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Temática y alcance

La *Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica* es una publicación electrónica cuatrimestral coeditada por AIDIS y el Instituto de Ingeniería UNAM. Publica contribuciones originales de calidad y actualidad evaluadas por pares, dentro de su área de competencia. Se presentan trabajos que abarcan aspectos relacionados con el conocimiento científico y práctico, tanto tecnológico como de gestión, dentro del área de Ingeniería y Ciencias Ambientales en Latinoamérica.

El enfoque es multidisciplinario, buscando contribuir en forma directa a la generación de conocimiento, al desarrollo de tecnologías y a un mejor desempeño profesional. Entre los temas cubiertos por la revista están los siguientes: agua potable, calidad de agua, aguas residuales, residuos sólidos, energía, contaminación, reciclaje, cambio climático, salud ambiental, nuevas tecnologías, ética, educación, legislación y política ambiental, gestión ambiental, sostenibilidad y participación social, entre otros.

Cada edición muestra los trabajos que derivan del arbitraje académico estricto de carácter internacional. También se publican números especiales de temas particulares que fueron presentados en los diversos Congresos Interamericanos realizados por la Asociación Interamericana de Ingeniería Sanitaria y Ambiental (AIDIS) y que en forma adicional fueron sometidos al proceso de revisión interno de la revista.

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AVALIAÇÃO DE DESEMPENHO AMBIENTAL DAS CAPITAIS BRASILEIRAS POR MEIO DO ÍNDICE DE QUALIDADE E EFICIÊNCIA DOS SERVIÇOS DE LIMPEZA URBANA (IQE_{SLU})

* Edvan Araújo de Sousa Júnior [1]
Cristiane de Paula Guilherme [1]
Paulo Eduardo da Silva Costa [1]

EVALUATION OF ENVIRONMENTAL PERFORMANCE OF THE BRAZILIAN CAPITAL BY MEANS OF THE QUALITY AND EFFICIENCY INDEX OF URBAN CLEANING SERVICES (IQE_{SLU})

Recibido el 16 de enero de 2018; Aceptado el 26 de junio 2019

Abstract

Considering the reciprocal relationship between the environment and sanitation, this article aims to evaluate the environmental performance of Brazilian capitals through the Quality and Efficiency Index of Urban Cleaning Services (IQE_{SLU}). The index was developed by the Hydraulics Researches Institute of the Federal University of Rio Grande do Sul (IPH/UFRGS) and consists of 13 subindex that address different aspects regarding the sanitation services provided to the population. In order to prepare the study, it was necessary to consult the databases of the Federal Government, the main one being the historical series of the National Information System on Sanitation (SNIS). As a result, the index indicated that the capital of the state of Paraná is the national leader in the provision of health service.

Keywords: environmental impacts, quality and efficiency index, sanitation, subindex of environmental impacts, urban cleaning service.

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MÉTODO SIMPLIFICADO DE COMPOSTAGEM PARA TRATAMENTO DE CAMA DE FRANGO

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SIMPLIFIED METHODOLOGY OF COMPOSTING FOR TREATMENT OF POULTRY LITTER

Recibido el 2 de marzo de 2018; Aceptado el 16 de octubre 2018

Abstract

Among the agricultural and agroindustrial wastes, the poultry litter is highlighted due to the quantity produced and nutrients content. This residue presents potential for use as conditioning and soil fertilizer, however it is necessary to use stabilization techniques of the organic matter and previous disinfection. In this scenario, the composting stands out for its operational simplicity, allowing the humification of organic content, pathogens elimination, larvae and weed seeds elimination, resulting in a sanitary and nutrient-rich compost. In this research, the treatment efficiency of poultry litter through composting was evaluated, from the application of simplified operational procedures, with manual revolvement for homogenization and aeration, and temperature and moisture control of the pile. The results demonstrate the thermophilic phase occurrence (average pile temperature greater than 40 °C) from the 2nd to the 29th day. The elimination of pathogenic agents, verified by the absence of total coliforms and E. coli from the 15th day, demonstrated the sanitization of the pile. The content of volatile solids and the total weight of wet mass in compost showed a reduction of 29% and 22%, respectively, between the beginning and end of the process. Germination tests, using Lactuca sativa as indicator organism, indicated the maturation of the compost and absence of phytotoxicity after 97 days of composting, indicating the viability and efficacy of the process used in the treatment of poultry litter.

