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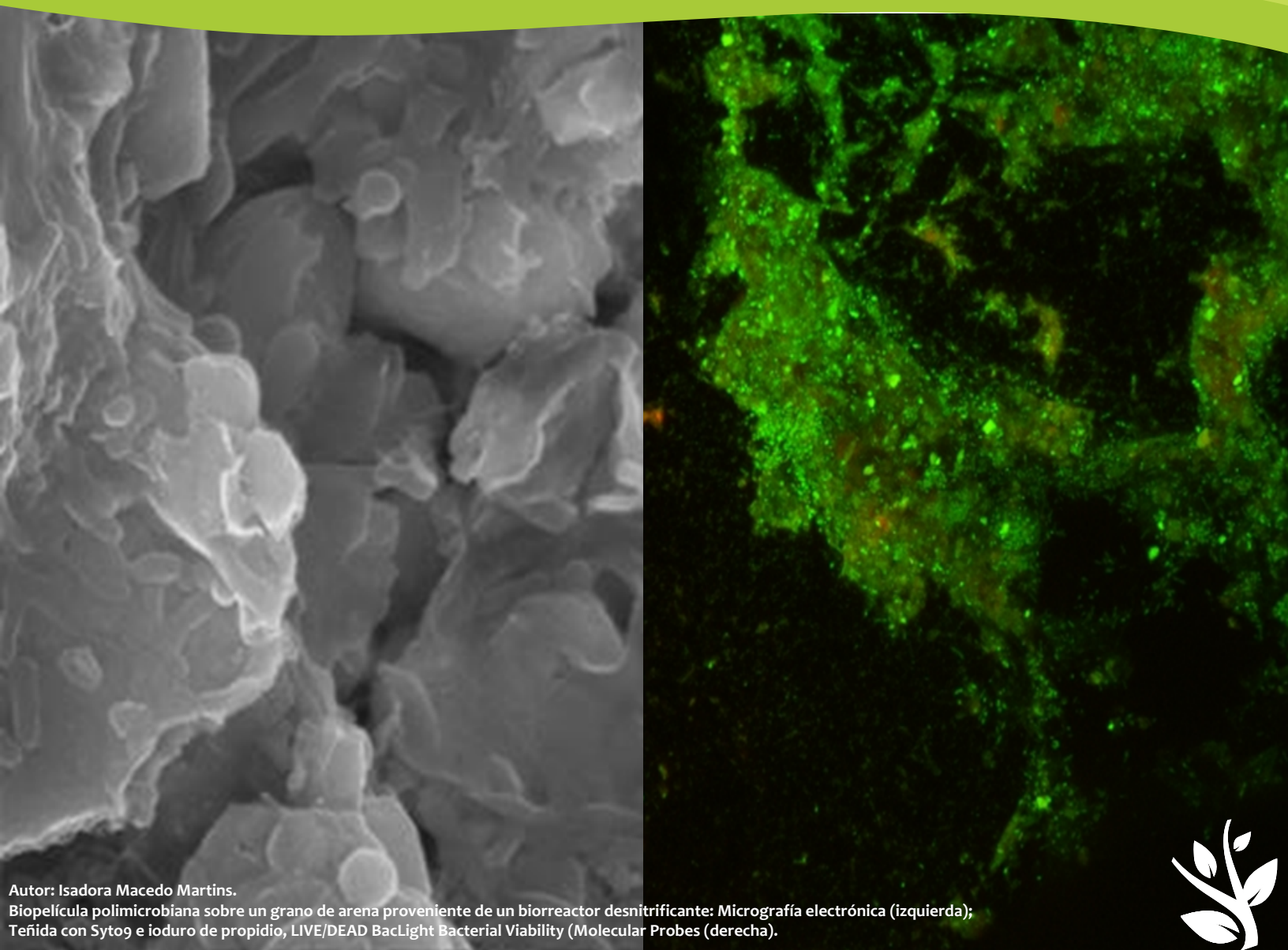

Autor: Isadora Macedo Martins.
Biopelícula polimicrobiana sobre un grano de arena proveniente de un biorreactor desnitrificante: Micrografía electrónica (izquierda);
Teñida con Syto9 e ioduro de propidio, LIVE/DEAD BacLight Bacterial Viability (Molecular Probes (derecha).

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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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Directorio

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Editorial

Tengo el gusto de presentar el número de Agosto 2022 de la Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica. En esta ocasión, el trabajo ***"Implementación de la desnitrificación biológica heterotrófica para remediar aguas subterráneas para consumo humano"*** de Cristián Dotto, Fernando Scolari, Leonardo Erijman y Eva Figuerola es la Selección del Editor. Felicitamos a los autores y a las instituciones que formaron parte del trabajo: Instituto de Investigaciones en Ingeniería Genética y Biología Molecular (INGEBI-CONICET Buenos Aires, Argentina); Agua y Saneamientos Argentinos (AySA Buenos Aires, Argentina); Departamento de Fisiología y Biología Molecular y Celular, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires.

En este número participaron autores de Argentina, Brasil, Bolivia y Portugal. Reconocemos la gran calidad y relevancia de todos los trabajos publicados. Finalmente, invito a la comunidad latinoamericana que trabaja en temas de ingeniería y ciencia ambiental a seguir sometiendo sus contribuciones a la Revista AIDIS, la cual constituye un foro de gran calidad para presentar avances en investigación y tecnología aplicada.

Guillermo Quijano

Editor en Jefe
Instituto de Ingeniería, UNAM
México

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REVISTA AIDIS

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INVENTÁRIO DAS EMISSÕES DE GASES DE EFEITO ESTUFA (GEE) EM UMA COMPANHIA DE SANEAMENTO

*José Carlos da Silva Júnior [1]
Fausto Diniz de Souza [1]
Marcio Gomes Barboza [1]
Daniele Vital Vich [1]
Karina Ribeiro Salomon [1]

INVENTORY OF GREENHOUSE GAS EMISSIONS AT A SANITATION COMPANY

Recibido el 22 de abril de 2020. Aceptado el 13 de abril de 2021

Abstract

Greenhouse Gas emissions inventories are strategic environmental management tools that estimate emissions by specific sources in a given geographical area and timeframe. Developing an inventory is the first step in creating programs to improve air quality. This research aimed to prepare a GHG inventory and propose a management of its emissions from the activities of the Sanitation Company of Alagoas (Casal) in the Capital Unit in 2018. The methodology employed involved literature analysis to identify the most appropriate method for inventory preparation, data collection in various units of the company, interviews with managers and GHG accounting. The methodology used for the estimation was that indicated by the Brazilian GHG Protocol Program, complemented by the guidelines of the Intergovernmental Panel on Climate Change (IPCC) for the case of sewage treatment. The results of the GHG emissions inventory indicate that in 2018, Casal, Capital unit emitted 31,099.33 tCO_2e, of which 86.7% (26,980.70 tCO_2e) came from direct emissions, while indirect ones represented 13.3% (4,118.63 tCO_2e). The company's main sources of emissions were the sewage treatment and energy consumption categories, respectively. The results form the basis for the incorporation of GHG reduction measures in the company's strategic planning.

