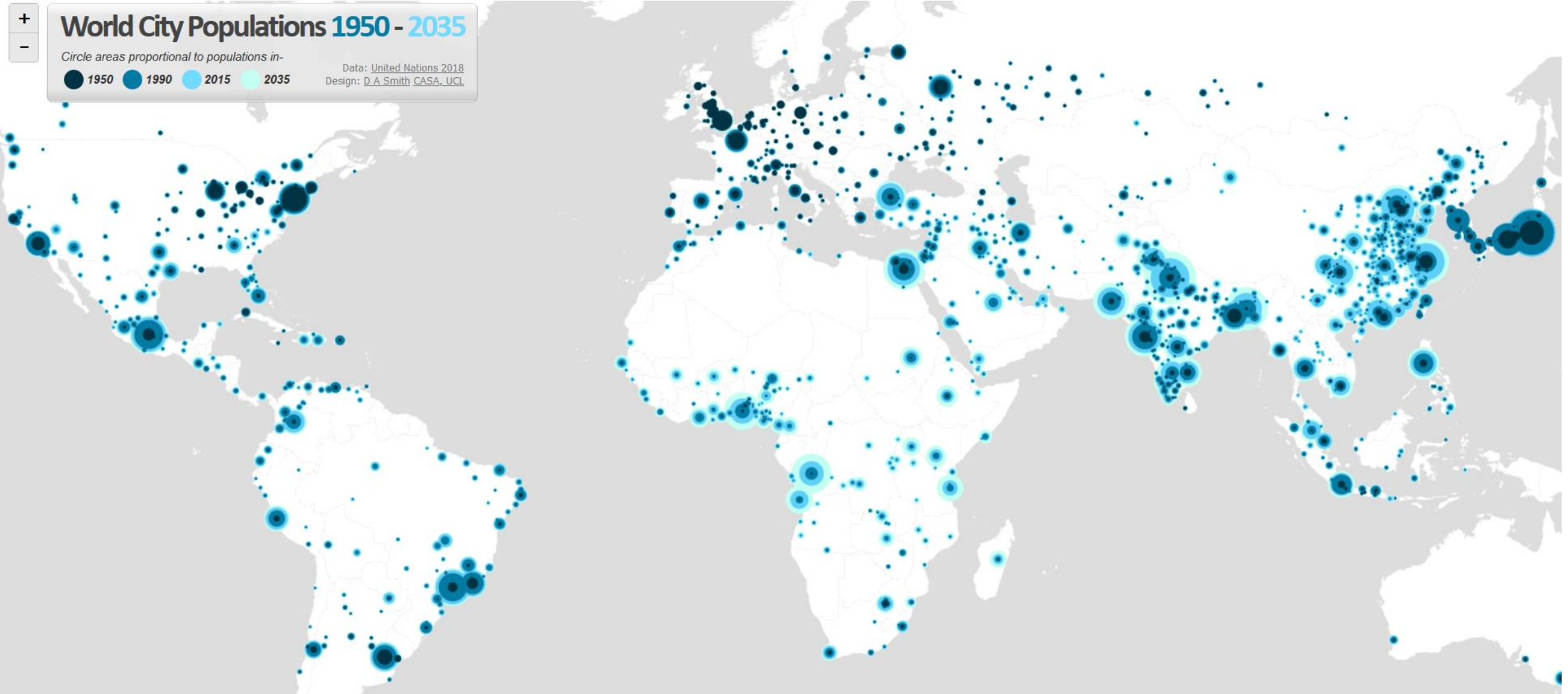


A Ghent University Global Initiative

*Towards transdisciplinary research supporting healthy ocean, healthy people  
and a sustainable economy*

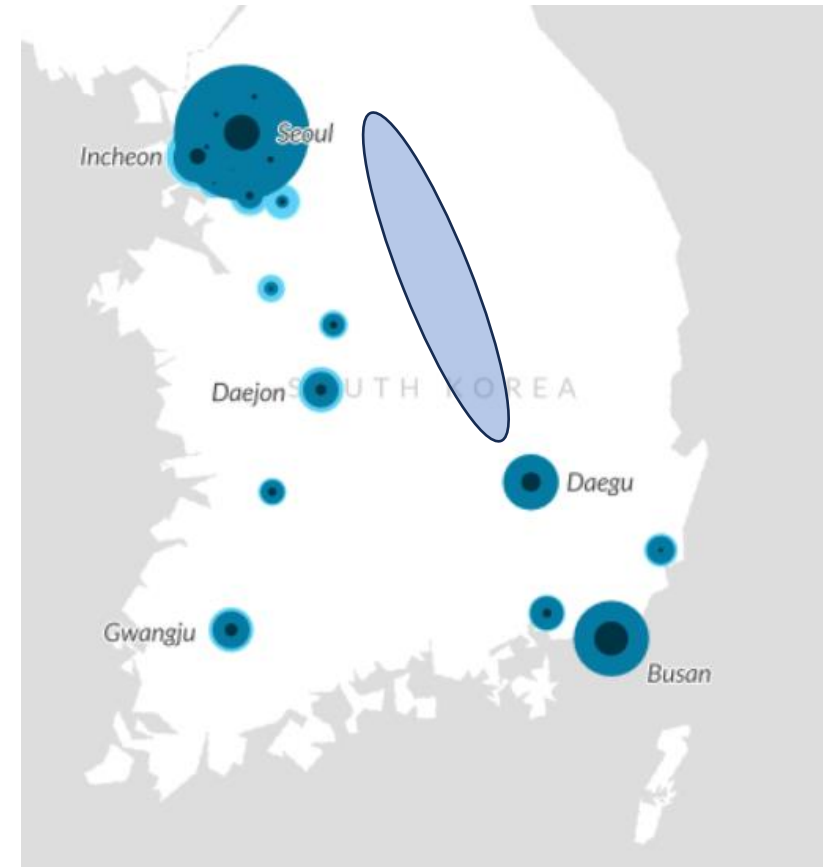
*Prof. Dr. ir. Jana Asselman - vice chair Marine@UGent*

