**MINDS: the spin-off company between New Naval, KISS Intelligence and the Hellenic Centre for Marine Research**

In the framework of the H2020 project CLAIM (**C**leaning **L**itter by developing and **A**pplying **I**nnovative **M**ethods in European seas), HCMR, NNL and KISS Intelligence decided to establish a spin-off company in order to better exploit the research results and know-how produced in the CLAIM project. The spin-off company will be called «MINDS TECHNOLOGIES AND ENVIRONMENTAL SCIENCES PRIVATE COMPANY» with abbreviated name «MINDS PC» (where MINDS means “**M**ARINE **IN**NOVATION, **D**EPOLLUTION & **S**ERVICES”).

The shareholders of MINDS are HCMR scientists (54.85%), HCMR (5.40%), the company New Naval (NNL - 23.70%) and the company **K**OSMOS **I**NTELLIGENT **S**YSTEMS AND **S**ERVICES Private Company (KISS Intelligence - 16.05%).

The main purposes of MINDS include:

1. Design and implementation of integrated solutions for the protection of aquatic ecosystems (marine and inland waters) from pollution, with emphasis on the collection of plastics (macro and microplastics).

2. The development, production, selling and exploitation of collection products and waste containment and filtration devices in aquatic ecosystems (marine and inland waters), utilizing already produced prototypes.

The new spin-off company will utilize, improve / upgrade / evolve and develop new techniques, methodologies and products - services related to the protection of aquatic ecosystems (marine and inland waters) from pollution, with emphasis on plastic and marine litter collection technologies such as the CLEAN TRASH system (Claim’s Litter Entrapping Autonomous Network Tactical Recovery Accumulation System Hellas).

**New Naval’s contribution**

NNL continuously invests in the invention and research of new products and systems in order to meet environmental demands and clients requirements to provide innovative solutions. Although internal R&D is fundamental to the growth and equipment portfolio of New Naval, participation in MINDS is essential to further enhance its ability to protect the environment and collaboration with stakeholders and environmental protection companies in Greece and abroad.

NNL has designed a series of solutions for marine and coastal environments based on an increasing demand for protection of valuable assets. The containment of naturally occurring phenomena such as jellyfish, algal blooms and red tides that invade marine environments as well as marine litter that results to environmental degradation, affecting ecosystem services, has resulted in the design of New Naval’s Marine and Coastal Protection line of products.

NNL participated in the CLAIM project, battling for cleaner seas free of marine litter, aimed to create simple, clever and innovative ideas to combat this problem. New Naval’s role in the project included the development of the CLEAN TRASH system to contain and collect litter from river mouths, preventing this pollution from reaching larger marine environments and breaking down into microplastics. NNL brings industrial expertise and technical knowledge, enhancing the efficiency and effectiveness of the innovative solutions designed in this project.

NNL has a long history and tradition in shipping and maritime. The company gradually turned its focus to the protection of the marine environment and started producing and supplying pollution control equipment to combat incidents. Tailor-made, cost-efficient and environmental-friendly solutions are developed for almost every marine environment issue. This, coupled with increasing capabilities in emergency response services and a dedicated customer focus makes NNL an alternative, unique manufacturer and service provider with an international network in Europe, Africa, Asia and the USA.

**HCMR’s contribution**

The Hellenic Centre for Marine Research (HCMR) and its scientists can contribute in the new spin-off and further support the NNL’s CLEAN TRASH System with a suite of numerical oceanographic models that will contribute to the estimation and mapping of major sources of micro- and macro-plastics, considering the main pathways of marine litter (river runoff, wastewater discharge, ship lanes etc). To that end, a lagrangian particle drift model that has been developed to track the transport and the fate of different types/sizes of **plastic litter** that includes microplastics (i.e. particles of less than 5 mm), plastic bottles, bags etc in the Sea will identify the “hot-spot” areas of plastics accumulation in the open sea, coast and sediment. The lagrangian model will include all the important processes (advection by ocean currents, stokes drift, wind drag, buoyancy, biofouling, beaching etc) determining the transport of the various categories of plastic litter (macro and micro). Particular attention will be given to the parameterization of density increase and sinking due to biofouling, a process that is important for the fate of smaller particles (microplastics). For improving the performance of the suite of models, a hybrid ensemble kalman filter scheme will be implemented to assimilate satellite altimetry and temperature data in the hydrodynamic model, in order to obtain a more realistic near surface circulation, which is particularly important for the transport of floating particles. The identified “hot-spot” areas of plastic pollution will be mapped against important ecosystem services areas (fisheries, aquaculture (mussel culture), marine protected areas, coastal areas with tourism, etc) to assess the potential risk. The models can also predict the effects on the environment using the CLEAN TRASH system(s).

**KISS Intelligence contribution**

KISS Intelligence is a spin-off of the University of Crete and is specialising in software development and IT services and will contribute and cover the needs for services and know-how on technical and scientific support especially on issues of Information Technology, new technologies, content management tools for building portals, management of processes and movements of documents and general protocol and decision management system of collective bodies and software development.

**Key words**

Plastic collection technologies from aquatic environment, depollution services, oceanographic models, modelling of pollutants dispersion and transport

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