



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

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A series of studies conducted by several researchers from the University of Tunis El Manar, delves into the environmental challenges facing various Tunisian lagoons. These studies revolve around the "Life Below Water" ODD, with a special focus on microplastic pollution, bioaccumulation of polycyclic aromatic hydrocarbons (PAH), risk assessment of trace metals in water and sediment, and biodegradation of biodiversity.

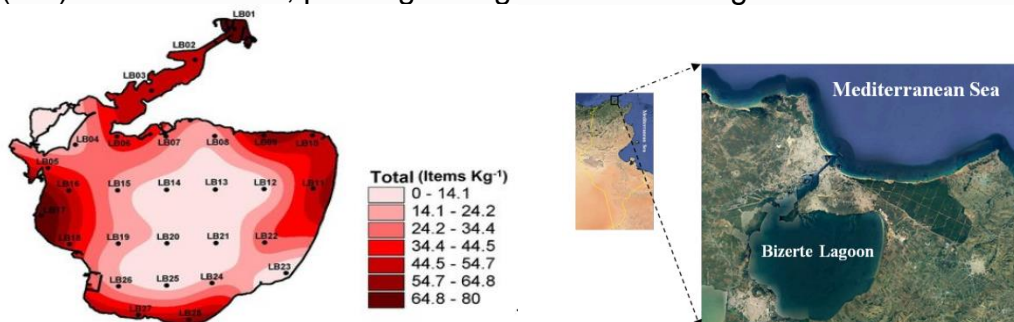
Microplastic pollution

Wakkaf et al. (2022) conducted a research study focusing on the seasonal patterns of microplastics in surface sediments of the heavily impacted mediterranean Bizerte lagoon, in Northern Tunisia.



Photos showing some of the unmanaged/uncontrolled plastic waste observed along the coast of the Bizerte lagoon

Seasonal patterns of microplastics in surface sediments, revealed significant seasonal variation in total microplastic (MP) concentrations, peaking in august and reaching their lowest levels in february.



Spatial variations in the concentrations (items kg⁻¹ DS) of total microplastics in surface sediments of the Bizerte Lagoon

Spatial variations in total MP concentrations were linked to the proximity to the coastline, the degree of human activity, the location within the lagoon, and the presence or absence of vegetation. The sources of plastic pollution primarily stem from coastal urban, industrial, and agricultural areas, as well as from major freshwater streams.

Trace metals: risk assessment in water and sediment

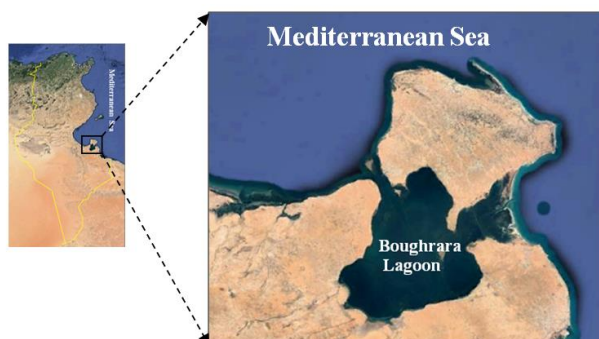
Bizerte Lagoon

The coastal lagoon of Bizerte in Northern Tunisia is consistently subjected to various disturbances, caused by waste and wastewater discharges.

A Team from the University of Tunis El Manar (Ben Mna et al., 2022), conducted a study focused on assessing the risk associated with some trace metals (Zn, Cu, Cr, Cd, Ni, Pb and Mn) in the sediment and pore water of Bizerte lagoon. This study aimed to determine how diagenetic processes influence the vertical distribution of these metals and their resulting diffusive fluxes. The findings, using various ecological indices, indicate a high ecological risk to benthic organisms from metals, chiefly Cd, Pb and Ni accumulated in the sediment

Boughrara Lagoon

Tlig et al. (2023) conducted a study on environmental risk assessment in Boughrara lagoon, situated insoutheastern Tunisia, specially related to trace metal discharges.



Location map of Boughrara lagoon

Results suggest that the Boughrara lagoon exhibits as highly levels of pollution for Cd, Pb, and Fe. Three possible sources of pollution were identified: phosphogypsum effluents (P, Al, Cu, and Cd), the former Pb mine (Pb and Zn), and the cliff weathering and streams input from the red clay quarry (Fe).

Bioaccumulation / biomarkers

A study titled “Bioaccumulation of polycyclic aromatic hydrocarbons (PAH) in Polychaeta Marphysa sanguinea in the anthropogenically impacted Tunis Lagoon: DNA damage and immune biomarkers” was carried out by Mdaïni et al. (2022).



Location map of Tunis Lagoon

This research investigated the impact of polycyclic aromatic hydrocarbons (PAHs) on the polychaeta *Marphysa sanguinea*. Results revealed a clear correlation between changes in animal physiology and the bioaccumulation of polycyclic aromatic hydrocarbons (PAHs). Statistical analysis revealed a likely impact of both low and high molecular weight PAHs on variations in energy storage lipids (Triacylglycerol and sterol and wax esters) and membrane lipids, particularly phospholipids.

Degradation of biodiversity

An assessment of decadal changes in the sedimentary, sea surface salinity and microfaunistic patterns of the Bizerte Lagoon was recorded by Gaaloul et al. (2022).

The findings from the microfaunal pattern suggest a progressive increase in alien marine species within the lagoon over the last few decades owing to changes in sea surface salinity and sedimentation. Moreover, the study revealed the unexpected presence of tropical to subtropical Larger B-bearing Foraminifera (LBF) species, which are exogenic to the warm southern Mediterranean coasts.

Additionally, Labidi et al. (2023) detected the invasive protozoan *Haplosporidium pinnae* in the critically endangered bivalve *Pinna nobilis* in Bizerte Lagoon and the update of its current status.

Since 2016, a mass mortality event (MME) caused by a parasite has led to a significant decline in *P. nobilis* populations throughout the Mediterranean Sea. Coastal lagoons across the Mediterranean Sea are key conservation areas for *P. nobilis*. This study aims to: i) assess the *P. nobilis* population status in the Bizerte Lagoon, between 2016 and 2022, conducting surveys both before and after the MME to provide reliable understanding on the trends, current situation and conservation status of the species; and ii) monitor the presence of *H. pinnae* and *Mycobacterium* sp. pathogens in *P. nobilis* populations.

Workshops and Conferences

National Workshop organized at the Faculty of Sciences of Tunis (February, 27-28, 2023), entitled: "Impact des pesticides sur l'écosystème aquatique : de la bio-surveillance à la résolution de la toxicité". Workshop led by Najla Soudani, Faculty of Sciences of Tunis.

Conference at the Faculty of Sciences of Tunis (April, 2023), entitled: "La spéciation des composés métalliques et organo-métalliques : évaluation de la qualité des écosystèmes et traçage de la contamination anthropique". Conference led by Pr. Chrystelle Montigny - University of Montpellier, France.

Conference in Hammamet (April, 2023) entitled : "Évaluation du stock de carbone bleu au niveau de quelques écosystèmes marins en Tunisie". Conference led by Asma Jlassi, Faculty of Sciences of Tunis.