# WORLD CITIES (+100 000 INHABITANTS)



# WORLD CITIES ARE COASTAL CITIES

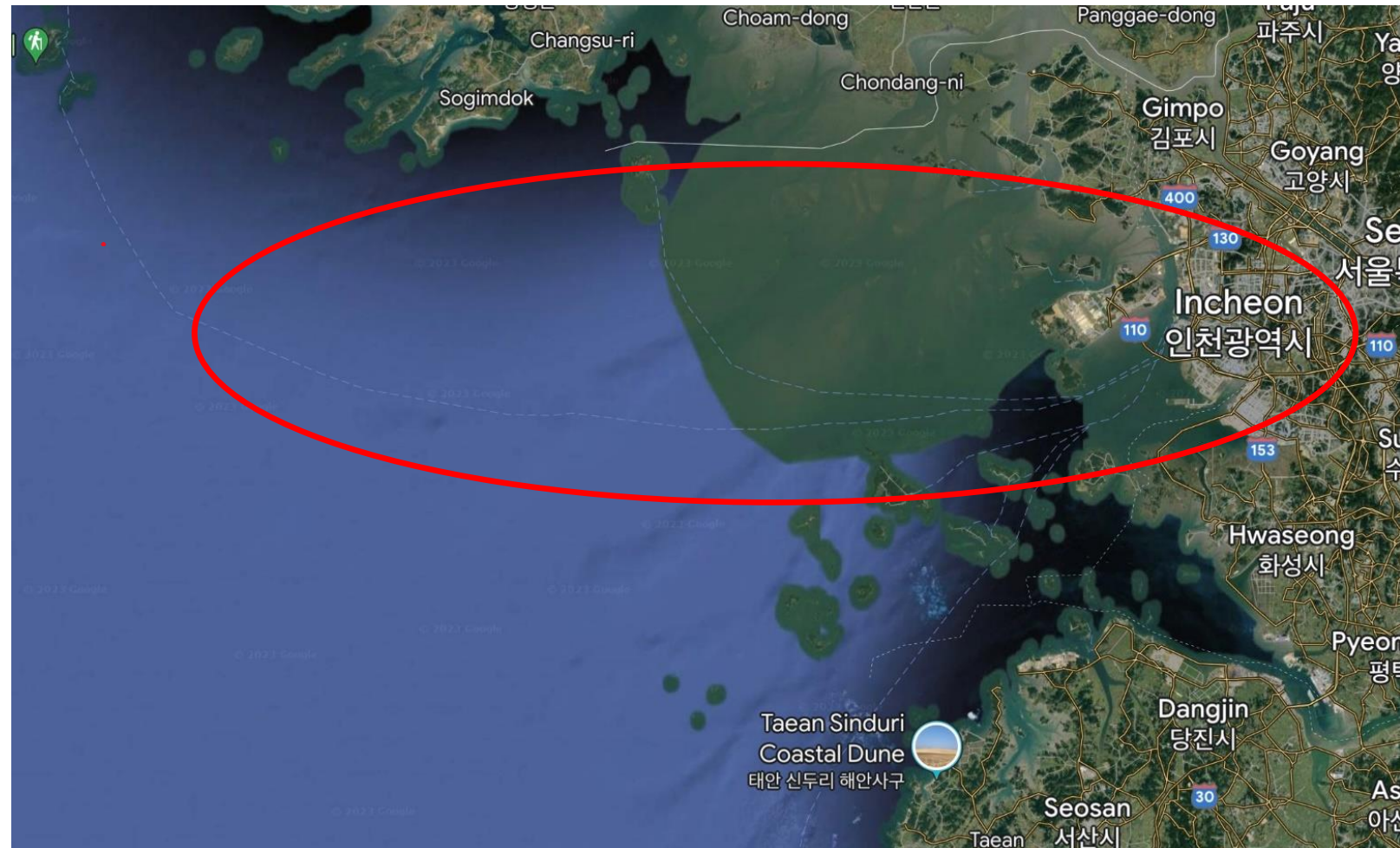
- **Coastal areas** (<100km from the coast) occupy only 4% of our planet yet the value of **their ecosystems' services** is more than a third of the total for the whole world
- **40% global population** lives in coastal areas
- **53%** of the people living in cities, live in **coastal cities**



