A role for biochar in waste water processing in the petroleum sector

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The use of biochar as a carbon sink can be very expensive if insufficient biomass residues are available and the full cost of biochar production must include the costs associated with growth and harvest of the biomass feedstocks. Therefore, the large-scale use of biochar to mitigate climate change would benefit from technologies that either reduce the production cost or that open up new, value-added markets for biochar.
In this study, we examine the potential of creating a biochar that could be used as an activated carbon to clean up wastewater in the petroleum sector, such as water produced from Canada's oil sands operations or in natural gas recovery. Like the mitigation of fossil fuel carbon emissions, the processing of contaminated water from Canada's petroleum sector is a major environmental and regulatory challenge for the industry.
Initial studies used a synthetic aqueous solution of 100 to 1000 ppm (w/w) naphthenic acids to simulate water from the tailings ponds of Canada's oil sands mining operations. Previous studies (Deriszadeh et al. 2009) had identified naphthenic acids as the primary substrate leading to the microbial production of methane (a potent greenhouse gas) in the tailings ponds.
Activated carbon biochar made from various biomass feedstocks were compared with activated carbon made from coal and petroleum coke (petcoke). The paper will describe the performance of various types of activated carbon in cleaning up water produced in Canada's petrochemical sector.
The results from these 'proof of concept' studies will be used to inform a theoretical model that estimates the potential economic - environmental costs and benefits for a biochar application that addresses both the water and greenhouse gas challenges associated with Canada's petroleum sector.

Can biochar resolve the current soil and environmental problems in China?

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China annually has more than 3000 millions tons of biomass production, mainly from swine farms and crop residues. Currently, a small portion of the waste biomasses are used for rural fuel, manure, marsh gas production. Most the biomass is not effectively utilized. A significant amount of crop straw, more than 20% of the total, is burned in field, which creates serious environmental problems. Chinese government is encouraging to developing new approaches to effectively use these "waste". In next 20 years, about 4000 marsh gas facilities will be established in swine farms. More than 40 millions rural families will use marsh gas as fuel. A significant amount of plant biomass will be used for producing biogas through pyrolysis, which may produce a large quantity of biochar.
China has less than 1220 millions hectares of arable land. Of the cropland, around 80% are of low soil quality. The fertile crop land, 20% of the total, is nibbled by economic development. To meet the food requirement of the increasing population, it is essential to enhance soil fertility and the use efficiencies of nutrient and water. Current researches show that biochar has significantly positive impacts on soil fertility, enhancing soil pH, CEC, nutrient retention, and water-holding capacity, but reducing ion leaching. Adding appropriate biochar into soil usually results in a significant increase of crop yield. There is thus a big potential to improve soil quality with biochar in China.
At present, a series of field experiments of biochar amendment to soil among main agronomic zones across China are being discussed. Accordingly, a network on biochar application to improve soil fertility is under construction, leading by China Agricultural University and including main local agricultural research and extension organizations. In the network, same method will be used among different sites and results in soil physical, chemical, and biological processes will be co-shared to make most clear conclusion.

Estimation of Carbon: A Modeling Approach for Acacia Woodlands in Meatu, Tanzania

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Acacia as woody trees and shrubs are wide spread in the savannah of tropical and sub-tropical Africa and worldwide [3]. In Tanzania. Acacia tortilis, Acacia nilotica and Acacia. polyacantha are dominant species in woodlands, particularly in Meatu district [5] and they are increasing, leading to increase in biomass and may influence carbon (C) storage.
At present methods, for estimation of biomass and C stored in terrestrial plant ecosystem has gained importance since the Kyoto protocol gained force in 2005 [1] as the demand for C credits has been escalating in international markets. In addition, these estimates are required to satisfy the requirements of United National Framework Conference on Climate Change (UNFCCC). Countries have to report frequently the state of their forest resources and emerging mechanisms [7] such as Reducing Emissions from Deforestation in Developing countries (REDD).Carbon stock is derived from above-ground biomass (in dry weight) assuming that, 0.5 of the biomass is C [2,6]. Therefore, precise estimate of biomass in the tropical forests is crucial for quantification of C.
The accurate approach to estimate C stock in above-ground biomass is using developed allometric equations [7]. Allometry is a technique, which involve relationships between tree above-ground biomass and tree stem diameter or height and between below-ground biomass and above-ground biomass [7].
This study was undertaken to develop specie-specific and tree components allometric models in above-ground biomass of Acacia species for estimation of C stocks.