

# MaTer - Pianeta Terra-Mare (Planet Earth and Sea)

## an interactive and multidisciplinary approach to Earth and Marine sciences

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### Introduction

Recent studies demonstrated that in scholar textbooks Earth and Marine Sciences are not properly treated. These arguments are generally multidisciplinary and experimental and the improving of knowledge in these fields is strictly linked to technologic advancement. The school cannot keep up with the huge advances in knowledge of the last 20 years which results in such inadequacy. In this context, in 2014-'15 three Italian Research Institutes (INGV, ISMAR-CNR and ENEA-CRAM) supported the Scholar Institute of Lerici (ISA 10, Liguria, Italy), encompassing from nursery to junior high schools schools (3-14 years old children/students) to develop the project **MaTer - Pianeta Terra-Mare** (Planet **Earth** and **Sea**). The project aims to promote and favor the diffusion of a technical-scientific culture and to sensitize scholars towards problems occurring in marine and terrestrial environments, settling in a sustainable attitude to exploitation of natural resources and consciousness to natural hazards such as earthquakes, floods and landslides, quite common in this Italian region. MaTer was organized in two main modules: one related to Geosciences (Planet **Earth**, Fig. 2) and the other to Marine Sciences (Planet **Sea**, Fig.1.a and 1.b). MaTer has been considered as one of the best projects funded by MIUR (Italian Ministry of Education, University and Research) inside the Dissemination of Scientific and Technological Culture call for the year 2014.