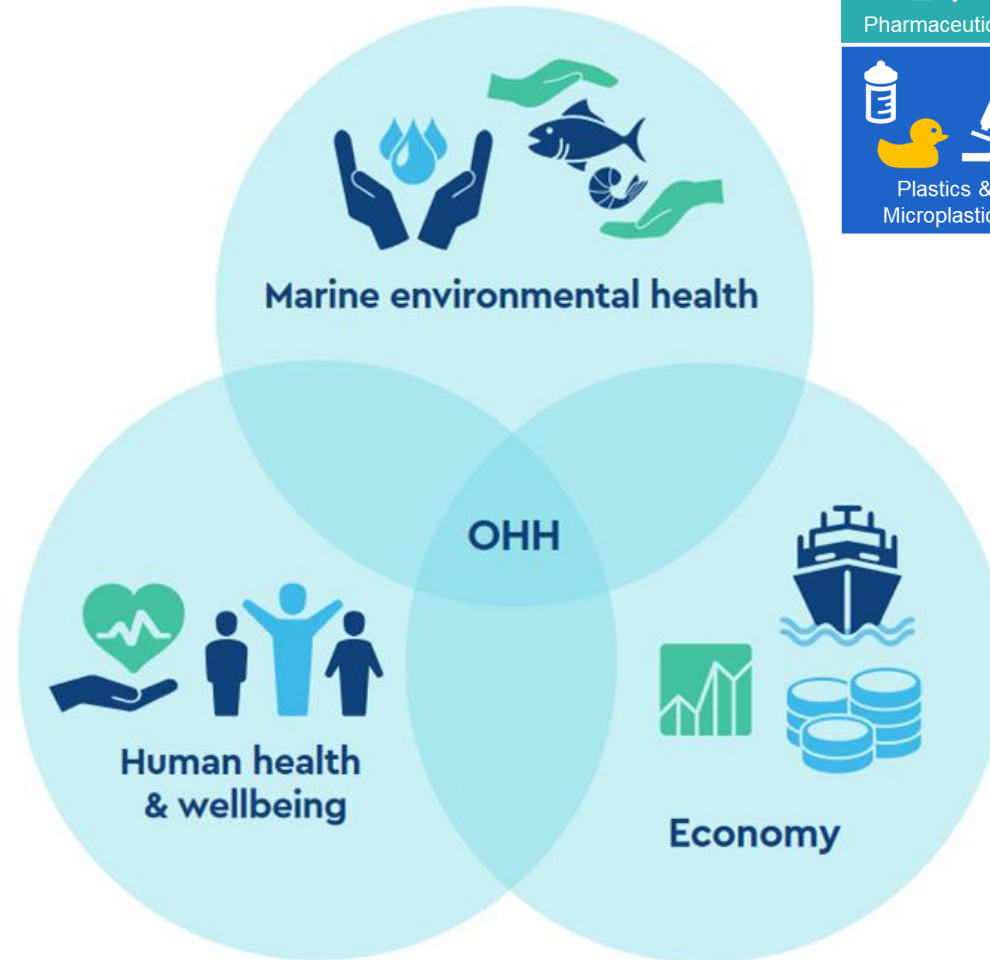
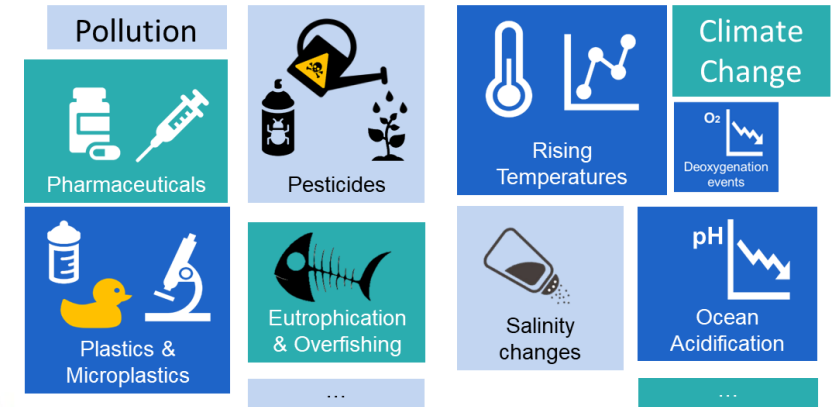


## ➔ Interactions between Integrated Coastal Zone Management & Urban Management

In coastal cities:  
city limits will go  
beyond the  
terrestrial scope



# COASTAL CITIES face challenges



Non-communicable diseases (NCDs) are a leading cause of mortality & morbidity globally (60%). ROK: 41% of total health expenditures in 2019

Sustainable growth of ocean Economy– worth an estimated \$3-6 trillion (UNCTAD, 2023)

[GBD 2019 South Korea BoD Collaborators](https://doi.org/10.1016/S2468-2667(23)00122-6) , Lancet Public Health [https://doi.org/10.1016/S2468-2667\(23\)00122-6](https://doi.org/10.1016/S2468-2667(23)00122-6)

H2020 SOPHIE Consortium (2020) A Strategic Research Agenda for Oceans and Human Health in Europe. H2020 SOPHIE Project. Ostend, Belgium. ISBN: 9789492043894 DOI: 10.5281/zenodo.36965

