

#### MSF.5

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#### **ESTUARINE VULNERABILITY ASSESSMENT: QUANTIFYING THE ACCEPTABILITY OF MIXING ZONES GENERATED BY POINT DISCHARGES. AN APPLICATION TO SUANCES ESTUARY (N SPAIN)**

State Members may designate approaches and methodologies to define mixing zones (Directive 2008/105/EC). Mixing zones (MZ) are defined as areas, adjacent to point discharges, where Environmental Quality Standards (EQS) can be exceeded. While, EQSs are established to ensure an effective surface water protection.

Taken into account the variability of European waters, it is not adequate to set general methods applicable to all water body types. Moreover, MZs in complex ecosystems such as estuaries, need careful judgments combining the necessity of more accurate numerical modeling to calculate EQSs exceedances and the acceptability criteria for the extent of MZs.

A holistic methodological procedure to assess the estuarine vulnerability in a spatio-temporal framework analysis is presented. This approach provides the acceptability criteria of the size of MZs and location of point discharges in order to guarantee an effective decision-making process.

Estuarine Vulnerability (EV) is referred to characteristics of an ecosystem that describes its potential to be harmed. Thus, vulnerability is presented as a combination of susceptibility and the state of conservation. Susceptibility is related to the flushing capacity, and it is estimated by means of numerical models. Meanwhile, the state of conservation is determined as a combination of naturalness and ecological value by means of GIS techniques. Naturalness is defined as the absence of physical anthropogenic modifications. Ecological value is described as the building capacity to support species of flora and fauna. Indicators, metrics, assessment criteria for each vulnerability parameter and a formula to integrate them are presented. Finally, Estuarine Vulnerability has been assessed in Suances Estuary (N Spain) to allocate a hypothetical point discharge. For this task, the spatio-temporal variation of EQSs exceedances (MZs) has been computed in several points along the estuary. Next, Estuarine Vulnerability values have been crossed with the extents of the MZs to find out the optimal location. Results from Suances Estuary confirmed the suitability of the proposal methodology and the conceptual approaches as a comprehensive and practical management tool.

#### SS2.12

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#### **A PRELIMINARY MODEL OF THE NET CARBON BALANCE IN MEDITERRANEAN COASTAL WETLANDS TO ASSESS THEIR CONTRIBUTION TO THE GREENHOUSE GAS EMISSIONS**

In global terms, wetlands entail almost 14% of the terrestrial biosphere carbon pool, yet they only are occupying roughly 6% of the land. Further, wetlands in temperate regions containing organic sediments are expected to act as carbon sinks, thus theoretically contributing in a significant way to the atmospheric carbon balance. To assess this idea, we are running a project called CARBONSINK, funded by Fundación Biodiversidad, which tries to evaluate the potential role of the main Spanish wetland types in battling climate change. An important typology is that formed by Mediterranean coastal wetlands (i.e., saltmarshes and coastal lagoons, being two representative The Marjal of Pego-Oliva (Alicante) and Marjal dels Moros (Valencia), the results obtained being presented here. Shifts in the balance of carbon sequestration/emission are expected to occur during the annual cycle. It is for this reason that a bi-monthly sampling schedule is being carried out in the project, covering at least one annual hydrological period. Here, we show preliminary results obtained during initial surveys performed at winter and spring seasons of 2014. We are quantifying the main carbon pools in these wetlands (i.e., dissolved carbon, plankton and benthic compartments, riparian plants, etc.) and the main processes linked to its mobilization. In relation to the latter, we are measuring in situ primary production and respiratory processes, both in plankton and benthic compartments. Other than aerobic respiration, dissimilative metabolisms such as methane production export carbon from wetlands. We have attempted to experimentally measure methane emission with infrared sensors in these wetlands and we have obtained only partial results in this regard. However, our findings show a higher methane production in coastal wetlands containing organic-rich sediments. This methane production results are significantly higher when compared with wetlands typologies characterized by an elevated salinity, which are also in the framework of the main project. Our studies also involve a qualitative characterization of dissolved organic matter by fluorescence methods to determine its nature and origin, which jointly with regular stoichiometric analyses of water and sediments will allow us to determine the bioavailability of these carbon pools and thus its potential outflow from the wetland.

#### RLWE.4

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#### **BENTHIC DIATOMS AS INDICATORS OF COASTAL WETLAND HABITATS IN A MEDITERRANEAN DELTA**

In coastal wetlands, the use of benthic diatoms as ecological indicators has been much less developed than freshwaters systems. We focused our study in the Ebro Delta (NE Iberian Peninsula) as one of the major deltas of the western Mediterranean and highly sensitive to climatic and anthropogenic impacts. We aimed i) to investigate the main ecological factors affecting the distribution of benthic diatom assemblages in the Delta and ii) to identify indicative taxa representative of deltaic habitats. For this purpose, 27 sites across the Delta plain were selected to encompass the habitat types of the area: coastal lagoons, salt and brackish marshes, tidal flats, bays and nearshore marine waters. Sediment surface diatoms (top 0.5 cm) were sampled for each habitat. Furthermore, sediment composition and water physicochemical properties were also measured for each sampling site. A total of 424 diatom taxa representing 82 genera were identified. Correspondence Analysis (CA) identified four main diatom groups along gradients related to salinity and shallowness. Thus, groups 1 and 2 corresponded to samples of fresh/brackish and brackish/marine coastal lagoons respectively, and groups 3 and 4 to diatom assemblages of brackish and saline marsh habitats. Group 3 comprised samples with the widest variation of water conductivity while the highest conductivities were recorded among group 4 samples.

The representative diatom taxa of these groups were identified: small *Fragilaria* species such as *F. geocollegarum* and *F. atomus* were typical of the fresh/brackish coastal lagoons, while *Planorbulina delicatulum* and *Opephora guenter-grassii* were typical of the brackish/marine coastal lagoons. In the shallow marsh habitats, *Mastogloia braunii* and *Navicymbula pusilla* were representative of the more saline marshes, while *Denticula subtilis*, *Navicula perminuta* and *Nitzschia inconspicua* were representative of the more brackish ones.

Our study shows that the main factors affecting the spatial and temporal distribution of the benthic diatoms in the Ebro Delta are related to salinity and shallowness gradients, and no clear seasonal influence was observed. The results also show that benthic diatoms can be used as indicators of the different coastal wetland habitats of a Mediterranean delta which may prove useful in future paleoecological studies.