

University of Milano-Bicocca
PhD Course in Chemical, Geological and Environmental Sciences
Call for Interest 40th cycle – session II – Curriculum “Terrestrial and Marine Environmental Sciences”

n.1		Supervisor	Andrea Franzetti
Title	Development of an innovative management tool for soil treatment plants with biological technology		
<p>The scholarship is co-funded by ENI Rewind company. The successful candidate will spend 6 months at ENI Rewind company and 6 months abroad.</p> <p>The main management objectives of a biological treatment plant are to estimate the treatment time of contaminates soil batches; the identification of suitable operating conditions for the treatment of the individual batch.</p> <p>In fact, since there are many variables that influence the rate of pollutant removal, it is necessary to define and optimize those condition that allow the maximum biodegradation efficiency based on the type and concentration of the pollutants present in the specific soil batch.</p> <p>Among these variables the main ones are:</p> <ul style="list-style-type: none">i) The biodegradability characteristics of the contaminants present;ii) the process conditions (temperature, humidity, oxygenation);iii) the structure and activity of the microbial community present;iv) the chemical-physical characteristics of the soil. <p>The variability of the type of contaminants present and their biodegradability characteristics limit the ability to predict the crossing times of the plots of land in the plant and to optimize the treatment.</p> <p>This projects aim is to develop and implement a management procedure for the biological treatment process for a case study plant which allows:</p> <ul style="list-style-type: none">1. The preliminary estimate of the treatment times of each incoming batch2. The estimate of the shortening of treatment times in the case of use of commercial products3. The construction of a predictive model that supports the management of material flows in the plant <p>The project ideas are:</p> <ul style="list-style-type: none">i) define and implement an operational procedure that includes a phase of characterization and study of the treatability of the terrigenous matrices before they arrive on the platform in order to optimize their treatment and estimate their durationii) integrating systematized information from the scientific literature with the data obtained from the optimization and planting tests, develop an empirical model that has as input the soil characterization data (texture, organic matter, pH, microbial activity, nutrients, . . .), of the contamination (type of contaminants, concentration, size distribution, co-contaminants, degree of weathering, ...), the process parameters (humidity, temperature, oxygenation, ...) and returns the constants as output values biodegradation of contaminants during treatment.			
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