# Marine@UGent Korea



Marine biotechnology

Behavioural Sciences

Pharmacology

Environmental Sciences



Law

Microbiology

Oceanography

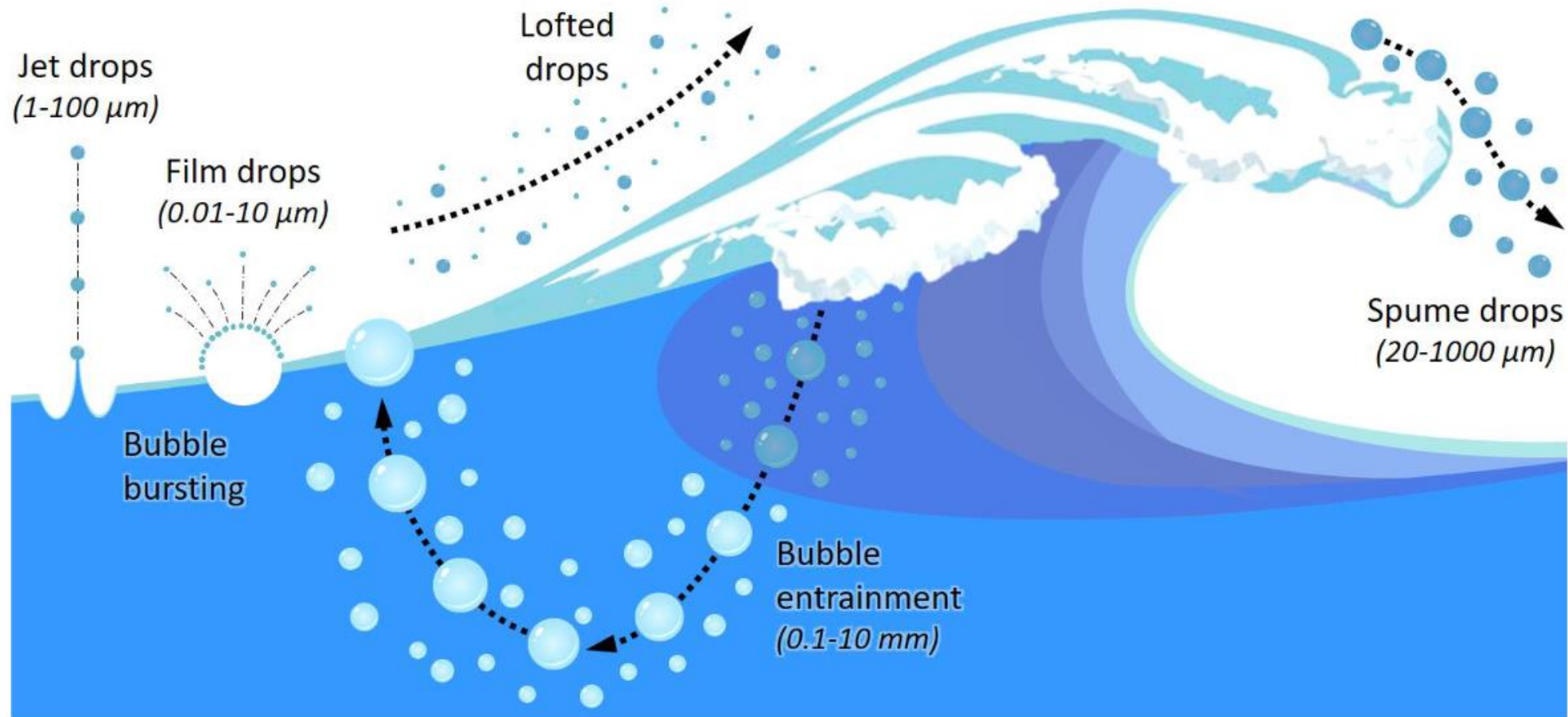
Health Sciences

Chemistry



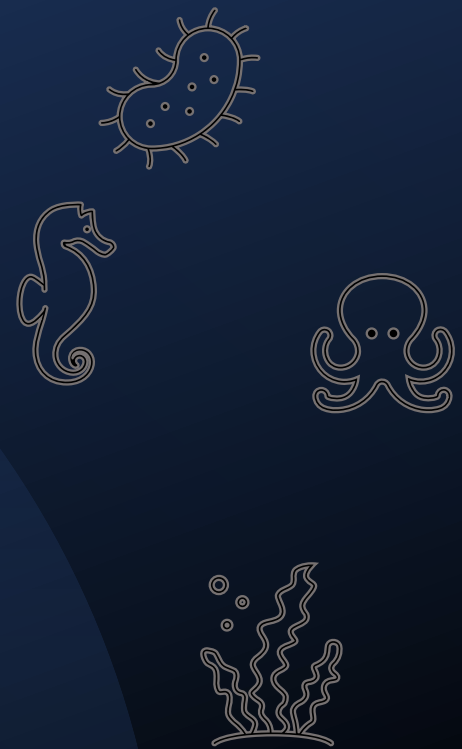
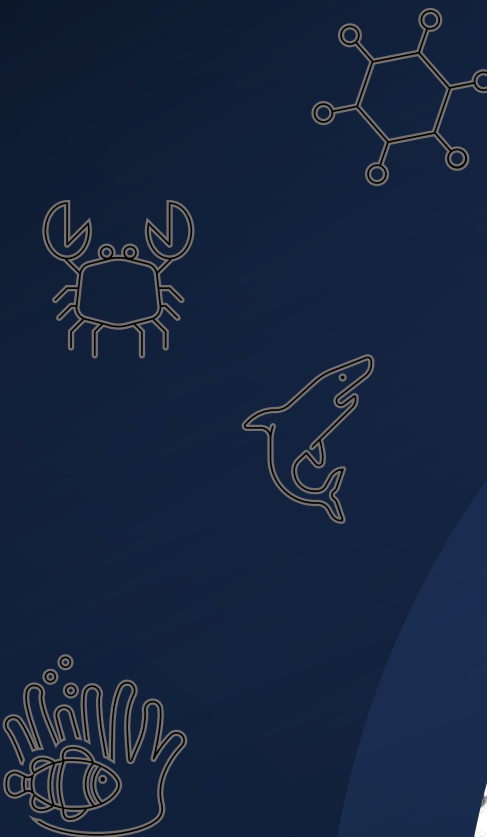
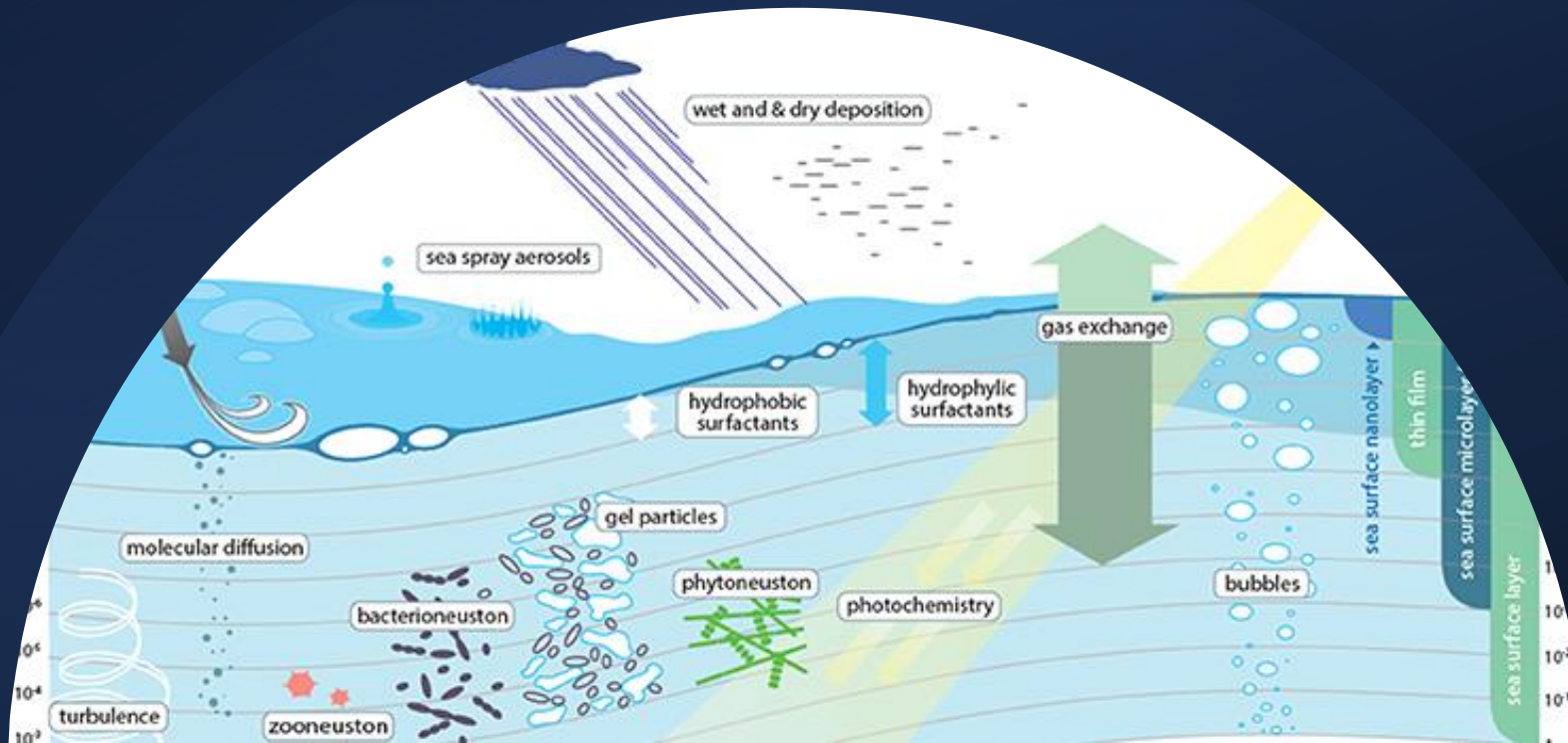
# Marine aerosol: most important natural aerosol system

