MULTIPLE CRITERIA DECIDING ON PHYTOREMEDIATION OF A HEAVY METAL CONTAMINATED AGRICULTURAL AREA CASE: THE CAMPINE, BELGIUM

Nele Witters*, Ann Ruttens, and Theo Thewys

Hasselt University, Centre for Environmental Sciences

From the end of the 19th century until the mid 1970s, zinc and lead were refined at several locations in the northeastern Belgium using a pyrometallurgical process. Consequently, a large area (280 km²) is moderately contaminated from atmospheric deposition of the dust, with lead (Pb), zinc (Zn), and cadmium (Cd) being the main pollutants. These heavy metals can be found in the upper layer of the soil (30 to 40 cm). Large areas of land in the region are currently in agricultural use, but soils and crops often exceed legal Cd limits. Regional policy therefore prescribes that the soils should be remediated, but at the same time it is desirable to keep the income of the farmers constant. One possible way to achieve both goals is the use of phytoremediation in combination with the growth of energy crops (e.g. energy maize, rapeseed, and woody species). This approach brings us to the concept of a multifunctional biomass system. Society's acceptance of phytoremediation is determined by the effect it has on farmer income. This income could be supported by producing renewable energy (heat and electricity) from the polluted biomass. The goal of this study is to compare the different crops on their remediating, economic, ecological, and energy impacts (criteria). Monte Carlo analysis shows the sensitivity of the economic viability to regional subsidising systems (due to high costs involved in converting the polluted biomass into energy and in processing the waste) and to energy crop prices. Preliminary results of our study show that when a high weight is attributed to the economic perspective, calculations do (for now) not favor short-rotation woody crops over large biomass-producing crops like energy maize. If, however, a larger weight is given to phytoremediation capacities, results give an advantage to woody crops.

KEY WORDS: agriculture, woody crops, phytoremediation, economics

*Corresponding author: Hasselt University, Centre for Environmental Sciences, Faculty of Applied Economic Sciences, Department of Economics-Law, Agoralaan – Gebouw D, 3590 Diepenbeek, Belgium;
Phone: +32 11 26 87 57; Fax: +32 11 26 87 60, Email: nele.witters@uhasselt.be