Keywords: CO_2e emissions, inventory of gaseous emissions, climate change, sanitation.

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POLÍTICAS PÚBLICAS RELATIVAS AO LODO DE ESTAÇÃO DE TRATAMENTO DE ÁGUA

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Milla Gomes Albuquerque [1]
Rosângela Gomes Tavares [1]
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PUBLIC POLICIES RELATING TO SLUDGE OF WATER TREATMENT STATION

Recibido el 27 de enero de 2021. Aceptado el 18 de agosto de 2021

Abstract

The disposal of ETA sludge with high concentration of aluminum in the environment has as consequence the contamination of biota. This article aims at analyzing the public policies pertinent to the disposal of the sludge in the environment, performing a critical reading of international agreements, Brazilian legislation, having in mind the norms established in the State of Pernambuco. In the scope of international policies there is the Global Agenda 21. The MDGs cover specific actions with a deadline of 2015. A new sustainable development agenda was established, the ODS. Considering the national panorama, we have the environmental issue mentioned in the Federal Constitution. Law N° 6938, which establishes the National Environmental Policy. The Brazilian Agenda 21 was created in 1992. Law N° 9605 was created, known as the Environmental Crime Law. Law n°11445 was instituted, which establishes the guidelines for basic sanitation. Law N° 12305 was instituted, referring to the National Policy on Solid Waste. Recently, Law No. 14026 was established, updating the Sanitation Legal Framework. In State Law n° 14236, it is observed that sludge was classified as industrial waste. When performing the diagnosis of the state in the Solid Waste Plan, it was pointed out the existence of 187 ETA, which the destination of the sludge occurs in adjacent water bodies. In Brazil, a greater national effort is needed with the expansion of sanitation services. A greater deepening of the issue is indicated, seeking the definition of norms that assure the maintenance of environmental quality relative to the final disposal of the sludge.

Keywords: international agreements; national legislation; state legislation; solid waste.

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THERMAL POTENTIAL OF THE MACROPHYTES *Eichhornia crassipes* (WATER HYACINTH) AND *Pistia stratiotes* (WATER LETTUCE)

Tammy Scarlet Balbina Sales Rosa [1]
* Pedro Henrique Weirich Neto [1]
Eliane Nascimento dos Santos [1]
Bruno Felipe Malanowski [1]
Sandra Regina Masetto Antunes [2]
Nátali Maidl de Souza [1]

Recibido el 10 de febrero de 2021. Aceptado el 9 de marzo de 2022

Abstract

Most of the world energy consumption comes from non-renewable sources, which are being depleted, so alternative sources are necessary. The purpose of this work was to evaluate the thermal energy potential of macrophytes *Eichhornia crassipes* (water hyacinth) and *Pistia stratiotes* (water lettuce). These macrophytes were evaluated by gravimetric analysis, growth temporal determination, immediate analysis, and determination of the calorific value, under Cfb climate, Campos Gerais Region of Paraná, Brazil. The upper calorific value of macrophytes ranged from 11,459 kJ kg^{-1} for water lettuce to 14,158 kJ kg^{-1} for water hyacinth, lower than the wood used (around 18,000 kJ kg^{1}). As for the dry mass productivity, the macrophytes varied from 6,889 kg ha^{-1} for water lettuce to 9,947 kg ha^{-1} for water hyacinth, also lower than the commonly used woods. The water hyacinth showed a higher potential than water lettuce. The values determined are lower, however, macrophytes are considered invasive in lakes have a high cost for maintenance, therefore, according to logistics, they can be an option as thermal energy.

Keywords: biomass, renewable energy, calorific value, biofuel.

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DEVELOPMENT OF SUNFLOWER AND CORIANDER GROWN IN HUMAN URINE

* Germário Marcos Araújo [1]
Marianna Chaves da Silva [1]
Ana Késia Pedrosa Viana [1]
Luis Gonzaga Pinheiro Neto [2]
Iran Eduardo Lima Neto [3]

Recibido el 14 de marzo de 2021. Aceptado el 25 de octubre de 2021

Abstract

Most of the nutrients that are essential for crops, mainly nitrogen, phosphorus and potassium, are found in human urine in sufficient quantities, and in most cases, they are more adequate and sustainable even when compared to commercial chemical fertilizers. This work evaluated the growth of sunflower (*Helianthus annuus L.*) and coriander (*Coriandrum sativum*) submitted to the use of human urine as a biofertilizer. A treatment was carried out in the urine using the storage method, as a way to decontaminate pathogens. The experimental design used was a randomized block, with 5 treatments and 4 replicates, which were: T1 – only water; T2 – water + 15% urine; T3 – water + 30% urine; T4 – water + 45% urine; and T5 – water + 60% urine for sunflower cultivation. In relation to coriander, it was used in T1 – only water; T2 – water + 5% urine; T3 – water + 10% urine; T4 – water + 15% urine; and T5 – water + 20% urine. The experiment evaluated for sunflower and coriander the following: stem diameter (SD); Plant Height (PH); Leaf number (LN), Root length (RL) and Total Dry Mass of the Plant (PDM). The T1 and T2 treatments in sunflower cultivation showed higher mean values of SD, PH, LN and PDM. The T2 treatment in the cultivation of coriander showed greater development in relation to the variables SD, PH, LN and PDM. Thus, the results indicate that the crops were able to absorb the nutrients contained in human urine, demonstrating that it is possible to replace chemical fertilizers, causing a reduction in their consumption.

Keywords: natural fertilizer, nutrients, reuse.