Global mass flux is estimated to be  $1-3 \times 10^{16} \text{ g yr}^{-1}$  in terms of sea salt



# Marine aerosol: the role of the sea surface microlayer

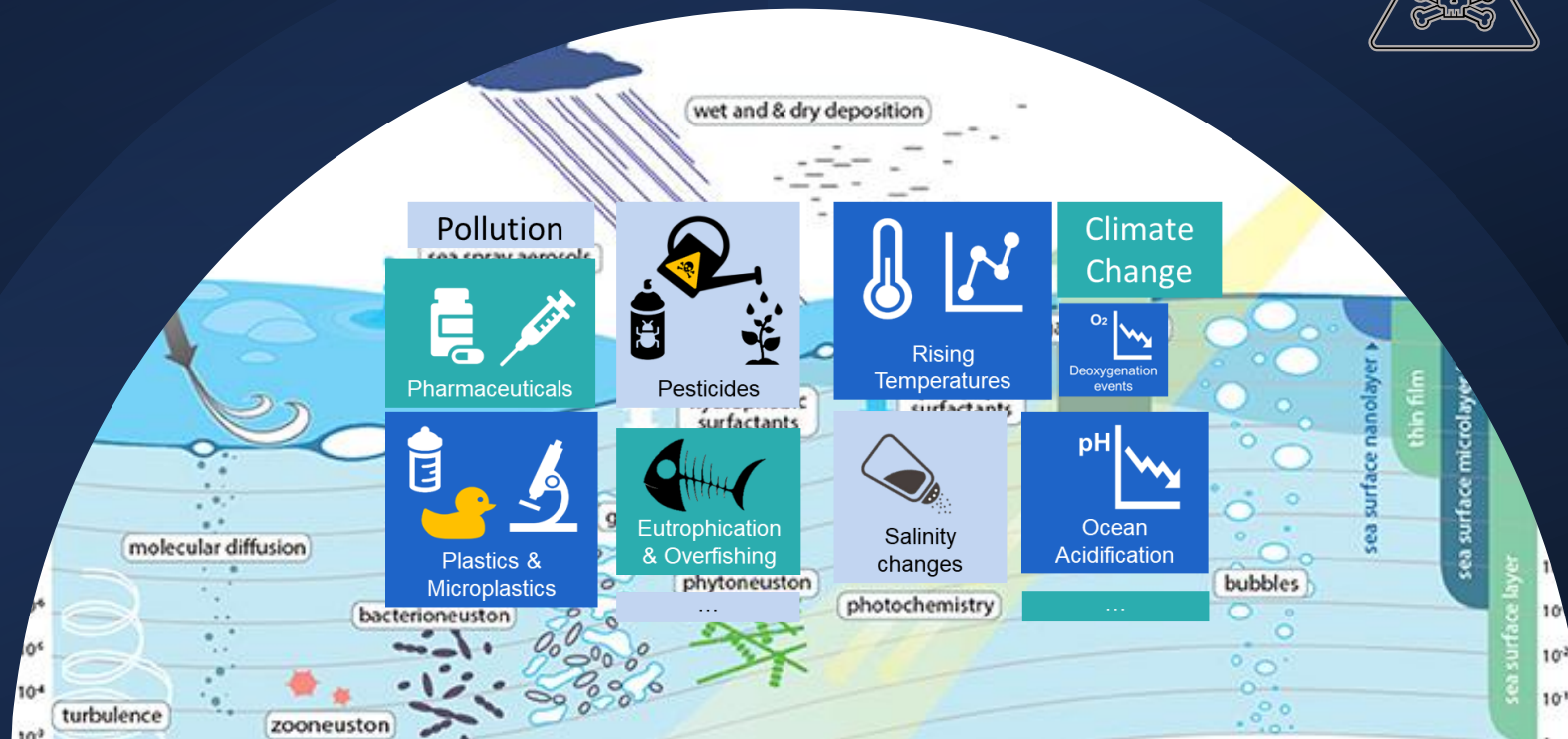
Engel et al. 2017: <https://doi.org/10.3389/fmars.2017.00165>





# Marine aerosol: the role of the sea surface microlayer

Engel et al. 2017: <https://doi.org/10.3389/fmars.2017.00165>



# Marine aerosol in a polluted ocean: unhealthy

Engel et al. 2017: <https://doi.org/10.3389/fmars.2017.00165>



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## Harmful algal bloom aerosols and human health

Chris C. Lim • Jeonggyo Yoon • Kelly Reynolds • Lynn B. Gerald • Andrew P. Ault • Seulkee Heo • Michelle L. Bell • [Show less](#)

[Open Access](#) • Published: May 08, 2023 • DOI: <https://doi.org/10.1016/j.ebiom.2023.104604> • [Check for updates](#)

