

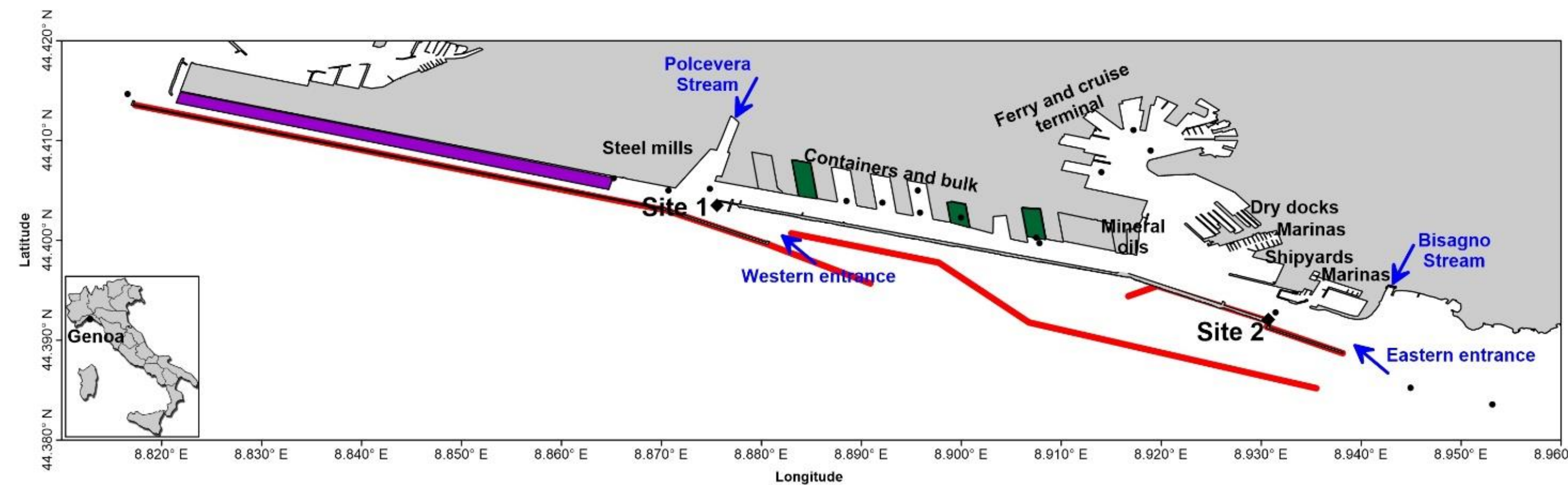
The Italian National Recovery and Resilience Plan (PNRR) RETURN Project: proposal of new monitoring and bioremediation protocols in the pilot site of the Port of Genoa