Keywords: *poultry litter, organic compound, aerobic biodegradation, agricultural wastes.*

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PERFORMANCE E CALIBRAÇÃO DE UM SENSOR TIPO TDR EM SOLOS DO ESTADO DE PERNAMBUCO, BRASIL

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PERFORMANCE AND CALIBRATION OF A TDR TYPE SENSOR IN THE STATE OF PERNAMBUCO SOILS, BRAZIL

Recibido el 27 de marzo de 2018; Aceptado el 28 de agosto 2019

Abstract

Soil moisture is an essential variable in several studies of the soil-plant-atmosphere system. Time Domain Reflectometry (TDR) is an indirect method of determining moisture, which stands out for its operational versatility, being widely used for monitoring soil moisture. Aiming to optimize the method, this work dimensioned the operating region of a TDR type sensor, evaluated the performance of a quadratic equation provided by the manufacturer and calibrated the equipment to three contrasting textural classes. The sensor operating region was verified with the interaction of the sensor with air + water + soil. The performance evaluation of the quadratic equation and the calibrations were performed by the saturation process of the three textural classes under controlled conditions. The results allowed to conclude that: (i) the range of the CS616 humidity sensor is approximately 3 cm and does not vary when used in different types of soils; (ii) the quadratic model did not perform well in estimating volumetric moisture, underestimating 20% for sandy soil, and overestimating in 34% for clayey soils; (iii) a third degree model, presented a good fit, with a coefficient of determination above 95%.

Keywords: soil moisture, time domain reflectometry, water storage in soil.

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RECYCLING OF CONSTRUCTION AND DEMOLITION WASTE AS AGGREGATE FOR PAVEMENT BLOCK PRODUCTION

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Yanna Carla Frutuoso de Araujo [2]

RECICLAGEM DE RESÍDUOS SÓLIDOS DA CONSTRUÇÃO CIVIL COMO AGREGADO PARA PRODUÇÃO DE BLOCO PARA PAVIMENTAÇÃO

Recibido el 29 de marzo de 2018; Aceptado el 16 de octubre 2018

Abstract

The objective of this paper is to evaluate the performance of recycled concrete aggregate for use in the production of pavement blocks. For this research project, aggregates were obtained from various sources of recycled waste, including wall plaster, ceramic tiles and concrete flooring. The concrete mixtures were prepared using three different quantities of recycled aggregate: 25%, 50% and 100% of the total aggregate weight. The structural properties of the concrete mixtures were analyzed using slump cone measurements and compressive strength tests (cube tests) at 3, 7 and 28 days. The results obtained indicated that the compressive strength of all mixtures increased with time. However, it was also noted that the compressive strength of the concrete mixtures decreased as the quantity of recycled aggregate increased. The maximum compressive strength was achieved at 28 days by the concrete mixture comprised of 25% recycled aggregate, which was obtained from concrete floor waste. This illustrates that the use of this type of recycled aggregate allows engineers to obtain concrete mix designs which meet the structural requirements for application in pavement blocks.

Keywords: *construction waste, demolition waste, recycled aggregate, pavement block, concrete.*

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FATORES CONDICIONANTES DA ADOÇÃO DO TIPO DE PRESTAÇÃO DE SERVIÇOS DE ABASTECIMENTO DE ÁGUA E ESGOTAMENTO SANITÁRIO: UM ESTUDO EM OITO MUNICÍPIOS DE MINAS GERAIS

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FACTORS EXPLAINING THE ADOPTION OF TYPES FOR WATER SUPPLY AND SANITATION SERVICES: A STUDY IN EIGHT MUNICIPALITIES OF MINAS GERAIS