ANTHROPOGENIC IMPACTS ON THE ATMOSPHERE | March 2, 2023

## Bacterial and Chemical Evidence of Coastal Water Pollution from the Tijuana River in Sea Spray Aerosol

Matthew A. Pendergraft\*, Pedro Belda-Ferre, Daniel Petras, Clare K. Morris, Brock A. Mitts, Allegra T. Aron, MacKenzie Bryant, Tara Schwartz, Gail Ackermann, Greg Humphrey, Ethan Kaandorp, Pieter C. Dorrestein, Rob Knight, and Kimberly A. Prather\*



Environmental Pollution

Volume 351, 15 June 2024, 124105



## Aerosolization of micro- and nanoplastics via sea spray: Investigating the role of polymer type, size, and concentration, and potential implications for human exposure



Silke Lambert <sup>a</sup> , Maaïke Vercauteren <sup>a</sup> , Ana Isabel Catarino <sup>b</sup> , Yunmeng Li <sup>a b</sup> ,  
Josefien Van Landuyt <sup>c</sup> , Nico Boon <sup>c</sup> , Gert Everaert <sup>b</sup> , Maarten De Rijcke <sup>b</sup> ,  
Colin R. Janssen <sup>a d</sup> , Jana Asselman <sup>a</sup>

## Constraining global transport of perfluoroalkyl acids on sea spray aerosol using field measurements

Y. SHA , JANA H. JOHANSSON , MATTHEW E. SALTER , SARA M. Blichner , AND IAN T. COUSINS [Authors Info & Affiliations](#)

SCIENCE ADVANCES • 5 Apr 2024 • Vol 10, Issue 14 • DOI: [10.1126/sciadv.adl1026](https://doi.org/10.1126/sciadv.adl1026)

# Marine aerosol in a SDG ocean: healthy

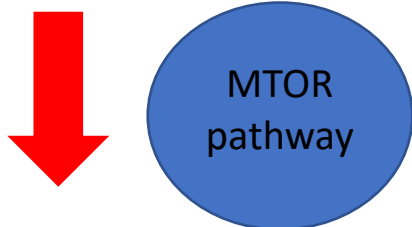
Source: Asselman, Van Acker et al. 2018. doi: DOI:10.1038/s41598-018-36866



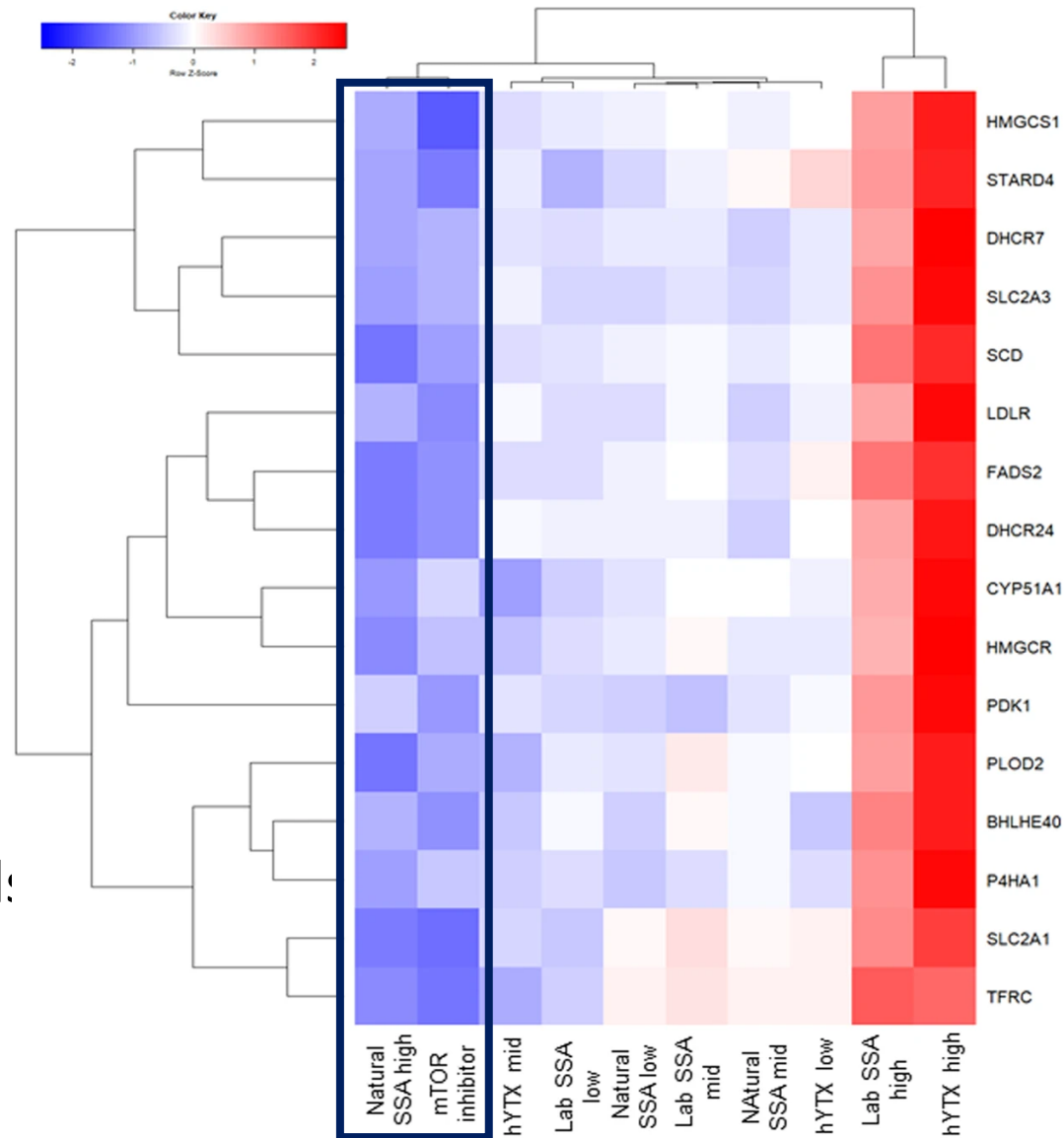
## Sea spray aerosols

MTOR: signal network involved in regulation of cell cycle:

