



Conserve and sustainably use the oceans, seas and marine resources for sustainable development

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Which Marine and ecosystems' environmental reality in Tunisia?

Waste and wastewater discharges throughout the Tunisian coastal strip and in coastal ecosystems are having negative impacts on fauna, flora as well as some human activities (fishing, aquaculture, swimming, etc.), leading to disastrous ecological, health, economic and social consequences. For examples: i) during the summer of 2021, swimming was banned by the Tunisian Ministry of Health in 17 beaches spread over 6 governorates, ii) the phenomenon of red waters on the coasts of Sfax, with excess fish mortality, noted in 2019. This later would be linked to a proliferation of marine algae.

It actually appears of great importance to analyze and understand the links between the pressure of contamination and the response of living organisms. This general problem is not

only a major scientific challenge, but also an essential issue for human health and the environmental management of anthropized marine ecosystems.



This overall set of challenges was efficiently covered through a significant number of studies within the framework of research projects or research-based training (Master and PhDs thesis) in the institutions of the University of Tunis El Manar. As a result, 118 articles were published between 2017 and 2021 concerning the "Life Below Water" ODD, as detailed below.



Phenomenon of red waters on the coasts of Sfax in Southeast of Tunisia



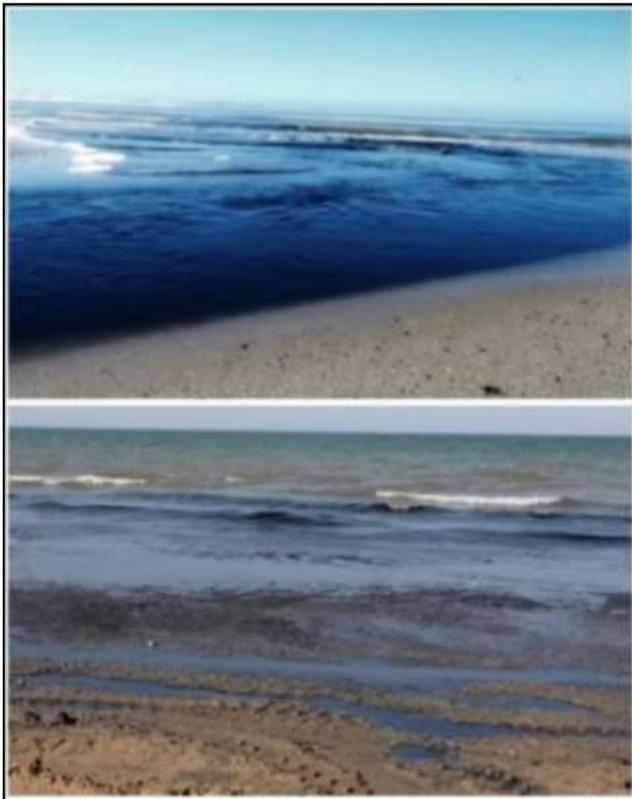
Coastal ecosystems

The studies carried out by several researchers from the University of Tunis El Manar, in connection with the "Life Below Water" ODD, concerned mainly the Gulf of Tunis, the bay of Monastir and the Gulf of Gabès.

Gulf of Tunis

The current degradation of the coastal waters of the Gulf of Tunis, due to pollution, has a negative impact on the functioning of ecosystems, on biodiversity and on small-scale fishing. Teams from the University of Tunis El Manar, in collaboration with the National Institute of Marine Sciences and Technologies (INSTM) have conducted studies which the topics are: i) Distribution and assessment of trace metal contamination in the surface sediments of the Meliane River and the Coast of the Gulf of Tunis, ii) the impact of anthropogenic inputs on the quality of the waters and sediments of the ecosystems of the west coast of the Gulf of Tunis.

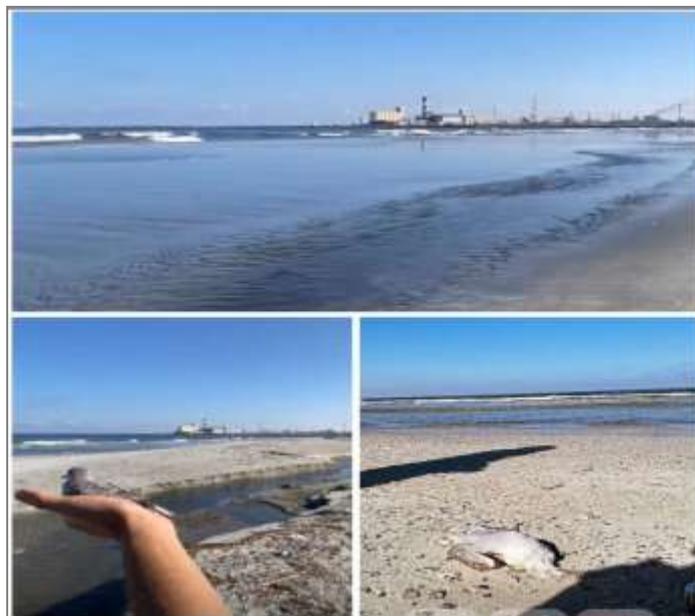
Research missions in various coasts of Tunisia



Rades Meliane-Ezzahra coastal ecosystem,
Gulf of Tunis

Gulf of Gabès

The Gulf of Gabès is characterized by a tidal range of up to 2m during high tides. Consequently, the possibility of dilution and dispersion of pollutants is relatively reduced and the risk of setting down to the bottom is increased. Several chemical industries are the source of various discharges, phosphogypsum in particular, which is directly discharged into the sea, impacting disastrously the marine environment. As part of training research program at the University of Tunis El Manar, a collaboration with the Tunisian Chemical Group was set up to study the impact of the compounds derived from the phosphogypsum discharge on Ghannouch-Gabes coastal ecosystem and Provide decision support tools and remediation solutions. The variations in the composition and structure of macroinvertebrate benthic communities in relationship with the marine sediment enrichment with heavy metals were also investigated in the Gulf of Gabes.



Ghannouche-Gabes Coastal ecosystem, Gulf of Gabès

Monastir Bay

Monastir Bay, located on the eastern coast of Tunisia, was a few decades ago, characterized by high marine biodiversity. However, the environmental quality of this coast is affected by several urban and industrial discharges. An assessment of heavy metal contamination, total organic

carbon and nutrient accumulation was performed to determine the quality of water and surface sediments.



Monastir Bay ecosystem degradation

Coastal lagoons: degradations and restoration

Lagoons are environments with high biological productivity and are essential to local economic activities (artisanal fishing and shellfish farming). They are consistently subjected to various disturbances, which involve numerous malfunctions and loss of services. In Tunisia, all coastal lagoons are subject to more or less significant disturbances caused by waste and wastewater discharges. Only 25% of these lagoons have been restored. Researchers from the University of Tunis El Manar, within the framework of projects or the doctoral school, have carried out research works. The research focused mainly on: i) assessment of the Trophic Status and evaluation of heavy metal pollution risk in surface sediment of the South Lagoon of Tunis, ii) biogeochemical cycles of metallic trace elements and nutrients in the sediments of the Bizerte lagoon, iii) evaluation of the bioaccumulation of trace metal (Cu and Zn) in three *Orchestia* species living in Bizerte lagoon, iv) evaluation of the spatial and temporal variation of oxidative stress biomarkers, metal content and DNA damage in *Venerupis decussata*, collected from Boughrara (Southeast of Tunisia) and Ghar El Melh (Northeast Tunisia) lagoons.