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REVISTA AIDIS

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AVALIAÇÃO DE SISTEMAS DE MICRODRENAGEM APLICADOS A BACIA HIDROGRÁFICA DO ONÇA NO TRECHO DO PARQUE DO BREJINHO

* Igor Guilherme Tameirão de Jesus [1]
Fernanda Silva Lage [1]
Lucas Vassalle de Castro [2]

EVALUATION OF MICRODRAINAGE SYSTEMS APPLIED TO THE ONÇA WATERSHED IN THE PARQUE DO BREJINHO SECTION

Recibido el 15 de marzo de 2021. Aceptado el 11 de octubre de 2021

Abstract

The city of Belo Horizonte developed unexpectedly in the 1950s. The arrival of automobiles resulted in the enlargment of roads, the population of the "cidade jardim" followed the drastic change, with the growth of its population and the construction of skyscrapers. The peak of population growth migrating from rural to urban space, resulted in an inadequate and inefficient infrastructure. The effects of this process are felt on all urban equipment related to water resources: water supply, transport and sewage treatment. From the perspective of transportation, looking for alternatives for surface rainfall runoff, This study proposes to carry out an environmental diagnosis of the Brejinho Park, sub basin of the stream Engenho Nogueira, aiming at a microdrainage solution, to delay the flood wave in the Ribeirão do Onça Hydrographic Basin. With the function of cushioning the flood flows and reducing the risk of flooding. Where a hydraulic modeling was performed using the Storm Water Management Model (SWMM) software, in order to simulate compensatory device interference in the basin. The implantation of the infiltration trenches proved to be technically feasible for the current scenario, reducing impacts caused by high local sealing. This makes it an alternative to flood reduction.

Keywords: microdrainage, Ribeirão do Onça Basin, SWMM.

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APLICAÇÃO DA FRONTEIRA INVERTIDA EM ANÁLISE ENVOLTÓRIA DE DADOS PARA MEDIR O DESEMPENHO RELATIVO DA PRODUÇÃO DE ENERGIA EÓLICA NOS ESTADOS BRASILEIROS ENTRE OS ANOS DE 2015 A 2019

* Marcus Vinícius Sousa Rodrigues [1]
Marisete Dantas de Aquino [2]
Antônio Clécio Fontelles Thomaz [3]
Rejane Felix Pereira [4]

APPLICATION OF INVERTED FRONTIER IN DATA ENVELOPMENT ANALYSIS TO MEASURE THE RELATIVE PERFORMANCE OF WIND ENERGY PRODUCTION IN THE BRAZILIAN STATES BETWEEN THE YEARS FROM 2015 TO 2019

Recibido el 20 de marzo de 2021. Aceptado el 8 de septiembre de 2021

Abstract

Wind energy is energy from the air currents that circulate through the atmosphere. It is a source considered clean, renewable and available everywhere. Currently the use of wind energy to generate electricity is already a reality in Brazil. It is known that multiple are the criteria that can be used to carry out the analysis of the efficiency of the wind power generation sector. The multicriteria tool adopted in this research will be the data envelopment analysis. The main objective is to assess the relative efficiency of wind energy production in Brazilian states between 2015 and 2019 and then apply the inverted frontier model, in order to order the analyzed set and identify the falsely efficient units. The efficiency analysis indicated that of the 58 (fifty-eight) units analyzed, 9 (nine) were classified as efficient. The application of the inverted frontier model ordered the units according to the standardized efficiency measure and identified 8 (eight) units with false efficiency. It was possible to conclude that the FCM product (average annual capacity factor) had a significant weight in the calculations of efficiency measures of the UTDs (decision making unit).

Keywords: efficiency, false efficiency, DEA, wind generation.

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YARD WASTE COMPOSTING AS A VIABLE COST REDUCTION PROCESS

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Recibido el 23 de marzo de 2021. Aceptado el 8 de septiembre de 2021

Abstract

Yard waste consist of garden waste, generated by public parks and private gardens routine maintenance such as grass clippings, leaves from deciduous trees, flowers, fallen fruits, branches, twigs and logs and its composition vary greatly depending on the original location due to climate and other environmental conditions. Yard waste may represent a problem to Municipal Solid Waste Management Programs due to its large volume thus, it is necessary to incentivize local composting programs. In this study we show a brief disposal cost estimation from different cities from United States of America and Canada and we discuss how this biowaste can be managed in order to reduce costs with storage, transportation and disposal fees, encouraging the utilization of the final product as a soil amendment, stimulating and reinforcing the circular economy concept. The composted yard waste may not substitute the use of commercial products but it can reduce the cost of acquisition of this soil conditioner as well costs waste management. Update in environmental public policies is essential to foment sustainable economy in this context.

Keywords: composting, landfill fees, yard waste, yard waste disposal.

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REVISTA AIDIS

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CARACTERIZAÇÃO FISIOGRÁFICA E DO USO E OCUPAÇÃO DE BACIAS URBANAS EM JUAZEIRO DO NORTE/CE

Pedro André de Sousa Gonçalves [1]
* Renato de Oliveira Fernandes [1]

PHYSIOGRAPHIC CHARACTERIZATION AND LAND USE AND OCCUPATION STUDY OF URBAN BASINS IN JUAZEIRO DO NORTE, CE

Recibido el 26 de marzo de 2021. Aceptado el 14 de septiembre de 2021

Abstract

The characterization of watersheds is essential for the implementation of solutions that minimize urban drainage problems. This work presents the characterization of the watersheds of Riacho dos Macacos and Timbaúbas, which are the main basins in the city of Juazeiro do Norte, Ceará. Physical, hydraulic, and hydrological characterizations and land use and occupation studies were performed by geoprocessing techniques using Sentinel-2 satellite images, Shuttle Radar Topography Mission data, and QGIS processing. Thirteen sub-basins were delimited with a total area of 57.3 km², flat to smooth-wavy relief, and concentration time ranging from 19 to 121 min. The two less urbanized sub-basins, SB1 and SB2, presented 71% and 61% of vegetation, respectively. On the other hand, intense urbanization generated 72.5% of impermeable areas in one of the sub-basins (SB10). In agreement with the waterproofing rates of the basins and soil type, the Curve Number, of the method Natural Resources Conservation Service (NRCS), ranged from 70 (SB1) to 90 (SB10) and averaged 79. Indicators of susceptibility to floods agree with the frequent occurrences of floods in the SB3, SB6, and SB11 sub-basins that mainly include the neighborhoods of Lagoa Seca and Jardim Gonzaga.

Keywords: geoprocessing, hidrologia urbana, urbanização.

