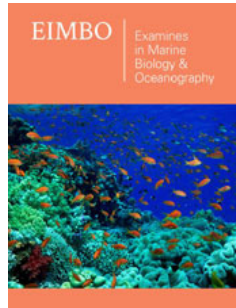


# Invasive Alien Species in the Mediterranean Sea: The Case Study of *Caulerpa cylindracea*

ISSN: 2578-031X



**\*Corresponding author:** Nicola Cantasano, Retired researcher, National Research Council of Italy, Institute for Agricultural and Forest Systems in the Mediterranean, Rende Research Unit, Cosenza, Italy

**Submission:** 📅 February 08, 2024

**Published:** 📅 February 29, 2024

Volume 6 - Issue 4

**How to cite this article:** Nicola Cantasano\*. Invasive Alien Species in the Mediterranean Sea: The Case Study of *Caulerpa cylindracea*. Examines Mar Biol Oceanogr. 6(4). EIMBO. 000644. 2024. DOI: [10.31031/EIMBO.2024.06.000644](https://doi.org/10.31031/EIMBO.2024.06.000644)

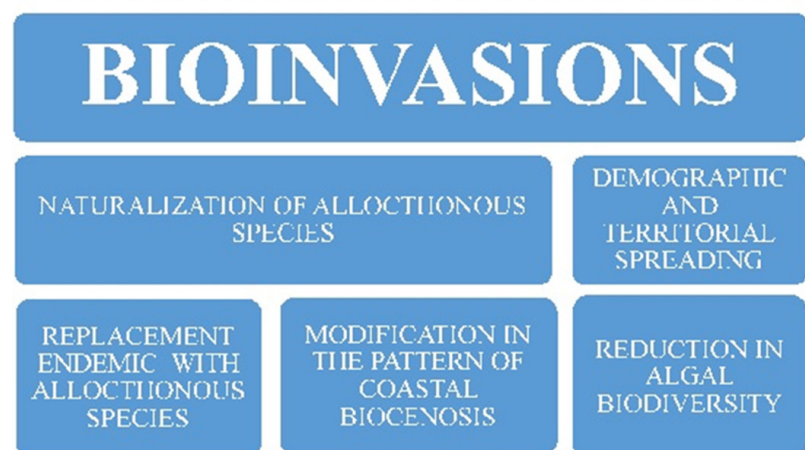
**Copyright@** Nicola Cantasano, This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

**Nicola Cantasano\***

Retired researcher, National Research Council of Italy, Institute for Agricultural and Forest Systems in the Mediterranean, Rende Research Unit, Italy

## Opinion

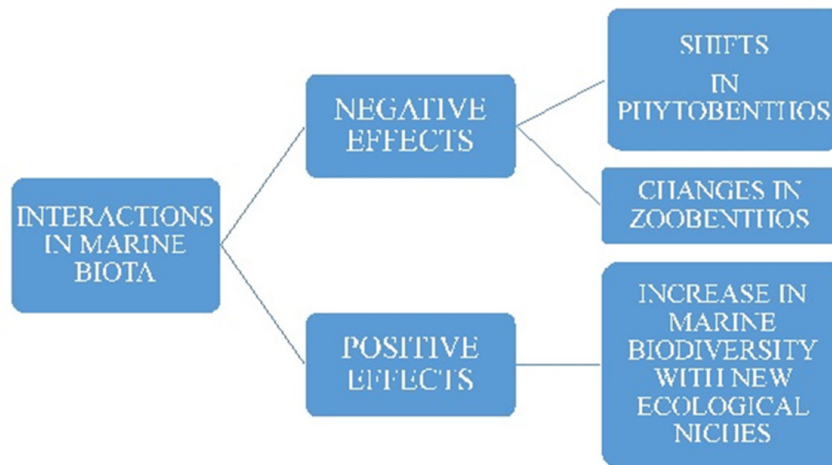
The Not Indigenous Species, named NIS, widespread in the Mediterranean Sea, penetrated into the basin just from the first decades of last century because of maritime navigation across Suez canal and Gibraltar strait connecting Indian and Atlantic oceans with Mediterranean basin [1]. In this way, the building of Suez canal, realized by Ferdinand de Lesseps, the reduction of the salinity levels in bitter lakes but, most of all, the doubling of the canal happened in 2015 [2], favoured the transit of many vegetal and faunal alien species from Indo-Pacific region to the Mediterranean one, that completely changed its geographical pattern from a semi-enclosed to a semi-opened basin, prone to a busy commercial navigation coming from the Red Sea. Indeed, the Mediterranean Sea has become very sensitive to biological invasions caused by many tropical alien species, entering into the basin. This process fostered also by the global warming of Mediterranean seawaters caused in time the entrance of allochthonous and thermophilic species spreading into the Mediterranean waters through “fouling” communities and ballast waters of ships and boats in transit along this important waterway for trading activities [3]. Amongst NIS, some plant and faunal species, after further phases of spreading and acclimatization, were completely established in the seawaters of the basin, extending their populations in time. So, many Invasive Alien Species, named IAS [4], have established in Mediterranean seawaters and are actually able to affect the sensitive ecological balance and the right functioning of some marine ecosystems [5-9] (Figure 1).