Recibido el 7 de mayo de 2018; Aceptado el 7 de octubre 2019

Abstract

The water supply and sanitation services in Brazil is characterized by different management types, including public or private operators and various legal and institutional arrangements. Using qualitative methodology, a comparative analysis was performed, investigating explanatory factors for the adoption of four different institutional types: direct municipal administration, indirect municipal administration (local autarchy), regional company and private company. Eight localities of the state of Minas Gerais, Brazil, were selected as case studies, two representing each institutional type. The results suggest that economic factors (lack of municipal resources for investments and ability to access external resources), political factors (influence of public manager in decision making, political contacts and political ideology), social factors (dissatisfaction with the quality of service, popular resistance to payment of tariffs and lack of popular participation), institutional factors (know-how, quality of the services, distance between the provider and the consumer, the tariff price, and financial and administrative autonomy) and legal factors (contractual and legislative issues) have had a strong influence in the adoption and maintenance of types for water supply and sanitation services.

Keywords: conditioning factors, public policies, qualitative analysis, water supply and sanitation provision types.

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ACOPLAMENTO DE MODELO HIDROLÓGICO E HIDRÁULICO A PARTIR DE DADOS DE SATÉLITE TRMM NA BACIA HIDROGRÁFICA DO RIO PARAÍBA DO MEIO (AL/PE)

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Rosangela Sampaio Reis [1]
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HYDROLOGICAL AND HYDRAULIC MODEL COUPLING FROM SATELLITE TRMM DATA IN THE PARAÍBA DO MEIO RIVER BASIN (AL/PE)

Recibido el 16 de mayo de 2018; Aceptado el 12 de noviembre 2019

Abstract

This work comprised the application of hydrological and hydraulic models to precipitation amount and intensity data from the TRMM satellite over the Paraíba do Meio river basin, with the purpose of mapping the Atalaia municipality areas susceptible to flood inundation. The procedure involved extending GIS environment operating models, aimed at improving data handling and visualization, based on altimetric and supplementary information obtained in the field at the expense of local authorities. The hydrological model calibration presented high significance when applied to former flood events in the basin (2000 and 2010). Its validation attained satisfactory results in the Atalaia River post for the adjusted satellite series ("TRMM + Postos"), with a Nash Sutcliffe Efficiency Coefficient (NSEC) of 0.91. Model calibration consisted of adjusting Manning Coefficients to channel margins and bed, based on field raised flood marks and maximum flow records at Atalaia station during the 2010 event. Model validation, for its part, considered the adjusted Manning Coefficients and the hydrogram generated by hydrological simulation of the adjusted satellite series ("TRMM + Postos"). As a result, the inundation flood mapping of the locations related to the 2010 event indicates that a large part of Atalaia flooded area is located within the river floodplain and is susceptible to future high-level floods.

Keywords: coupling models, flooded áreas, GIS, HEC-HMS, HEC-RAS.

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AVALIAÇÃO DA COLETA SELETIVA EM UM MUNICÍPIO BRASILEIRO: ESTUDO DE CASO EM IGARAPÉ/MG

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ASSESSMENT OF SELECTIVE COLLECTION IN A BRAZILIAN CITY: CASE OF IGARAPÉ/MG

Recibido el 17 de mayo de 2018; Aceptado el 16 de octubre 2018

Abstract

Greater consumerism in society and population growth in urban centers has increased the generation of urban solid waste. Selective collection and recycling are actions that reduce the amount of waste to be treated or sent to final destination, however its implementation represents a challenge for municipalities around the world. The aim of this study is to evaluate the direction of the selective waste collection implementation in Igarapé city, Brazil, through access to historical documents and consulting the National Sanitation Information System (SNIS). It was identified that 6,845 tons of solid waste are collected per year, and of these wastes, 130 tons were recovered as recyclable materials (paper, cardboard, plastics, metals, glass and others). The data on the selective waste collection coverage in Igarapé are high compared to other Brazilian municipalities, even with the low expenditure on waste management in relation to the total expenses of the municipality. Nevertheless, a significant amount of solid waste is being destined to the landfill, which could be recycled if there were actions as greater participation of population segregating wastes and a better wastes sorting by the waste cooperators. The greatest investment in education and environmental awareness of the population is essential for improving the waste selective collection.

Keywords: solid wastes, Brazil, selective collection.