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IMPLEMENTACIÓN DE LA DESNITRIFICACIÓN BIOLÓGICA HETEROTRÓFICA PARA REMEDIAR AGUAS SUBTERRÁNEAS PARA CONSUMO HUMANO

Cristián Dotto [1]
Fernando Scolari [2]
Leonardo Erijman [1,3]
* Eva Figuerola [3]

IMPLEMENTATION OF HETEROTROPHIC BIOLOGICAL DENITRIFICATION FOR GROUNDWATER REMEDIATION FOR HUMAN CONSUMPTION

Recibido el 13 de abril de 2021. Aceptado el 14 de septiembre de 2021

Abstract

Nitrate pollution of drinking water sources is widespread in Buenos Aires Province. Its main causes are agriculture, livestock farming, or the poor design and operation of septic systems. High nitrate concentration in drinking water is detrimental for human health, for this reason, standards have been set for this ion. Biological denitrification, carried out ex-situ by bacteria indigenous to the aquifer, has been shown to be a suitable form of treatment for water for human consumption. The objective of the project described here was to establish the local conditions for the configuration of an heterotrophic biological denitrification pilot plant for groundwater in the province of Buenos Aires. For this purpose, laboratory tests were carried out in a batch and two continuous systems, including a 10X pre-scaling. The results obtained allowed the design and implementation of the proposed pilot plant, which is currently in the testing phase.

Keywords: biological denitrification, groundwater, nitrate.

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REVISTA AIDIS

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REÚSO DE ÁGUAS NO BRASIL: SITUAÇÃO ATUAL E PERSPECTIVAS

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WATER REUSE IN BRAZIL: CURRENT SITUATION AND PERSPECTIVES

Recibido el 6 de abril de 2021. Aceptado el 27 de julio de 2021

Abstract

This paper discusses the current situation of water reuse in Brazil and presents the perspectives for its use. A discussion is made about the federal and some states' laws, which establish the criteria, procedures and quality standards for the various modalities of reuse, emphasizing that the legal framework at the federal level is still very incipient. It is highlighted that the modalities of industrial and urban reuse were the ones that developed the most in the country, not having news about the use of treated sewage in medium or large systems in irrigation and fish farming. The paper presents the perspectives for the reuse of waters in Brazil, highlighting the proposals for direct or indirect drinking reuse. It is also emphasized the need for a broad program of awareness of the population to face the existing resistance to this practice. The necessary instruments for water reuse in Brazil are discussed, including a legal and institutional framework.

Keywords: population awareness, reuse modalities, use of treated wastewater, wastewater, sanitation.

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COMPARAÇÃO ENTRE O COAGULANTE NATURAL TANINO E OS COAGULANTES INORGÂNICOS PAC E CLORETO FÉRRICO PARA O TRATAMENTO DE ÁGUAS RESIDUAIS DA INDÚSTRIA DE RECICLAGEM DE PLÁSTICOS

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COMPARISON BETWEEN THE NATURAL COAGULANT TANNIN AND THE INORGANIC COAGULANTS PAC AND FERRIC CHLORIDE, FOR THE TREATMENT OF WASTEWATER FROM THE PLASTIC RECYCLING INDUSTRY

Recibido el 13 de abril de 2021. Aceptado el 14 de septiembre de 2021

Abstract

The present research sought to carry out the treatment of an effluent from the plastic washing processes, present in a recycling industry. For this purpose, the performance of the natural tannin coagulant in relation to the inorganic coagulants of polyaluminium chloride (PAC) and ferric chloride was analyzed. The parameters studied were related to the removal of apparent color, turbidity and COD. The bench scale treatment consisted of the physical-chemical processes of coagulation, flocculation and sedimentation, and the determination of the amount of tests required and the processing of the results obtained were carried out using the Statistica software. The test variables were the coagulant dosages and the coagulation pH, and after the discovery of the ideal treatment, the performance of the tannin coagulant in relation to the removal of phosphorus, nitrogen, suspended solids and total solids, as well as changes in conductivity and alkalinity were also verified. All coagulants reached results of removing turbidity, apparent color and COD above 97%, with emphasis on tannin, which in addition to exceeding 99%, facilitates the disposal of sludge, as it is a biodegradable coagulant.

Keywords: coagulation, flocculation, natural coagulant, sustainability, wastewater treatment.

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AVERIGUAÇÃO E ANALOGIA DAS FERRAMENTAS CONSTANTES NAS POLÍTICAS ESTADUAIS E NACIONAL DOS RESÍDUOS SÓLIDOS URBANOS NO BRASIL

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VERIFICATION AND ANALOGY OF THE TOOLS CONSTANT IN THE STATE AND NATIONAL POLICIES OF URBAN SOLID WASTE IN BRAZIL

Recibido el 16 de abril de 2021. Aceptado el 30 de enero de 2022

Abstract

Solid Waste State Policies lead strategies to ensure proper waste management and corroborate the effective implementation of the Solid Waste National Policy, however there are several instruments guided by the National Law, which need to be established and complied with, regardless of hierarchical level. In this study, the existence of some instruments present in the State Policies was verified and an analogy was made with those of the Waste National Policy, taking into account the main points of the Federal Law No. 12.305 / 2010. These instruments were Sectorial Agreements implementing Reverse Logistics, Environmental Education and Solid Waste Information System. A check of the Solid Waste State Plans was also carried out, which, in turn, are characterized as groups of these instruments. Obedience to the Solid Waste State Policies in 8 states was observed, namely: Amazonas, Tocantins, Ceará, Alagoas, Bahia, Rio de Janeiro, Rio Grande do Sul and the Federal District. For the rest of the investigated states, the need to review these laws and measures involving the integrated management of solid waste was made explicit. It should be noted that the states of Pará, Acre, Amapá, Maranhão, Piauí, Rio Grande do Norte, Paraíba, Sergipe, Paraná and Mato Grosso do Sul still do not have State Solid Waste Policies, for this reason they were not included in the aforementioned study.

Keywords: agreement between public solid waste policies, PNRS instruments, state solid waste policy, national solid waste policy.

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WATER HYACINTH COMPOSTING AS A WASTE MANAGEMENT STRATEGY: A SYSTEMATIC REVIEW

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Rodrigo Kanno [1]
Rejane Maria Candiota Tubino [1]

Recibido el 20 de abril de 2021. Aceptado el 6 de enero de 2022

Abstract

Macrophytes proliferation problem is worldwide know resulting in impacts on natural environment, human health and economic activities. These organisms have several parameters resilience, which ensures high rate of reproduction and proliferation, hindering their management. As a management difficulty consequence, however, solutions are sought to disposal this large amount of macrophytes, such as composting and fertilizer production. Thus, this study aims to conduct a systematic literature review in Scientific Platforms Science Direct and Scopus, identifying current status of macrophytes composting process, main methods, analyses and results obtained, in order to contribute in innovation studies to convert this type of weed into fertilizer. The general words source in titles, summary, or keywords specified by author were "Macrophyte" or "water hyacinth" and "compost" or "composting". Only articles dating from the last 20 years were maintained. Macrophyte composting process interest is addressed around the world because of their potential environmental, economic and social impacts, mainly for Eichhornia crassipes. Natural aeration predominates (56%) with composting time equal to or less than 60 days. Humidity control is essential (around 60%) like macrophytes dehydration prior to the composting process beginning. The significant quantity cellulose requires previous comminution and/or the cellulose-degrading inoculants addition. Composting process operational parameters are not standardized. Micro and macro nutrients richness can be considered for next evolutionary composting studies stage for this plant type, either by organic matter sources characteristics and/or mineral sources addition.

