MSF.4

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A GIS TOOLBOX FOR ASSESSING THE IMPACT OF DIFFUSE CONTAMINANT SOURCES IN ESTUARIES (DIA)

In this contribution, a methodology to assess the impact of diffuse contaminant sources using Geographical Information System (GIS) techniques is presented. Traditionally, environmental risk assessment on aquatic systems has been mainly focused on point contaminant sources. Numerical models have allowed interpreting, simulating and predicting responses of aquatic systems to these contaminant sources. Nevertheless, diffuse contaminant sources usually present a lack of information, making the use of numerical models an arduous, and sometimes impossible, task. To overcome these inconvenients, several authors have implemented the response-distance method, which considers an exposure directly proportional to the distance between the agent and the receptor. Radial proximity, assuming linear agent dispersion, has been widely used, ignoring environmental and agents' characteristics.

The developed methodology assesses the impact of a diffuse contaminant sources in four stages: i) identifying the activity liable to produce a diffuse contaminant source; ii) calculating an area around the activity, using a buffer tool and having into account agents' characteristics (nature, density, magnitude); ii) obtaining the affected area, using a conservative particle tool and computing the dispersion of virtual particles at given environmental hydrodynamic currents; iii) assessing the impact, using interpolation tools and classifying it into four categories (low, moderate, high, very high). To automate and simplify the process to obtain immediate and homogeneous results without miscalculation errors, a user-friendly toolbox (DIA, Diffuse Impact Assessment toolbox) has been developed in ArcGIS (9.3.1), using Python and ArcGIS scripting library to build a non-ambiguous geoprocessing workflow. The toolbox has been extensively tested by applying it to different locations. The results obtained at three estuaries: Bay of Santander (N Spain), Bay of Cadiz and Ria de Huelva (SW Spain) are presented.

We can conclude that the methodology to assess the impact of diffuse contaminant sources constitutes an advanced, precise and detailed procedure, being suitable for the management of this type of activities at any aquatic system. The use of GIS techniques allows to consider aspects from agent and environmental characteristics. Results provide spatial variation of impacts, essential data for a cost-benefit management.

SS2.9

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SPATIAL VARIABILITY OF CARBON EMISSIONS ALONG A MEDITERRANEAN RIVER NETWORK DURING SUMMER DROUGHT

During summer drought, Mediterranean river networks turn into a fragmented heterogeneous landscape conformed by different environments (i.e. running and stagnant waters combined with isolated water pools and exposed dry river beds). This hydrological setting results in the development of biogeochemically active areas that can potentially increase the rates of carbon emissions from the river network to the atmosphere. Here we aimed to quantify carbon emissions and to identify emission hotspots from a typical Mediterranean river during the summer drought period. Using chamber methods, we measured carbon dioxide (CO2) and methane (CH4) fluxes to the atmosphere in a selection of the different environments found along the Fluvià River (Catalonia, NE Spain). We identified dry river beds as hotspots of CO2 efflux (mean ± SD = 209.1 ± 17.0 mmol m-2 d-1) and stagnant waters as hotspots of CH4 efflux (13.9 ± 22.6 mmol m-2 d-1). We showed that while the diffusive CO2 and CH4 efflux is physically limited, the ebullitive CH4 efflux (bubbling), only detected in stagnant waters but accounting for more than 80% of the total CH4 efflux, is limited by the biological activity in the sediments. Using a heuristic approach, we showed that an increase of the surface area of temporally dry environments would result in an increase of the total CO2 emitted. Likewise, the transformation of running waters into stagnant waters (i.e. lentification) would increment the total CH4 emissions from the river network. We conclude that carbon emissions from dry river beds and small lentic environments should be explicitly considered an integral part of Mediterranean river networks, especially under predicted global change scenarios which are expected to increase the spatial and temporal extent of these environments.

FW.4

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ARE FATTY ACIDS PROFILES INDICATORS OF SPECIES STATUS IN AQUATIC FOOD WEBS?

Fatty acids (FA) are important indicators of food web dynamics, allowing the identification of the organisms' physiological status, particularly given their role on the growth and reproduction of consumers. Of particular interest in food web studies are the polyunsaturated fatty acids (PUFAs), as for the most part these must be first synthesized by primary producers and then consumed and incorporated into the tissues of grazers and secondary consumers. The so called essential fatty acids (EFAs) cannot be produced de novo, or at least not in sufficient amount by primary consumers, they constitute useful trophic markers, being used as indicators of specific food sources. Furthermore, lipids components are very sensitive to stressors and environmental changes, leading to an overall decrease in highly unsaturated fatty acids (HUFA) production in aquatic ecosystems with possible negative implications for the surrounding terrestrial communities. Therefore, variation in FA content at the base of aquatic food webs significantly influences the production of economically important species. Thus, the main aim of this work is to review the information stated in fatty acid profiles of aquatic species exposed to environmental and anthropogenic stressors and unravel dietary preferences according to feeding plasticity and food availability.