



## **Ecological consequences of hot-spots in the Marmara Sea**

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The ecological consequences of the land-based pollution experienced so far prove evidence of significant environmental stress in the Marmara Sea which is a semi-enclosed internal sea with a stratified structure. The stratification is due to the Mediterranean originated lower layer current and Black Sea originated upper layer current that hinders the water circulation. Rapid urbanization on the coastal zone of the Marmara Sea has attracted congested population influx since the 1970's. This has been one of the main reasons for the pollution that has affected primarily the estuaries and bays of the Marmara Sea and has ultimately spread along the shoreline and continental shelf that constitutes 50% of its total area. The Marmara Sea where large industries and cities are located on the coast of the elongated semi-enclosed Izmit, Gemlik and Bandırma bays receive untreated or partially treated domestic and industrial wastewater. The Marmara Sea coastal zone is at risk of severe industrial and domestic pollution where hot-spots comprise Izmit, Gemlik, Bandırma bays and Greater Istanbul Metropolitan Area. Anthropogenic pollution trapped in bays, in particular, has created significant ecological damage resulting in the decrease or extinction of marine species.

The findings of various studies and the present one carried out so far reveal that a comprehensive environmental management supported with a good understanding of the oceanographic and ecological processes is essential, that wastewater pollution control including nutrients and petroleum hydrocarbons must be given prime importance in the sensitive waters of the Marmara Sea, in particular, to avoid further ecological damages. This issue necessitates an in-depth analysis comprising the replenishment period of the sensitive bays before setting-up the means and tools for remedial actions.