Keywords: composting, macrophytes, waste management, water hyacinth, weeds.

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UTILIZAÇÃO DE FILTRO BIOLÓGICO COM DIFERENTES MEIOS DE SUPORTE PARA TRATAMENTO DE ÁGUAS RESIDUÁRIAS DE LATICÍNIOS

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USE OF BIOLOGICAL FILTER WITH DIFFERENT SUPPORT MEDIA FOR TREATMENT OF WASTEWATER OF DAIRY PRODUCTS

Recibido el 4 de mayo de 2021. Aceptado el 8 de diciembre de 2021

Abstract

The dairy industry has a prominent role in the Brazilian scenario, lacking alternatives that combine a good cost / benefit ratio in the management of its effluents. Thus, the objective of this work was to experimentally analyze the biological filter (BF) with two different media, sugar cane bagasse and wood sawdust, in the biological treatment of dairy effluent, in order to evaluate the effectiveness of the treatment and to identify which of the materials is more efficient. Analyzes of pH, BOD, turbidity, total solids, sediment solids, total dissolved solids, electrical conductivity (EC), nitrogen and phosphorus were performed. There were superior results of removal of BOD, nitrogen and turbidity for the filter filled with wood sawdust. The bagasse filter presented better results on average in the reduction of phosphorus concentration and total solids, which are 91.7% and 59.8, respectively. The reduction of TDS concentration and EC reduction, both filters demonstrated equivalence. The results of sediment solids indicate the need to implement the secondary settler to the system. It is recommended to use FB filled with wood sawdust for treatment of dairy wastewater.

Keywords: effluent of dairy products, organic filters, sugarcane bagasse, wood sawdust.

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AVALIAÇÃO DO TRATAMENTO POR CLARIFICAÇÃO DA ÁGUA DE LAVAGEM DE FILTROS DE ESTAÇÃO DE TRATAMENTO DE ÁGUA CONVENCIONAL

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Eduardo Cleto Pires [1]

EVALUATION OF TREATMENT BY CLARIFICATION OF THE WASHING WATER FOR CONVENTIONAL WATER TREATMENT STATION FILTERS

Recibido el 5 de mayo de 2021. Aceptado el 31 de enero de 2022

Abstract

For the production of drinking water in Water Treatment Plants (WTPs) there is the generation of waste, with emphasis on the washing of filters, which is usually thrown into bodies of water. Because of this, many WTPs are returning the filter washing water (FWW) without treatment to start the process. Such practice can compromise the proper functioning of the station and affect the quality of the treated water. On the other hand, there is growing interest in implementing this practice, since it provides savings in electricity and water. The work analyzed the quality of FWW of a conventional WTP to verify the possibility of recirculation at the beginning of the system, after previous treatment. It was concluded that the recirculation of FWW cannot be performed without adequate treatment due to the high degree of pathogenicity and the presence of solids. The treatment of FWW with the addition of cationic polymer was satisfactory, with removal 97.8% of turbidity, reaching values below the value of raw water, as well as removal of up to 97,5% of Escherichia coli and 100% of total iron.

Keywords: clarification, filter washing water, polymers, recirculation, treatment.

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UTILIZAÇÃO DA PIRÓLISE COMO TRATAMENTO DOS RESÍDUOS TÊXTEIS DE FIBRAS NATURAL E ARTIFICIAL RESULTANTE DO CORTE NA INDÚSTRIA DE CONFECÇÃO

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USE OF PYROLYSIS AS TREATMENT OF NATURAL AND ARTIFICIAL FIBER TEXTILE WASTE RESULTING FROM CUTTING IN THE CLOTHING INDUSTRY

Recibido el 17 de mayo de 2021. Aceptado el 27 de octubre de 2021

Abstract

Textile manufacturing is one of the oldest technologies used by man. Brazil is one of the largest world producers in the textile sector, and is still an important producer of cotton fiber, producing an average of 9 billion pieces per year. An alternative to avoid inappropriate destination is recycling. Thus, this research investigated the technological feasibility for the conversion of textile waste, composed of cotton, viscose and linen fibers through the pyrolytic process. The pyrolysis was carried out in a cylindrical reactor without gas flow, at temperatures of 500 and 700°C and times of 30 and 60 minutes. The results revealed that, among the 137 types of textile composition distributed in 801 types of fabrics with different weight, color or weave, fabrics A (100% Cotton) and VLA (65% Viscose, 21% Linen, 14% Cotton) were those chosen for this research. The results of the generated biomass and by-products, revealed characteristics for use in the chemical and energy industry, since the higher calorific value was 2.214 Kcal/Kg, due to the low moisture and ash content, high volatile material content, low density and high content of C and H found in textile residues A (47.64%) and VLA (44.91%). The solid textile material was compared to bituminous coal in C, N and H levels and TOC content. Therefore, it is possible to conclude that the textile residues A and VLA presented favorable physicochemical characteristics not only for energy production, but also for use in other industrial sectors.

Keywords: artificial fiber, natural fiber, textile waste, fixed bed reactor, pyrolysis.

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BIODEGRADABLE MATERIAL FORMULATED WITH OAT HULLS IN THE COMPOSTING PROCESS OF HOUSEHOLD ORGANIC WASTE AND TREE PRUNING

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Recibido el 25 de mayo de 2021. Aceptado el 8 de noviembre de 2021

Abstract

With attractive research and development of new biodegradable polymers and their packaging applications, there is a need to address their environmental performance. This study aimed to compare the compostability of biodegradable materials (BM) produced with cassava starch, glycerol, poly (lactic) acid, with and without oat hulls to compost organic waste and also to evaluate if the BM influenced the compost process and its final product. The composting was carried out in 100 L reactors, 30 L of which were occupied with household organic waste and 66 L with tree pruning. The process was monitored for 60 days using the following parameters: temperature, C/N ratio, total organic carbon, total nitrogen, pH, electrical conductivity, series of solids, humidity, and reduction in mass and volume. At the end of the experiment, the degradation of the BM was analyzed by scanning electron microscopy (SEM). In the SEM images, cracks, voids, and irregular surfaces were observed, which did not exist in the BM before composting. The degradation of BM occurred, and their presence did not interfere in the composting process or the final compost's quality.

