Chemical and Ecotoxicological Monitoring of a marine coastal area in the Central Italy

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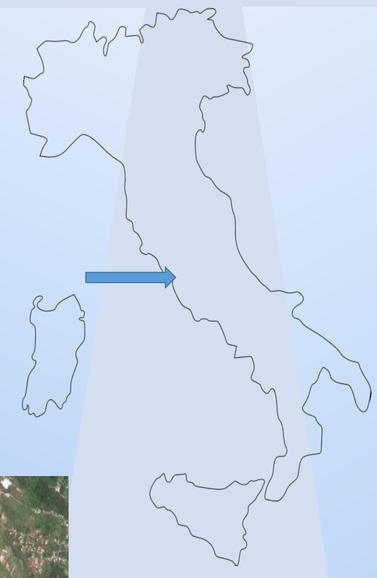
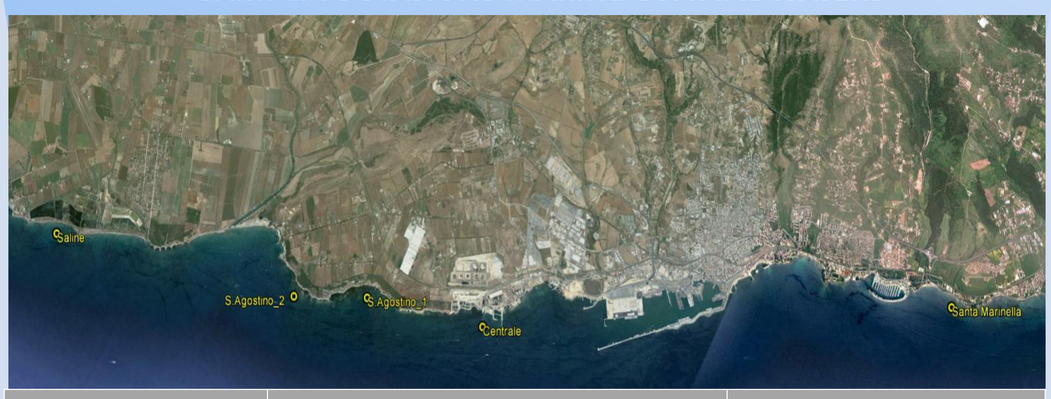
INTRODUCTION

A monitoring campaign has been performed in Central Italy with the aim to characterize the chemical quality status of the coastal marine area in order to detect the possible impact of the emissions of a Coal fired power station and other sources of pollution in proximity of the city of Civitavecchia.
The sampling has been carried out in two different seasons of the year along the marine coastal area and in a transitional surface waterbody (Saline di Tarquinia).



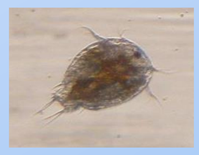
SAMPLING STATIONS MARINE COASTAL WATERS



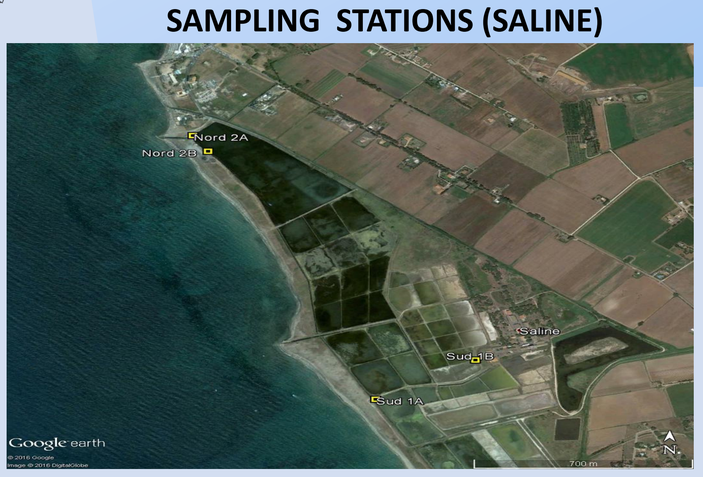
STATIONS	Exceedances of Parameters in Sediment	Ecotoxicological Effects
Santa Marinella	Chromium, Arsenic, Barium,	Not performed
Centrale	Naphtalene Acenaphtene, Acenaphtylene, Arsenic, Chromium ,Barium	Low Effect on crustacean
Sant'Agostino 1	Chromium Arsenic, Barium	No effects
Sant'Agostino 2	Chromium, Arsenic, Barium	Not analysed
Saline/Mare	Chromium, Arsenic, Barium, Lead, Mercury	Not performed
Saline sud(1A)	Lead	No effects
Saline sud (1B)	Chromium, Nickel, Lead, Copper, Barium	Algae Ecotoxicological effects
Saline nord (2A)	Chromium, Arsenic Lead Barium	No effects
Saline nord (2B)	Mercury, Copper	No effects