- Growth
- Cell death
- Proliferation of cancer cells
- Immune regulation



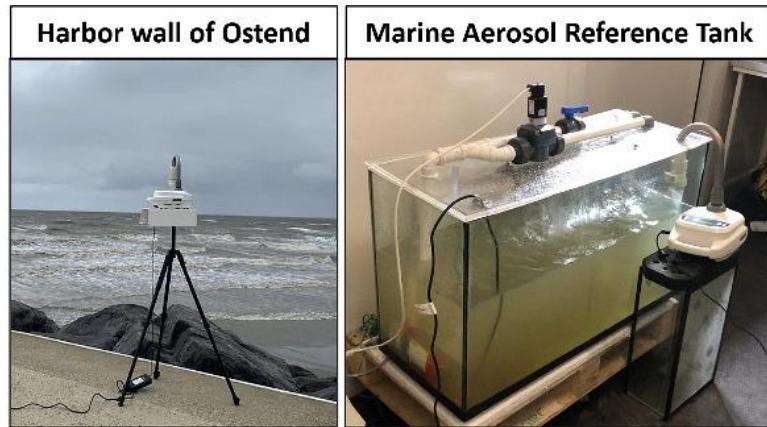
mTOR inhibitors  
(Torkinib )



Increasing algal density to HAB



# Marine aerosol in a SDG ocean: healthy



collect

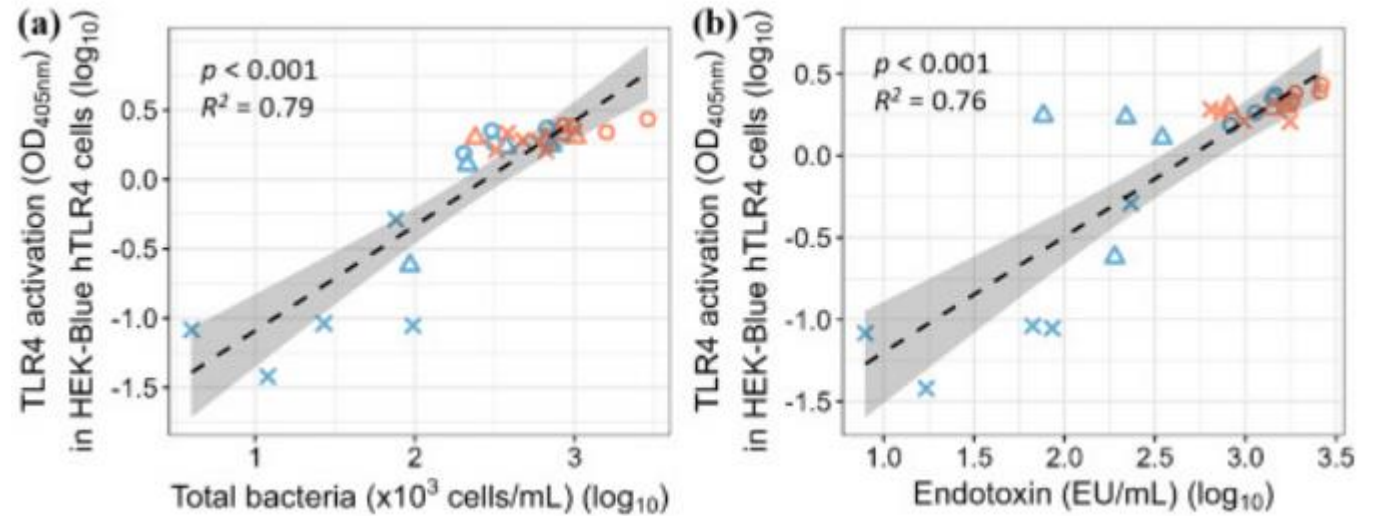


Sea spray aerosols (SSA)

expose



HEK-Blue hTLR4 cells HEK-Blue hTLR2/6 cells THP1-Dual monocytes



Sampling site ● Field ● MART Sampling week ○ Week 1 ▲ Week 2 × Week 4

1. The activation of TLR4 showed significantly positive correlations with both total bacterial count and endotoxin concentration, demonstrating dose-dependent effects.
2. TLR4 activation to be significantly affected by both total bacterial count and endotoxin concentration (both  $p < 0.05$ ).
3. SSA might play a role in modulating and priming immune responses, particularly in dampening the intensive activation of TLR-mediated proinflammatory cytokine signaling by pathogens.



# Marine aerosol in a SDG ocean: healthy



## The Effects of Air Pollution, Sea Exposure and Altitude on COVID-19 Hospitalization Rates in Italy

by [Ennio Cascetta](#)<sup>1</sup> ✉, [Ilaria Henke](#)<sup>1,\*</sup> ✉ and [Luigi Di Francesco](#)<sup>2</sup> ✉ 

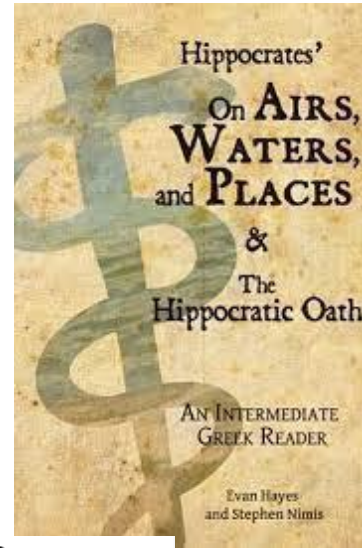
<sup>1</sup> Department of Civil, Construction and Environmental Engineering, University of Naples "Federico II", 80125 Napoli, Italy

<sup>2</sup> Department of Engineering, University of Campania "Luigi Vanvitelli", 81031 Aversa, Italy

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*Int. J. Environ. Res. Public Health* **2021**, *18*(2), 452; <https://doi.org/10.3390/ijerph18020452>

provinces, that would have led to 7339 less hospitalizations for COVID-19 (-11%). On the contrary, near the coast there were lower hospitalized cases in the referred period. In the hypothetical case that no Italians lived near the sea, about 1363 (+2%) more hospitalizations would have been recorded in the analysis period in addition to the effect of a lower PM concentration. This paper wanted to investigate which are the areas with a higher risk of hospitalization in Italy, so as to help the Italian Government to strengthen Health System measures, predicting the most suffering areas