Keywords: biodegradation, biodegradable packaging, compost quality, scanning electron microscope, solid waste management.

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USO DE ÁGUAS CINZA NO BRASIL: ASPECTOS LEGAIS E QUALITATIVOS

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USE OF GRAY WATER IN BRAZIL: LEGAL AND QUALITATIVE ASPECTS

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Abstract

This paper discusses the use of gray water in Brazil. A revision of the Brazilian legislation on water reuse was made, with emphasis on the qualitative aspects of gray water. Examples of use of gray water in Brazil are presented. As a case study, it was characterized the composition of the raw and treated gray waters from a home building composed of two towers with 22 floors, each, with an average population estimated at 224 people. The gray waters come from the showers and washbasins of the apartments and, after being treated, are used in the discharge of sanitary appliances and in the irrigation of about 4400 m^2 of gardens. The treatment of gray water is composed of the following units: coagulation, flocculation, laminar decanter, double layer filter (anthracite and sand) and chlorine disinfection. It was concluded that the treated gray waters can be used for less restrictive purposes. The results obtained in the research indicate the importance of water reuse, notified in non-potable uses, constituting an alternative for water resource management, both under economic and environmental aspects.

Keywords: water reuse; use of treated wastewater; reuse modalities; treatment for reuse; legislation for reuse.

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AVALIAÇÃO DO ADENSAMENTO POR GRAVIDADE DO LODO GERADO PELO TRATAMENTO DE ÁGUA

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EVALUATION OF GRAVITY THICKENING OF SLUDGE GENERATED BY WATER TREATMENT

Recibido el 22 de junio de 2021. Aceptado el 25 de enero de 2022

Abstract

Water used for human consumption must undergo treatment to become potable. One of the most used water treatment technologies in Brazil is the complete cycle, which includes the stages of coagulation, flocculation, sedimentation, filtration and disinfection. In this type of treatment, there is the generation of residues in greater quantities in the sedimentation and filtration units, also called sludges or WWTP, which cause environmental impacts when improperly discharged into untreated springs. A widely used alternative for the treatment of waste generated in WTP is gravity thickening with the application of chemical conditioning, mainly polymers. In the present work, a water sample was prepared and submitted to treatability tests to obtain the sludge. From the generated sludge, "samples" were prepared with different concentrations of total suspended solids (TSS) and tested different chemical conditions (synthetic polymers and organic polymers) in gravity density tests. The results showed that synthetic polymers were more efficient than organic polymers, and that the higher the concentration of TSS in the initial sludge, the lower the values for turbidity and total solids of the clarified water, as well as higher speeds of clarification and thickening. Turbidity removal reached 95% for the 5.7 g TSS/L sludge in the gravity thickening tests.

Keywords: thickening, WTP residues, WTP sludge, polymers, water.

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CONTROLE DA DRENAGEM ÁCIDA DE MINA DE CARVÃO POR MEIO DE *WETLANDS* CONSTRUÍDOS

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CONTROL OF COAL MINE ACID DRAINAGE BY CONSTRUCTED WETLANDS

Recibido el 26 de junio de 2021. Aceptado el 26 de noviembre de 2021

Abstract

In the present article, the performance of two vertical flow constructed wetlands (WC), operated in batches, for the treatment of Mine Acid Drainage (DAM) from coal mining waste piles was evaluated. The wetlands consisted of two types of support medium of the basal layer, one of limestone and the other of granite, both complemented by a layer of organic compost, sandy soil, bovine manure and pine bark. The macrophyte used as vegetation cover, in the two wetlands, was of the genus Typha, known as Cattail. The treatments were evaluated in relation to the pH and concentration of total iron and manganese in the effluents, after a period of hydraulic detention of 24 hours in the systems, and a statistical comparison was made between the results. The final effluent from the calcite-based wetland showed a pH increase higher than that of the granite base, whose highest average increase was from 2.8 to 5.8. There was no statistically significant difference between the two treatment systems in terms of removal of iron and manganese, having reached, in that order, a level of 60.9% and 49.3% in the system composed of limestone and 59.0% and 45.0% in that built with granite. It was observed good applicability of wetlands built in the treatment of AMD, with the warning that, for effluents with very low pH values and a high concentration of metals, the technology should be used as an alternative combined with other types of treatment.

Keywords: acid mine drainage. constructed wetlands. iron removal. manganese removal. ph rise.

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SISTEMATIZAÇÃO E IMPLANTAÇÃO DE PROJETO DE EDUCAÇÃO AMBIENTAL PARA VALORIZAÇÃO DOS RESÍDUOS SÓLIDOS COMPOSTÁVEIS EM UM PLANO MUNICIPAL INTEGRADO DE RESÍDUOS

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SYSTEMATIZATION AND IMPLEMENTATION OF AN ENVIRONMENTAL EDUCATION PROJECT FOR THE VALORIZATION OF COMPOSTABLE SOLID WASTE IN AN INTEGRATED MUNICIPAL WASTE PLAN

Recibido el 26 de junio de 2021. Aceptado el 26 de noviembre de 2021

Abstract

This study presents results of systematic socioenvironmental education as a tool for the management and recovery of solid waste. This tool was developed through an agreement between Enviromental Studies Laboratory (LEAMet/UFRGS)and Secretariats of Environment (SEMAM) and Education (SMED) from Novo Hamburgo (NH), to enable projects contained in the Municipal Plan for Integrated Management of Solid Waste (PMGIR) and implement socio-educational programs, promoting the reduction of waste in the common and/or selective collection of NH. This work aims to raise awareness, organize, guide and facilitate field practices for waste management and development of projects and socio-environmental education good practices. The methodology begins with the registration of schools for pedagogical actions, preparation of an action plan, composting workshops and recording activities in a field diary. Data collection and content production were carried out through Action Research. The activities carried out correspond to the socio-environmental education and composting workshops, facing the school community (students, parents, teachers and employees) and the educating collective. Trained schools received sets of composting boxes, donated by SEMAM. 57 schools in this municipality participated in the training workshops and received composting boxes and 1747 people were trained and sensitized. It is understood that this initiative has been a successful prototype of this type of program and that it can be replicated to other schools and even to other municipalities.

Keywords: management and socio-environmental education, systematization, methodology, awareness, practices in projects.

