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ORIGINAL RESEARCH PAPER

Calorific and greenhouse gas emission in municipal solid waste treatment using biodrying

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ABSTRACT

BACKGROUND AND OBJECTIVES: Urban intensity and activities produce a large amount of biodegradable municipal solid waste. Therefore, biodrying processing was adopted to ensure the conversion into Refuse Derived Fuel and greenhouse gases..

METHODS: This study was performed at a greenhouse, using six biodrying reactors made from acrylic material, and equipped with digital temperature recording, blower, and flow meters. The variations in airflow (0, 2, 3, 4, 5, 6 L/min/kg) and the bulking agent (15%) were used to evaluate calorific value, degradation process and GHG emissions.

FINDINGS: The result showed significant effect of airflow variation on cellulose content and calorific value. Furthermore, the optimum value was 6 L/min/kg, producing a 10.05% decline in cellulose content, and a 38.17% increase in calorific value. Also, the water content reduced from 69% to 40%. The CH₄ concentration between control and biodrying substantially varied at 2.65 ppm and 1.51 ppm respectively on day 0 and at peak temperature. Moreover, the value of N₂O in each control was about 534.69 ppb and 175.48 ppb, while the lowest level was recorded after biodrying with 2 L/min/kg airflow.

CONCLUSION: The calorific value of MSW after biodrying (refuse derived fuel) ranges from 4,713 – 6,265 cal/g. This is further classified in the low energy coal (brown coal) category, equivalent to <7,000 cal/g. Therefore, the process is proven to be a suitable alternative to achieve RDF production and low GHG emissions.

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ORIGINAL RESEARCH PAPER

Geographic information system and process-based modeling of soil erosion and sediment yield in agricultural watershed

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ABSTRACT

BACKGROUND AND OBJECTIVES: The study explored the capability of the geographic information system interface for the water erosion prediction project, a process-based model, to predict and visualize the specific location of soil erosion and sediment yield from the agricultural watershed of Taganibong.

METHODS: The method involved the preparation of the four input files corresponding to climate, slope, land management, and soil properties. Climate file processing was through the use of a breakpoint climate data generator. The team had calibrated and validated the model using the observed data from the three monitoring sites.

FINDINGS: Model evaluation showed a statistically acceptable performance with coefficient of determination values of 0.64 (probability value = 0.042), 0.85 (probability value = 0.000), and 0.69 (probability value = 0.001) at 95% level, for monitoring sites 1, 2, and 3, respectively. A further test revealed a statistically satisfactory model performance with root mean square error-observations standard deviation ratio, Nash-Sutcliffe efficiency, and percent bias of 0.62, 0.61, and 44.30, respectively, for monitoring site 1; 0.65, 0.56, and 25.60, respectively, for monitoring site 2; and 0.60, 0.65, and 27.90, respectively, for monitoring site 3. At a watershed scale, the model predicted the erosion and sediment yield at 89 tons per hectare per year and 22 tons per hectare per year, respectively, which are far beyond the erosion tolerance of 10 tons per hectare per year. The sediment delivery ratio of 0.20 accounts for a total of 126,390 tons of sediments that accumulated downstream in a year.

CONCLUSION: The model generated maps that visualize a site-specific hillslope, which is the source of erosion and sedimentation. The study enables the researchers to provide information helpful in the formulation of a sound policy statement for sustainable soil management in the agricultural watershed of Taganibong.

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ORIGINAL RESEARCH PAPER

Willingness of end users to pay for e-waste recycling

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ABSTRACT

BACKGROUND AND OBJECTIVES: The sheer volume of electrical and electronic waste (e-waste) has presently been generated in Vietnam, posing a growing concern regarding its impact can have on the environment and human health. Therefore, the need for developing policies and regulations towards the environmentally sound management of e-waste is becoming crucial. Although the municipalities play an important role in e-waste recycling program, there does not appear to be any study involving residents' perceptions on e-waste management. This paper aims to examine the influencing factors of end users' willingness to pay and their payment preferences toward e-waste recycling.

METHODS: The logistic regression model was employed to analyze a qualified data set collected through a personal interview survey in Danang city, Vietnam. All analyses were conducted using Statistical Package for Social Sciences software (version 22.0).

FINDINGS: The results revealed that the end users' willingness to participate in recycling programs, laws and regulations, inconvenience of recycling and past experience were four key determinants significantly contributing to the willingness to pay for recycling e-waste. With regards recycling payment methods, most of the participants (36%) were in favor of deposit and refund scheme, while pre-disposal fees and advanced recycling fees came in second and third place (25.8% and 21%, respectively), making monthly payment of recycling fees the least preferred (10.2%).

CONCLUSION: These findings may provide policy-makers with crucial information for better e-waste management policy development, which helps address the conflict between development and conservation, may be applicable in Vietnam and other countries as well.

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