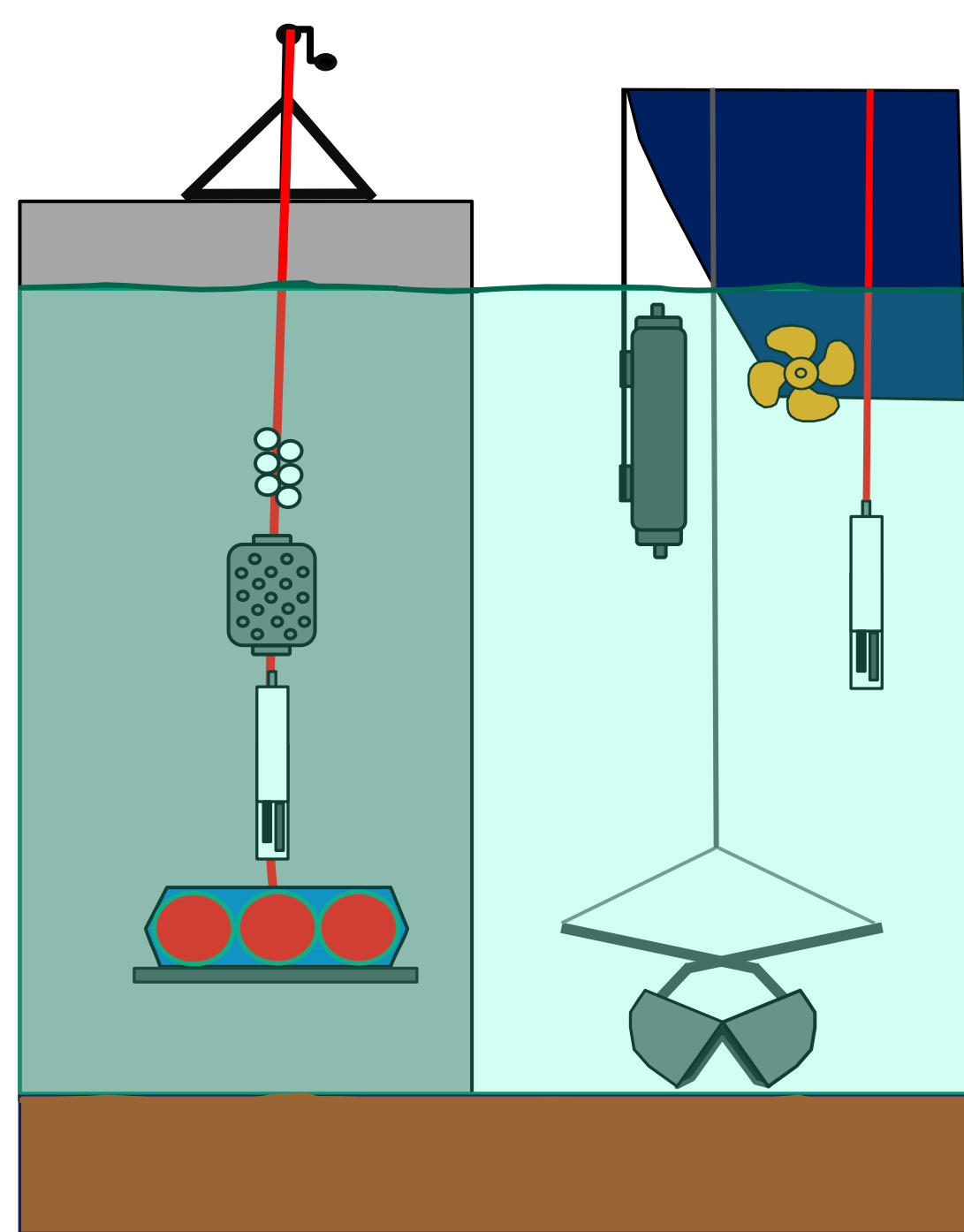
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The **RETURN (multi-Risk sciEnce for resilientT commUnities undeR a changiNg climate)** Project aims to improve understanding of environmental, natural and anthropogenic risks; develop new methodologies and technologies for monitoring; promote a more efficient and sustainable use of data, products and services; and strengthen the bridge between research and end products, enhancing cross-sectoral skills, technology transfer and service integration. The project includes three different research lines: **WP2** - creation of a new monitoring protocol for several traditional and emerging contaminants (metals, asbestos fibers, organic micro-contaminants, drugs, pesticides and other) and their ecotoxicological effect evaluation; **WP3** - determination of the microplastic (MP) content in different environmental matrices by innovative techniques of sampling and analysis; **WP5** - theoretical development of the multi-risk approach specific for the management of dredged sediments from ports and their handling. Here we report the methodology and the preliminary results obtained in the pilot site of the **Port of Genoa** (NW Italy).



WP2 This activity aims to the creation of a **new protocol** for measuring physical-chemical parameters of water masses and **dynamics**, sampling **multiple contaminants** simultaneously, examining both traditional contaminants, such as **metals** and hydrocarbons, and **emerging contaminants**, such as pesticides, organic micro-contaminants, drugs and **asbestos fibers**, and assessing the **ecotoxicological effects**.