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Marine Policy

Volume 63, January 2016, Pages 144-152

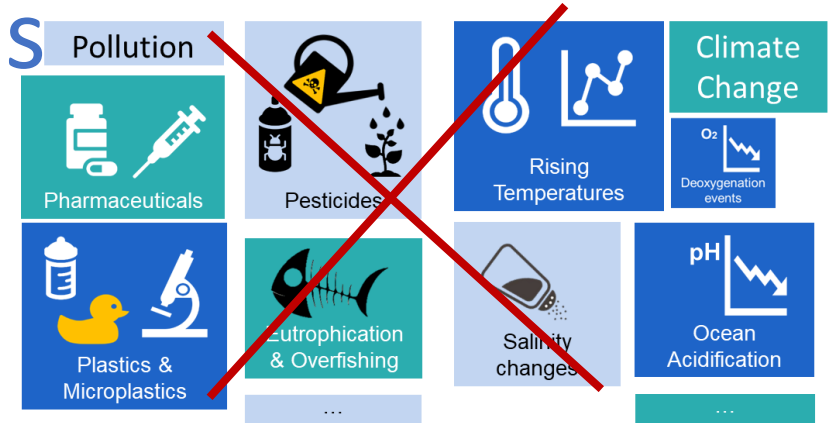


## Valuing the health benefits of physical activities in the marine environment and their importance for marine spatial planning

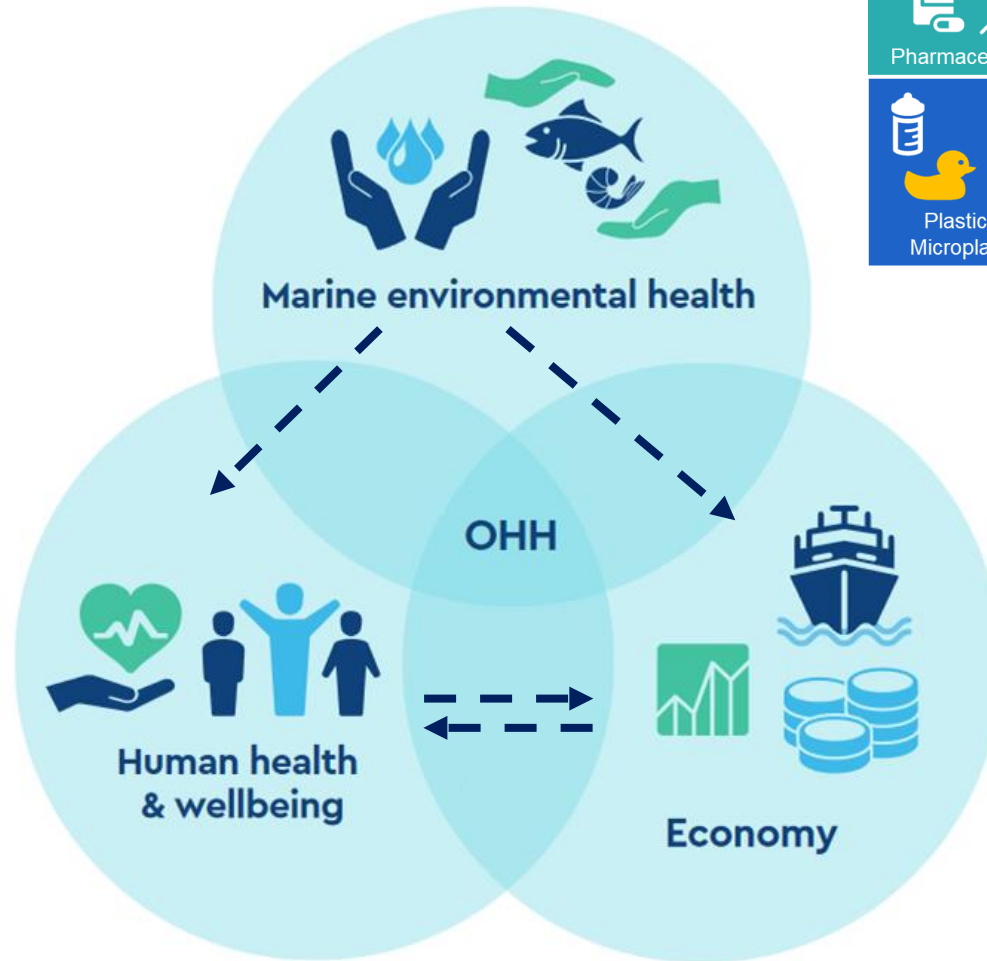
[Eleni Papathanasopoulou](#)<sup>a</sup>  ✉, [Mathew P. White](#)<sup>b</sup>, [Caroline Hattam](#)<sup>a</sup>, [Aisling Lannin](#)<sup>c</sup>, [Andrea Harvey](#)<sup>a</sup>, [Anne Spencer](#)<sup>d</sup>

from the Health Survey for England, the research estimates that physical activities undertaken in aquatic environments at a national level provides a total gain of 24,853 QALYs. A conservative estimate of the monetary value of a QALY gain of this magnitude is £176 million. This approach provides estimates of health benefits which can be used in more comprehensive impact assessments, such as cost-benefit analysis, to compare alternative marine spatial plans. The paper concludes by discussing future steps.

# COASTAL CITIES offer opportunities



Non-communicable diseases (NCDs) are a leading cause of mortality and morbidity globally (60%) and even up to 90%,



The world's ocean economy – worth an estimated \$3-6 trillion (UNCTAD, 2023)



# Marine@Ugent Korea:



*We rethink how oceans and humans can interact sustainably, pioneering in innovative and research-driven solutions.*

- ✓ Establishing a **platform-based blue cluster ecosystem** to ensure continuous development of science and technology in the marine and fisheries fields, and enhance research and technological advancement in the private sector
- ✓ Building a **strategic global-local ocean and fisheries research network** to address international issues and joint challenges
- ✓ Fostering the **growth of the marine industry and creating quality jobs**
- ✓ Enhancing the technological competitiveness in the private sector by **sharing marine research infrastructure and fostering creative and multidisciplinary talent**