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ANÁLISE DE ASPECTOS SOCIAIS INERENTES AO GERENCIAMENTO DE LODO E DE BIOGÁS EM UMA ESTAÇÃO DE TRATAMENTO DE ESGOTO EMPREGANDO REATOR UASB

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ANALYSIS OF SOCIAL ASPECTS INHERENT TO THE MANAGEMENT OF SLUDGE AND BIOGAS IN A WASTEWATER TREATMENT PLANT USING UASB REACTOR

Recibido el 22 de mayo de 2018; Aceptado el 29 de marzo 2019

Abstract

The sludge and biogas management stages are responsible for important social aspects in a Wastewater Treatment Plant (WWTP), such as the emission of odor and noise, the manipulation of chemicals by the workers and the valuation of the final product to be intended. The objective of this article is to perform an inventory and evaluation of the social aspects associated with the assessment of the social life cycle (LCA-S). The research was performed in a WWTP that use anaerobic UASB reactor. In preparing the social inventory, the following categories of stakeholders were considered: workers, consumers, local community and society. Indicators were developed for each subcategory. For the category workers were presented the results of salaries, occupational noise, hazardous chemicals, gaseous emissions and biological risk. For the consumer's category, nitrogenous, phosphorous and concentration levels of pathogens present in the biological sludge. For the local community stakeholder and society, environmental noise, odor and job generation. The baseline scenario, where the prolonged alkaline stabilization is performed, showed the best indicators regarding the capacity to generate employment and the use of the agronomic potential of the sludge. When using the thermal dryer for the sludge sanitation, using biogas, it obtained improvement in the health and safety aspect of the worker.

Keywords: social aspects, assessment of the social life cycle, management of WWTP by-products.

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CRIMES AMBIENTAIS NA ZONA DE FRONTEIRA FRANCO-BRASILEIRA – 2010 A 2015

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ENVIRONMENTAL CRIMES IN THE FRONTIER ZONE FRANCO BRASILEIRA - 2010 A 2015

Recibido el 28 de mayo de 2018; Aceptado el 20 de junio 2019

Abstract

This paper presents an overview of the main environmental crimes, means of surveillance, profile of offenders and ways of combating these crimes and their results, in the border area of Brazil with the French overseas department of French Guiana. Federal Highway Police (PRF), Brazilian Institute of Natural Resources and Environment - IBAMA and Military Police of Amapá, through the Environmental Battalion - PMAP/BA, institutions that work in the fight against environmental crimes in the Franco-Brazilian border area. The research is divided in the conceptualization of the frontier area, pointing out difficulties and demonstrating the dynamics of the environmental occurrences. For that, field research was carried out in the months of March to July 2016, survey of sources related to the theme, statistics, interviews and subsequent treatment, organization and conclusions of the data surveyed with production of tables, charts and maps. It is possible to infer, through these, the crimes with the greatest number of commissions in the survey, and the highest number of cases occurred during BR 156. The efficacy of the action of the organs is still low in the fight against these crimes.

Keywords: environmental crimes, SINIMA, border of amapaense. public security.

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ESTUDOS SOBRE ALTERNATIVAS DE PROJETO PARA A MINIMIZAÇÃO DO IMPACTO AMBIENTAL DE EDIFÍCIOS EM CONCRETO ARMADO

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STUDIES OF DESIGN ALTERNATIVES FOR MINIMIZING THE ENVIRONMENTAL IMPACT OF REINFORCED-CONCRETE BUILDINGS

Recibido el 11 de octubre de 2018; Aceptado el 31 de marzo de 2019

Abstract

In a built environment, practice of sustainability is a responsibility of all involved in the design and execution. Most of the measures should be used in the design stage, in which there are the greatest implications regarding the dimensions, specifications and details incorporated into the structure. Therefore, prior identification and study of the impacts generated in the environment allow professional, company or public agencies to develop action plans and innovative solutions focused on reducing of negative impacts. This paper shows a literature review on the alternatives applicable in the project phase, in order to minimize the environmental impact of reinforced-concrete buildings. Initially, a brief history and a contextualization about sustainability has been presented. After, this work relates studies in civil engineering, with an emphasis on structural design. The proposed alternatives include the role of each professional in the project development, such as studies and applications on sustainable concrete, including the relationship between structural optimization and environmental impacts of reinforced-concrete buildings. Thus, it was possible to conclude that with these avaliable options, designer must verify which one will result better results with lower expenses and consumption of labor, financial and structural resources.