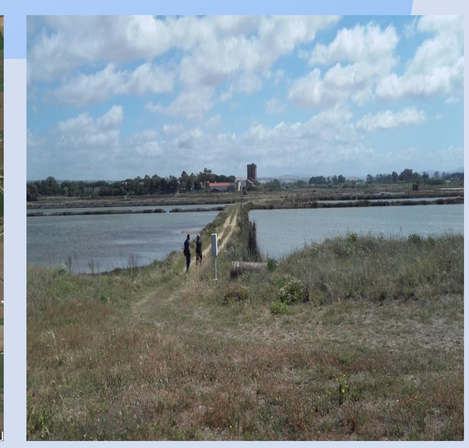
MATERIALS AND METHODS

The analysis has been performed in the water column and in the first 20 centimeters of the sediments. The chemical substances analyzed included several priority substances of the WFD (water framework directive) and other chemical substances: Metals, Dioxins, PCB, PAH, Naphtalene.
The Ecotoxicological assays have been performed with the use of algae (*Phaeodactylum tricornutum)* and crustaceans (*Artemia franciscana* and *Tigriopus fulvus*).



SAMPLING STATIONS (SALINE)



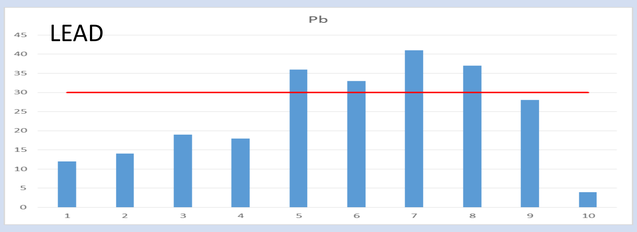


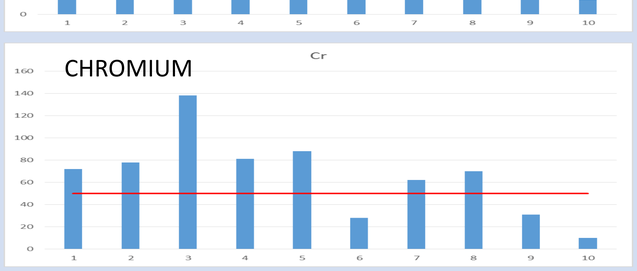
SEDIMENT SAMPLING

Sediments have been collected by t scuba-divers through the use of tubes of neutral material. The first 20 cm of the sediment have been analyzed. The range of depht in the marine coastal area has been 6-9 meters. For each site 3 sub-samples have been taken.

RESULTS AND DISCUSSIONS

SEDIMENT





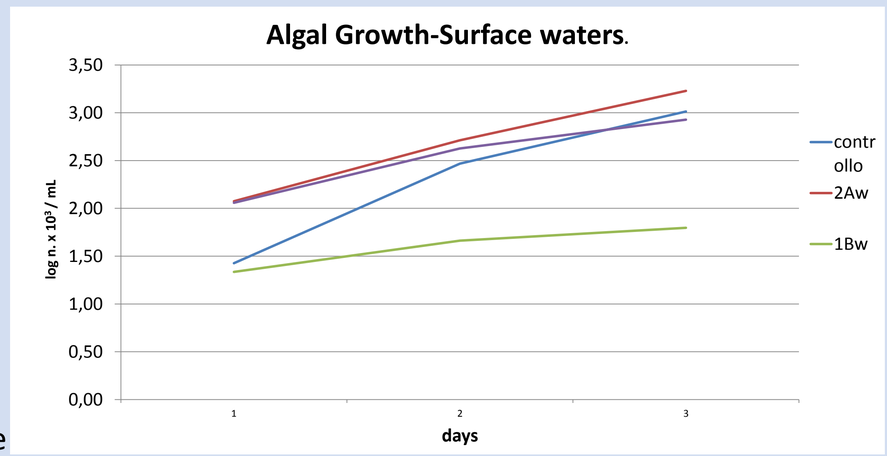
The results have showed a diffuse exceedance of the sediment environmental quality standards (red line) of the Italian legislation for some metals (e.g. arsenic, lead, chromium, mercury) and naphthalene

WATER COLUMN
Uranium (µg/L)

	S.M.	S.M.	Centr	Centr	S.Ag 1	S.Ag 1	S.Ag 2	S.Ag 2	Salin e	Salin e	PNEC
Uranium	5	6	6	6	7	5	6	6	7	6	0,5* 100**

The data of the water column are in general below the environmental quality standards, but Uranium has been detected in surface water samples at concentrations above the available EU PNEC (predicted no effect concentration). Further investigations are needed on Uranium (* draft WFD dossier **chronic risk NOAA).

BIOASSAYS



Ecotoxicological effects have been detected with the algae (green line in figure) and could be related to the substances detected (e.g. heavy metals) or other substances released in the area (transitional waterbody-Saline di Tarquinia).

CONCLUSIONS

In general the results show a situation in which the quality of the sediments is not in a good status, although the level of concentrations should not cause a high risk for the aquatic ecosystems; the chemical contaminants can derive from different sources of pollution (industrial, urban, agricultural, atmospheric deposition) of the area.

The management measures should be reinforced in order to achieve the good quality status required by the water framework directive. The presence of Uranium in the marine coastal area should be further investigated to understand the possible role of the Coal fired power station.