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O CENÁRIO LATINO-AMERICANO DA SUSTENTABILIDADE NA INDÚSTRIA DA CONSTRUÇÃO CIVIL: REVISÃO SISTEMÁTICA

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THE LATIN AMERICAN SCENARIO OF SUSTAINABILITY IN THE CIVIL CONSTRUCTION INDUSTRY: SYSTEMATIC REVIEW

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Abstract

Sustainable development aims to find a balance between economic growth and rational use of resources, which directly impacts the most important activities, just like civil construction. In this sense, the present article aims to perform a literature review about sustainability in the construction industry between 1990 and 2020, focusing on Latin America in an approach that makes it possible to evaluate management tools in comparison to other scenarios. As a methodological strategy, the PRISMA methodology was used to include articles for quali-quantitative analysis. In the analysis step, 11 articles related to Latin America were included, confirming the incipient number of studies focusing in sustainability in civil construction, especially in developing countries. Studies have shown recurring points regarding the lack of a systemic view and an integrated approach that considers, among others, environmental, economic and social aspects. About the last one, it is important to highlight the importance of training of human resources for the use of sustainable management tools and methodologies that can assist in decision making and dissemination of a planning culture, based on the principle of prevention.

Keywords: Latin America, heavy construction, management tools, sustainable development.

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AVALIAÇÃO DE UM BIORREATOR A MEMBRANA DE LEITO MÓVEL NA REMOÇÃO DE NUTRIENTES DE EFLUENTE DA INDÚSTRIA DE LATICÍNIOS

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EVALUATION OF A MEMBRANE BIOREACTORS WITH A MOVING BED FOR THE REMOVAL OF NUTRIENTS OF THE DAIRY INDUSTRY WASTEWATER

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Abstract

The membrane bioreactors are characterized by combining processes of biological degradation and membrane filtration in the same unit, resulting in high efficiencies for effluents treatment. However, the insertion of a moving bed in these systems can further the efficiency, especially in relation to the removal of nutrients such as nitrogen and phosphorus. Due to the high presence of nutrients in the effluent of the dairy industry and the number of environmental problems related to these compounds, the main objective of this study was to evaluate the removal of nutrients, exceptionally nitrogen and phosphate forms, by using a membrane bioreactor with a moving bed. The reactor was built on a pilot scale with 30% of its useful volume filled with support material and operated for a period of 60 days continuously. The sludge age and the hydraulic detention time adopted were 20 days and 20 hours, respectively. The average achieved efficiencies of total Kjeldahl nitrogen and ammonia nitrogen removal were 96 and 98%, respectively, highlighting the advantage of this type of system for removing nitrogenous compounds. In relation to phosphorus removal, for the conditions adopted, the average efficiency was 7.9%, resulting in a low efficiency.

Keywords: membrane bioreactors with moving bed, wastewater, nutrients removal.

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AVALIAÇÃO DA SUSTENTABILIDADE DA GESTÃO DE RESÍDUOS SÓLIDOS URBANOS NO MUNICÍPIO DE TUCURUÍ – PA

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SUSTAINABILITY ASSESSMENT OF URBAN SOLID WASTE MANAGEMENT IN THE CITY OF TUCURUÍ - PA

Recibido el 20 de julio de 2021. Aceptado el 31 de enero de 2022

Abstract

The growing production of solid waste is proportional to the advance of globalization and urban expansion. Many cities find it difficult to manage urban solid waste (MSW), concerning its operationalization and evaluation, due to the few informations about its main source which lead to limitations in the various dimensions involved in this process. Therefore, the present study used a matrix of indicators developed by Ramos (2013) to analyze the sustainability of MSW management in the city of Tucuruí-PA through the Solid Waste Management Quality Index (IQGRS). Using the Delphi Method, questionnaires were applied to specialists in the environmental research field and the company responsible for waste collection and management services. As a matter of fact the IQGRS found characterized the city management as unfavorable in terms of sustainability according to a study by Santiago and Dias (2012). The study noticed the necessity of a integrated management involving all environmental agents and variables, as long as the local management failed, according to the National Solid Waste Policy (PNRS) rules.

Keywords: integrated management, sustainability dimensions, sustainability indicators, urban solid waste.

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ANÁLISE ESTATÍSTICA DA PRECIPITAÇÃO E DA EROSIVIDADE DAS CHUVAS NO SEMIÁRIDO PARAIBANO, NORDESTE DO BRASIL

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STATISTICAL ANALYSIS OF RAIN PRECIPITATION AND EROSIVITY IN THE PARAIBANO SEMIARID, NORTHEAST OF BRAZIL

Recibido el 22 de julio de 2021. Aceptado el 8 de noviembre de 2021

Abstract

Soil erosion by water is a serious threat to many regions around the world. The impacts caused by this phenomenon are complex and, in some cases, imperceptible, slowly changing the geomorphology over the years. Despite being a natural process, erosion is intensified by anthropic action, and rainfall erosivity is one of the main factors for soil degradation in semiarid environments. In Brazil, research at local scales is still timid and limited, which makes it difficult for researchers to effectively analyze soil loss across the country. The objective of the work was analyzed using descriptive statistics and rainfall erosivity in the semiarid region of Paraíba State, northeastern Brazil. The study area corresponds to the Paraíba portion of the Piancó-Piranhas-Açu River basin (BHRPPA-PB). The homogeneity of time series data from 28 rainfall stations from 1962 to 2020 (59 years of data) was analyzed and verified, the erosivity was calculated using the rainfall erosivity index (EI_{30}), and a descriptive statistic of the Erasure and erosivity data. From the results it was possible to observe that the average rainfall erosivity value that represents the R Factor of the USLE is 3275 MJ mm ha^{-1} h^{-1} being evaluated as moderate, and the period from January to May is the more conducive to the action of the erosivity of rains.

Keywords: brazilian semiarid region, rain intensity, r-factor, soil erosion, USLE.