Keywords: ***s****ustainability, structural design, structural optimization, sustainable concrete, reinforced concrete structures.*

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ESTIMATIVA DE PRECIPITAÇÃO ANUAL NO NORTE DO BRASIL CONSIDERANDO OS EFEITOS DOS EVENTOS ENOS: EL NIÑO E LA NIÑA

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ESTIMATION OF ANNUAL PRECIPITATION IN NORTHERN BRAZIL CONSIDERING THE EFFECTS OF THE EVENTS ENOS: EL NIÑO AND LA NIÑA

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Abstract

Unavailability rainfall data in Amazonia occurs due to the size of the region, which makes it more expensive the consolidation of a network of rainfall gauge stations. However, these data are important for the planning of Agriculture, water resources and public supply. In this case, an alternative is to develop models for estimating rainfall. Thus, it was analyzed a historical series of 31 years of satellite-monitored data (1960-1990), this satellite group using a suite of geostationary and polar orbiting data from NOAA, DMSP and NASA environmental satellites for an understanding of the atmosphere, ocean and air-sea interface, selecting the years with episodes of El Niño and La Niña, making two new time series. Ward's agglomerative hierarchical method was used and a Euclidean distance as a measure of similarity, with which six homogeneous rainfall regions were identified. To these regions, multiple linear regression models (MRLM) were applied for regionalization of the average annual rainfall. The models were adjusted for the complete series, considering the El Niño events and only the La Niña events; and validated with observed data from the years 1973 to 2012 of 12 rainfall stations of ANA (National Water Agency). The estimates presented different results as a function of the homogeneous region and the analyzed series, demonstrating the influence and necessity of considering the El Niño and La Niña events in the modeling approach. The mean errors between observed and estimated rainfalls did not exceed 23.6%, therefore, the adopted methodology is a good option for estimates of average annual rainfall in Pará state, Northern Brazil.

Keywords: **w***ard method, homogeneous regions, multiple regression, ENOS, El Niño, La Niña.*

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UTILIZAÇÃO DE LODO ANAERÓBIO DE ESTAÇÃO DE TRATAMENTO DE ESGOTO NA PRODUÇÃO DE MUDAS DE IPÊ ROXO (*Tabebuia avellanedae*)

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USING ANAEROBIC SLUDGE SEWAGE TREATMENT PLANT IN THE PRODUCTION OF IPÊ ROXO (Tabebuia avellanedae)

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Abstract

This work aimed to evaluate the potential use of anaerobic sludge from a sewage treatment plant as substrate for Ipê seedlings production. In this study was used 8 treatments with different proportions of sludge:soil:sand. The treatments were divided, respectively, as follows: T0 (0: 50:25, added 25% bovine manure), T1 (12.5:62.5:25%), T2 (25:50:25%), T3 (50:25:25%), T4 (75:0:25%), T5 (0:75:25%), T6 (0:100:0%), T7 (100:0:0%). The experimental design was completely randomized with three replicates for each treatment, performed in a greenhouse. The following aspects were evaluated for seed productivity after 120 days of sowing: height, stem diameter, shoot dry mass, root dry mass, total dry mass, number of leaves and Dickson Quality Index. The sludge characterization showed a satisfactory quantity of macro and micronutrients within the environmental legislation limits. On the other hand, for the pathogens (eggs of helminths and coliforms), the sludge was outside the legislation limits. So, it was necessary to sanitize it with 30% lime for 60 days. The study concluded that the sludge sanitation with 30% of lime damaged the seedlings growth. Because of that, the control treatment (T0) presented the best productivity results, since in this treatment the sanitized sludge was not added.

Keywords: *biosolid, Dickson Quality Index, reforestation seedlings, sludge, Tabebuia avellanedade.*

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