POCIS
(Polar Organic
Chemical Integrative
Sampler)



Van Veen grab



CTD
(multi-parametric probe)



SPMD
(Semi-Permeable
Membrane Devices)



Niskin bottle

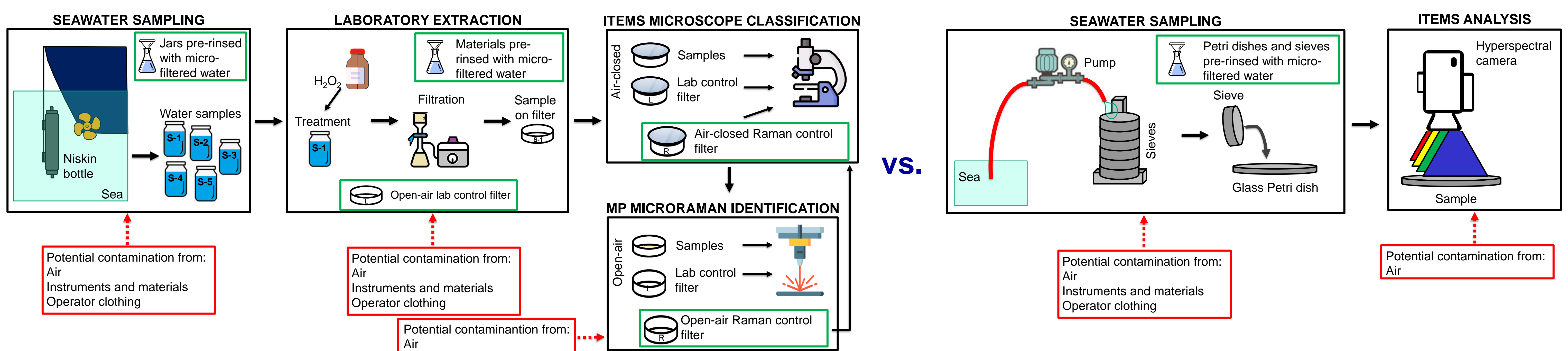


ADCP
(Acoustic Doppler
Current Profiler)

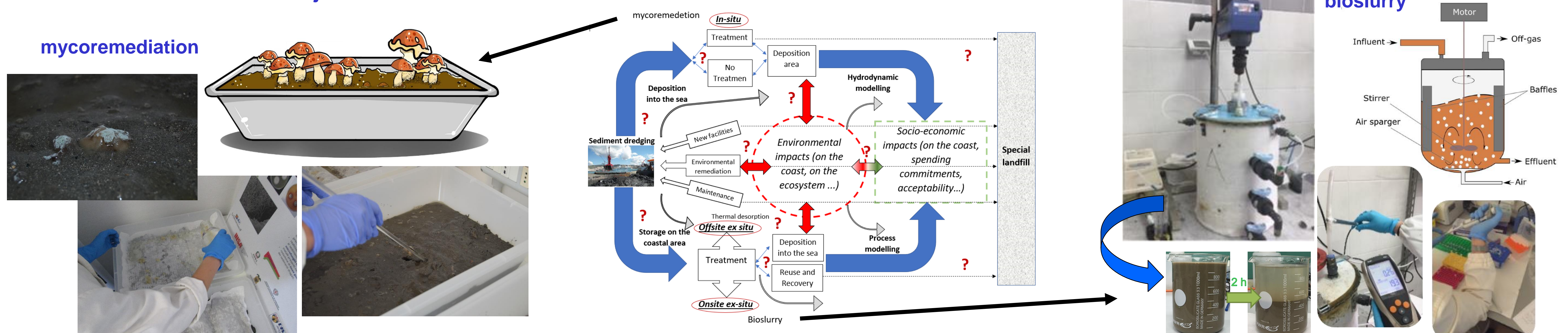


DGT
(Diffusive Gradient
in Thin films)

WP3 We will compare the **classic method** of sampling and **analysis of MP** present in the water column, which involves several steps from sampling to result (laboratory treatment of samples, classification items under optical microscope and microRaman analysis), with a more expeditious method, which involves the use of a new sampling system and a **hyperspectral camera**, which will reduce considerably the risk of sample contamination and the time needed to obtain the result.



WP5 This research line develops a multi-risk analysis for the **management of dredged sediments** from commercial ports and their handling in marine coastal areas and port areas. Some specific activities will concern: development of a **SWOT** (Strengths, Weaknesses, Opportunities, and Threats) analysis for management choices of dredged port sediments; applications of in-situ mitigation methods based on **mycoremediation** for the mitigation of the diffusion of heavy metals during dredging and re-immersion operations; evaluation and studies on off-site treatments for the decontamination and recovery of contaminants, based on both biological (**bioslurry**) and physical-chemical (thermal desorption) processes. These activities will be carried out in collaboration with the **SUS-MIRRI Project**.



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