



From Pole to Pole: micro-plastics in marine environment

Giulia Realdon

University of Camerino – UNICAMearth group, Scienza under 18 Isontina

giulia.realdon@unicam.it

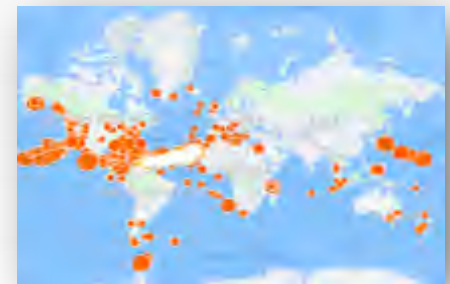




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THE RATIONALE OF THE PROJECT

- Differently than ocean *garbage patches*, marine **micro-plastics** are a relatively **recent issue in research** (Thompson et al. 2004), in the media and in education
- Due to novelty and relevance, they are a suitable topic for addressing Ocean Literacy within science teaching to different age groups
- In fact marine micro-plastics can be used to introduce **Ocean Literacy** and environmental science, but also traditional science subjects like biology, chemistry and Earth science
- According to our proposal, micro-plastics are addressed with a **system approach** focused on *“understanding the Ocean’s influence on humans and human influence on the Ocean”*



Images: greeningforward, Adventurers and Scientists for Conservation



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A VERTICAL CURRICULUM WITH THE USE OF DIFFERENT LANGUAGES

- Inspired by the growing public interest for marine micro-plastics and by the lack of specific teaching activities in our country (Italy), we developed a **vertically articulated curriculum** on micro-plastics for students aged 5-15 years.
- Our proposal is based on a number of practical activities realized with **different language and communication styles** to be suitable for different age groups.





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MICRO-PLASTICS AND MARINE FOOD-CHAINS: A DRAMA FOR KINDERGARTEN

- For younger students (age 5-7) we use **drama** to address micro-plastics bioaccumulation in marine food chains
- **Children act as fish** of different trophic levels who pretend to “eat” micro-plastics models (built from plastic bottles) until the biggest fish is captured and ends up as a “meal” shared by other pupils.

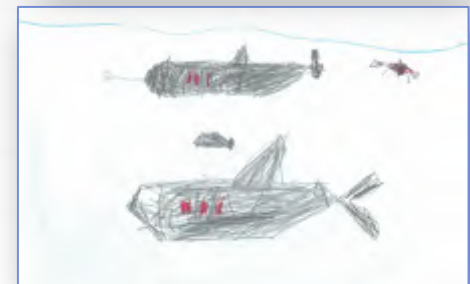




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MICRO-PLASTICS AND MARINE FOOD-CHAINS: A DRAMA FOR KINDERGARTEN

- Teachers guide the performance and stimulate observations and remarks about the origin of micro-plastics and the **correct management** of plastic objects.
- The performance has been documented in a **video** and presented in a national teacher workshop .
- Lab protocols have also been **published** in Italian and European teachers' journals





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LIFE-CYCLE OF PLASTIC OBJECTS FOR PRIMARY SCHOOL

- For students aged 8-11 we propose observation and manipulation of common household plastic objects, followed by **physical/chemical testing of different polymers** to understand plastics characteristics that make these materials valuable but troublesome at the same time.
- Students then observe **sand samples**, taken from a local beach, containing natural components and man-made fragments (including micro-plastics)
- They can directly **experience the fate of dumped plastic**, discussing more sustainable management of plastic objects





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THE THREAT OF HIDDEN MICRO-PLASTICS FOR SECONDARY SCHOOLS

- For older (12-16) students we introduce **primary micro-plastics** by means of personal care products containing micro-beads
- Students learn to recognize the presence of micro-beads by reading the product's composition, then **measure micro-beads content** of one of these products and calculate a possible annual dispersion of micro-beads from their town to the sea.
- Also this activity is followed by classroom discussion about possible solutions to **micro-beads water pollution**.





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EVALUATION AND ACCESS

- Micro-plastics activities have been presented to 39 students' groups since 2014 and have been used for teacher training
- The project has been evaluated through questionnaires given to class teachers
- Project activities are freely accessible under **Creative Commons licence**:
- <http://www.scienceinschool.org/content/microplastics-small-deadly>





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Thank you!

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