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Polluted Yesterday, Remediated Tomorrow

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Environmental pollution is world-wide known phenomenon that raises the following questions: when did it start? Can we completely avoid it or defeat it? Can we just reduce it? If so, how can we reduce it?

Pollution is the introduction of any substance in sufficient concentration as to make air, water, soil and sediments no longer suitable for any use, causing an alteration of the environment, often with adverse effects.

Pollution started since humans appeared on Earth. The human population increase in the very first part of our history changed the world dramatically. For instance, in the Middle Ages, the hygienic conditions were so poor that viruses and bacteria flourished, while animals and humans were decimated by one epidemic after another.

In more recent times, at the start of the so-called Industrial Revolution, hygienic conditions started slowly improving – at least for part of the populations – but factories (and not only them) started spreading sewage and waste into the environment.

As industrial production dev loped and improved, waste and sewage accumulated to such a degree as to become a serious concern not only for the health of the environment, but also for the health of human beings (see the cases of Minamata Bay, lake Erie bursting into flames, etc.).
Experts gradually came to realise that natural attenuation could not be the one and only answer. Remediation was born.

Anyway, some doubts were still lingering in the mind of the experts. Which concentration can be considered to produce adverse effects on the health of humans and of the environment? If I bury the contaminants on the bottom of lakes, rivers, the sea, the ocean, would I solve the problem once and for all?

Sediments are known as an historical archive and a sink for elements and different contaminants. Anyway, the quality of sediments represents globally a key factor in the environmental management.
In more than 5% of the coastal areas and of the water bodies of industrialized countries sediments represent an hazard for the environment and for the human health. Thus, governments, scientists and stakeholders are deeply concerned about the management and the remediation of polluted sediments, which may become a source of different pollutants.

Dredging sediments in harbours, in coastal areas or in transitional environments is necessary not only to maintain the depth for navigation, but also for the environment management. Thus, it is of paramount importance to localize the environmentally sensitive areas (in situ management) and to pinpoint a sustainable management of the dredged polluted sediments (ex situ management). Different disposal treatment and remediation technologies have been studied and implemented. In order to treat polluted sediments some of these were adapted, while few others were specifically designed; in any case very few allow an environmental friendly remediation of sediments, able to simultaneously remove organic and inorganic pollutants.

The Venice Lagoon and the management of its contaminated and dredged sediments is a very interesting case of study. Taking into account not only the environmental management, but also the need to dredge sediments in order to maintain the depth for navigation, remediation and environmental recovery are key topics in the Venice lagoon.

Furthermore, it is important to underline that for the environmental management, environmental risk assessment, bioaccessibility and bioavailability of contaminants are necessary. To design a very efficient remediation project, these parameters are needed as well as the knowledge of the best available techniques (BAT), economically and environmentally speaking.