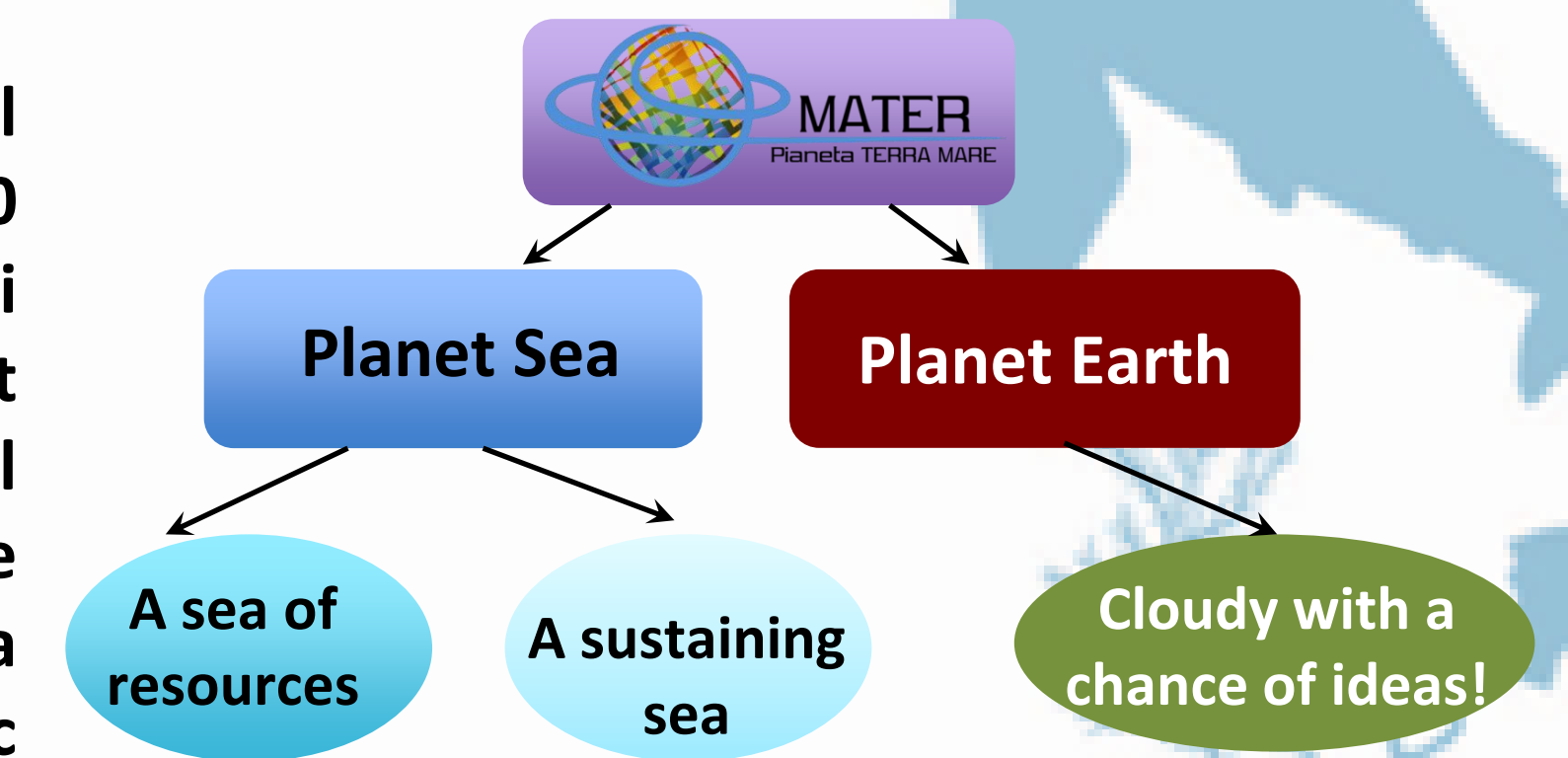


Fig. 1.a. A sea of resources: Lessons & laboratories of marine ecology. On the bottom, two panels of the exhibition elaborated by students.

### Planet Sea: Mare acqua che ci... sostiene! (A sustaining sea!)

The activity proposed by CNR-ISMAR consists in a guided educational path presenting 8 different “themes”. For each theme, different experiments are proposed and the visualization of concepts addressed is supported by amusing posters and interactive exhibits, in order to put direct experiences at the center of the learning path. The principal arguments dealt with are chemical and physical characterization of sea water, buoyancy, the role of the sea in the global climate equilibrium and the impact of human activities connected with sea exploitation.

### Planet Sea: Un mare di risorse (A sea of resources)

This module was developed by ENEA. Here, students faced various biological and ecological aspects of the marine life. They familiarized with basic concepts such as ecosystem function and biodiversity. Different focused and practical lessons were offered concerning marine food webs, both in the benthic and pelagic domains, the importance of marine biodiversity and the present threats for its conservation, phytoplankton, seaweeds and seagrasses or organisms found on the beach. Specific lessons and also seminars were carried out on how the Mediterranean and the oceans in general, are changing, on biological invasions (specifically on the so-called “Lessepsian invasion”, i.e. organisms entering from the Red Sea into the Mediterranean) and on the effects of ocean acidification on bioconstructors, such as encrusting algae, bryozoans or corals. All lessons were realized in a pleasant setting, with direct experience and observation, contact with marine organisms and story-telling by ENEA researchers. Still, students produced their own exhibition after the learning path was completed.



Fig. 1.b. A sustaining sea: Students acting as scientific tutors for primary school children (peer education). Some of the experiments, looking like “magic tricks”, introduce difficult concepts in an amusing way, basing on surprise and wonder, activating so interest in students.

### Planet Earth: Piovono idee! (Cloudy with a chance of ideas!)

Natural hazards are developed through an interactive learning experience on hydrogeological risk and climate change which is the result of a research by INGV and ConUnGioco Onlus, following a stimulating didactic/communicative model. The exhibition emotionally involves the participants to raise awareness on the social dimension of the natural risk reduction. On each stand the *scientific session* explained the geological phenomena; while the *experience session* was meant towards actions to be taken towards risk mitigation. Children, experts and scientists built together the interactive workspaces, games and educational laboratories exploring scientific concepts and their consequences on land and inhabitants. The learn-by playing approach instilled appropriate behaviors. The project was also a “peer-education experiment”, where students of the High and Middle School had played the role of guides in the interactive paths during the guided visits for classrooms and public in general.



Fig. 2. Cloudy with a chance of ideas!: The hands-on activities of the learning path are completely interactive and made of simple materials (mainly cardboard). Scholars improve their specific scientific knowledge while exploring feelings and emotions triggered by the experience of a flood.

### Seminars for teens and adults

A series of multidisciplinary a scientific conferences, and seminars targeted to teenagers and up and open to the public, were also organized during the opening and closing weeks of the project, inside the “Week of Planet Earth” 2014 and 2015. Different Italian researchers, involved directly or not in MaTer, held talks on the most intriguing themes of natural hazard, marine ecology, oceanography, geology and geophysics (i.e., ocean acidification, deep-sea ecosystems, marine litter, magnetic and solar storms, seismic and tsunami risk, biological invasions, etc.).

### Impact of the project

MaTer reached ca. 1000 users and had a good feedback from teachers, scholars and general public, supported by questionnaires, press releases and notes on local newspaper. Through the website, where all project’s materials have been uploaded, MaTer is expected to reach a broader scholar community, outside its local context. The project was a good example of cooperation of different territorial institutions and associations, working together to promote the culture of prevention, involving future citizens to reflect on the values of appropriate behaviors and best practices towards an ethical and sustainable interaction between human activities with the geosphere disaster risk, pointing out that human behavior is the crucial factor in the degree of vulnerability and the likelihood of disasters taking place. We would like to thank Fabrizio Rozzi, the headmaster of ISA 10, for kindly allowing us to realize all of these activities.