**Figure 1:** The interactions of Invasive Alien Species (IAS) in the structure of Mediterranean marine biota.

Actually, in Mediterranean seawaters live 247 IAS, of which 25 ones are marine macroalgae [10,11]. Amongst them, a green algae, named *Caulerpa cylindracea* Sonder1845 (hereafter *C. cylindracea*), has been classified as one of the first 100 worst invasive species [6] able to affect the plant biodiversity of Mediterranean Sea. Really, *C. cylindracea* shows a great environmental capacity thriving in

different stations such as in exposed and sheltered sites, in shaded and sunny seawaters but, also, in pristine and in polluted coastal regions, from surface waters until 70 meters depth [12]. In this way, the spreading of the species could affect negatively the structure of marine biota or, otherwise, could increase its biodiversity, leading in time to new ecological niches (Figure 2).



**Figure 2:** The effects of biological invasions on coastal ecosystems.

Therefore, it is difficult to value the effects of this invasive process in the short and long time because it is yet unknown if the spreading of *C. cylindracea* could increase or decrease the Mediterranean marine biodiversity [13]. These doubtful conditions call for monitoring programs and mapping plans directed towards an effective management of the species, as highlighted by scientific literature [14-16]. Finally, it is necessary to ensure a close connection between scientists, policy makers, stakeholders and citizens so to realize an effective management of all the invasive processes occurring in Mediterranean Sea.

## References

- Galil BS, Boero F, Campbell ML, Carlton JT, Cook E, et al. (2015) "Double trouble": The expansion of the Suez Canal and marine bioinvasions in the Mediterranean Sea. *Biological Invasions* 17: 973-976.
- Galil B, Marchini A, Occhipinti-Ambrogi A, Ojaveer (2017) The enlargement of the Suez Canal- Erythraean introductions and management challenges. *Management of Biological Invasions* 8(2): 141-152.
- Raitsos DE, Beaugrand G, Georgopoulos D, Zenetos A, Pancucci-Papadopoulou AM, et al. (2010) Global climate change amplifies the entry of tropical species into the eastern Mediterranean Sea. *Limnology and Oceanography* 55(4): 1478-1484.
- Kolar CS, Lodge DM (2001) Progress in invasion biology: predicting invaders. *Trends Ecol Evol* 16(4): 199-204.
- Bax N, Williamson A, Aguero M, Gonzalez E, Geeves W (2003) Marine invasive alien species: A threat to global biodiversity. *Marine Policy* 27(4): 313-323.
- Streftaris N, Zenetos A (2006) Alien Marine Species in the Mediterranean – the 100 "worst invaders" and their impact. *Mediterranean Marine Science* 7(1): 87-118.
- Occhipinti-Ambrogi A, Galil B (2010) Marine alien species as an aspect of global change. *Advances in Oceanography and Limnology* 1(1): 199-218.
- Servello G, Andaloro F, Azzurro E, Castriota L, Catra M, et al. (2010) Marine alien species in Italy: A contribution to the implementation of descriptor D2 of the marine strategy framework directive. *Mediterranean Marine Science* 20(1): 1-48.
- Zenetos A, Galanidi M (2020) Mediterranean non indigenous species at the start of the 2020s: Recent changes. *Mar Biodivers Rec* 13: 10.
- Katsanevakis S, Poursanidis D, Hoffman R, Rizgalla J, Bat-Sheva S, et al. (2020) Unpublished Mediterranean records of marine alien and cryptogenic species. *BioInvasions Records* 9(2): 165-182.
- Ragkousis M, Zenetos A, Ben Souissi J, Hoffman R, Ghanem R, et al. (2023) Unpublished Mediterranean and Black Sea records of marine alien, cryptogenic, and neontative species. *Bioinvasions Records* 12(2): 339-369.
- Piazzi L, Meinesz A, Verlaque M, Alcali B, Antolic B, et al. (2005) Invasion of *Caulerpa racemosa* var. *cylindracea* (*Caulerpales*, Chlorophyta) in the Mediterranean Sea: An assessment of the spread. *Cryptogamie Algologie* 26(2): 189-202.
- Piazzi L, Balata D, Bulleri F, Gennaro P, Ceccherelli G (2016) The invasion of *Caulerpa cylindracea* in the Mediterranean: The known, the unknown and the knowable. *Mar Biol* 163: 161.
- Molnar JL, Gamboa RL, Revenga C, Spalding MD (2008) Assessing the global threat of invasive species to marine biodiversity. *Front Ecol* 6(9): 485-492.
- Galil BS, Marchini A, Occhipinti-Ambrogi A (2018) East is east and West is west? Management of marine bioinvasions in the Mediterranean Sea. *Estuarine, Coastal and Shelf Science* 201: 7-16.
- Katsanevakis S, Coll M, Piroddi C, Steenbeek S, Rais Lasram FB, et al. (2014) Invading the Mediterranean Sea: biodiversity patterns shaped by human activities. *Frontiers in Marine Science* 1(32): 1-11.