EFFECTS OF A CLAY CAP ON CONTAMINANTS IN WATER, SEDIMENTS, PLANTS AND MACROINVERTEBRATES OF KEARNY MARSH

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As a result of agricultural, commercial and industrial activities conducted in the absence of environmental regulations and enforcement in the past, sediments contaminated by organic compounds, heavy metals, and other potentially toxic chemicals have accumulated in many of the world's deepwater and wetland environments. These sediment-borne contaminants can eventually become incorporated into aquatic food webs and adversely affect ecological receptors like benthic organisms and fish, and ultimately pose a risk to human health. This project investigated a new *in situ* capping technology that could be used to remediate and/or manage contaminated sediments. AquaBlok™ (AB) is a patented, composite-aggregate technology comprised of a solid core, an outer layer of clay material, and polymers. When placed in water and over sediment, AB hydrates forming a layer between contaminants in sediment and the overlying water. Other materials – such as organic matter or plant seeds – can be incorporated into the AB as needed. Kearny Marsh in the NJ Meadowlands was chosen as the site for the field study because it has been chronically contaminated by landfills, leachate and run-off. The study design involved five treatments done in duplicate. They included: (1) AB alone; (2) AB with SubmerSeed; (3) AB amended with 2% peat moss and SubmerSeed; (4) uncapped control; and (5) uncapped control with SubmerSeed (AB amended with seeds from aquatic plants). Each of the 10 plots was approximately 60 by 60 feet. AB was placed in the marsh by a "stone-flinger" between July 25th and August 3rd of 2005. For water quality in May of 2006, controls, with and without Submerseed, were lowest in temperature, DO, pH, and ORP. In August of 2006, controls, with and without Submerseed, were highest in temperature and duplicate plots were split between being the highest and lowest in DO, pH, and ORP. In October of 2006 a control was almost always lower in all parameters and AB with peat moss was highest in all water quality parameters. In November of 2006, control temperatures, DO, and pH were the lowest whereas depth was highest. Total suspended solids were always similar in all plots as was number of benthic macroinvertebrates from cores which were low. The numbers were higher on the Hester-Dendys. For contaminants of concern (COC) in water, Cd was highest in the peat moss plots. Fe was highest in AB, and Pb was lowest in control plots and highest in the peat moss plots. Organic contaminants were lowest and highest in AB. Background levels of metals were mostly lowest in *Phragmites* and highest in *Pluchea* sp. COC in Hester-Dendy macroinvertebrates was similar in all plots. For COC in the sediment, metals and organic contaminants were highest in the control plots. These results suggest that AB is more effective in the removal of COC in sediment than it is in decreasing TSS, increasing diversity and abundance of macroinvertebrates, and removing Cd, Fe, Pb, and organic contaminants from the water column.