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PROFUNDIDAD DE DISCO DE SECCHI Y SU RELACIÓN CON LA TURBIDEZ Y CLOROFILA "A" EN EL EMBALSE SAN JACINTO, TARIJA, BOLIVIA

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SECCHI DISK DEPTH AND ITS RELATIONSHIP WITH TURBIDITY AND CHLOROPHYLL, "A" IN THE SAN JACINTO RESERVOIR, TARIJA, BOLIVIA

Recibido el 31 de julio de 2021. Aceptado el 31 de enero de 2022

Abstract

The depth of observation of the Secchi disk is an indicator of the water quality of the reservoirs, and it has been shown that it is possible to relate it to other environmental parameters to build prediction limits for new observations. The objective of this research was to establish the relationships between the depth of the Secchi disk with turbidity and Chlorophyll "a" to use them as a basis to estimate values of turbidity and chlorophyll concentration from mathematical models of simple regression adjustment. This work was carried out in the period 2018 and 2019. The results obtained from the estimated equations show that it is possible to estimate and build prediction limits for new Turbidity and Chlorophyll observations in the San Jacinto reservoir, showing an R^2 and a degree of effectiveness of the Turbidity and Z_{sd} relationship of 92.73% and an R^2 in the Chlorophyll and Z_{sd} ratio of 96.05%. Knowing the relationships between the environmental parameters of water is essential for space-time monitoring, which allows adequate management of the waters of the San Jacinto reservoir.

Keywords: water quality, simple regression models, water transparency.

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IMPACTOS AMBIENTAIS DO CICLO DE VIDA DO SISTEMA DE GERENCIAMENTO DE RESÍDUOS SÓLIDOS URBANOS DO MUNICÍPIO DE PAULISTA/PE - BRASIL

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ENVIRONMENTAL IMPACTS OF THE LIFE CYCLE OF MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM IN THE MUNICIPALITY OF PAULISTA/PE - BRAZIL

Recibido el 31 de julio de 2021. Aceptado el 8 de noviembre de 2021

Abstract

The management of urban solid waste range from the collection activity to the final disposal of the tailings. Waste management is a complex issue around the world due to consumption habits and the intense urbanization process of communities. In developing countries such as Brazil, it is an even greater challenge due to the pressure on municipal budgets. The aim of this study is to analyze the environmental impacts of the life cycle of the urban solid waste management system in the city of Paulista, Pernambuco, Brazil, through the Life Cycle Assessment (LCA) method. The LCA methodology followed the guidelines of the ABNT 14.040 standard, the product system being the phases of waste management that occur in the study area, the functional unit is the amount of waste managed by the municipality in one month, the software used was the SimaPro 9.2 and the impact assessment method was ReCiPe 2016. The results of the analysis showed that the common waste collection stage is the most impactful in the system. The operation of the landfill also contributes to impacts characterized by the chosen categories, especially human toxicity. The consumption of fossil fuel and emissions from burning through transport is the main justification for the impacts from collection. In this sense, there was a need for new collection models and alternatives to reduce distances traveled and, consequently, reduce fuel consumption.

Keywords: life cycle assessment, municipal management, waste.

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ANÁLISE MORFOMÉTRICA DA BACIA HIDROGRÁFICA DO RIO CARAPIRANGA EM REGISTRO (SP), BRASIL, POR MEIO DE TÉCNICAS DE GEOPROCESSAMENTO

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MORPHOMETRIC ANALYSIS OF THE CARAPIRANGA RIVER BASIN IN REGISTRO (SP), BRAZIL, USING GEOPROCESSING TECHNIQUES

Recibido el 2 de agosto de 2021. Aceptado el 21 de febrero de 2022

Abstract

The hydrographic basins are of great importance in environmental studies, as their components are interconnected and the alteration in any of them can generate a great impact in the region in which it is located. Therefore, this research aimed to analyze morphometrically the Carapiranga river watershed, located in the municipality Registro (SP), Brazil, using geoprocessing techniques to obtain physical data of the watershed that support management and planning actions. For this, the geoprocessing techniques used topographic maps provided by the Geographical and Cartographic Institute (GCI) to perform the morphometric analysis. The results showed that the watershed covers an area of 68.88 km², a perimeter of 75.71 km, has a more elongated, and less circular shape, and the watercourse presents up to the 4th order. The parameters of circularity index (0.17), compactness coefficient (2.39), and sinuosity index (1.24) demonstrated that the basin has good drainage, as it has medium permeability and high infiltration. It is noteworthy that the roughness coefficient indicates that a large part of the basin is suitable for agriculture, main economic activity of the region, especially banana production, as this basin does not have areas with steep slopes, which attenuates water erosion.

Keywords: agriculture, geotechnology, morphometry, slope.

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USO DE AERONAVES REMOTAMENTE PILOTADAS PARA DERIVAÇÃO DE ALTURAS DE EDIFICAÇÕES DO ENTORNO DE UMA FONTE FIXA DE POLUIÇÃO ATMOSFÉRICA

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USE OF REMOTELY-PILOTED AIRCRAFT TO DERIVE BUILDING HEIGHTS FROM THE SURROUNDINGS OF A FIXED SOURCE OF ATMOSPHERIC POLLUTION

Recibido el 25 de agosto de 2021. Aceptado el 8 de diciembre de 2021

Abstract

Air pollution is a topic of relevant interest as it directly affects the health and well-being of the population. One of the main sources of air pollution emission is stationary or fixed, such as industrial ducts and chimneys, which must be properly sized, considering factors such as the heights of buildings neighboring point sources, so that the emission of pollutants reaches the receptors (neighboring population) in a sufficiently diluted way so as not to cause any harmful effects. In this sense, remote sensing is an alternative for managing air quality control, with RPAs standing out as a practical and low-cost tool for obtaining the dimensions of imaged objects. This research aimed to evaluate the heights of buildings located in the area of influence of an industry, derived from MDS and MDT, obtained through high-resolution images from aerial survey with RPA. To validate the heights obtained from the models, 70 buildings were sampled in the field. The statistical analysis of the data obtained in the field and those from the models showed the following errors in the estimate: RMSE = 20 cm and R-RMSE = 4.93% and R2 of 0.99. The use of RPAs proved to be viable to determine the height of buildings inserted in the area of influence of atmospheric emission sources.

Keywords: remote sensing, geographic information system, DSM, DTM.

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ÍNDICE DE SALUBRIDADE AMBIENTAL E A OCORRÊNCIA DA LEPTOSPIROSE: UM ESTUDO EM BAIRROS POPULARES DE SALVADOR – BAHIA

ENVIRONMENTAL HEALTH INDEX AND THE OCCURRENCE OF LEPTOSPIROSIS: A STUDY IN POPULAR NEIGHBORHOODS OF SALVADOR – BAHIA

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Abstract

Leptospirosis, an endemic disease in Brazil, with high lethality, is related to the environmental health of the territories, mainly impacting populations in a state of socioeconomic vulnerability. The present work aimed to investigate the gradients of environmental health in popular neighborhoods of Salvador-Bahia and its influence on Leptospira infection. The investigation involved the collection of primary and secondary data about the environmental health and the occurrence of individuals with antibodies against Leptospira. An Environmental Health Index (EHI) for the areas of study was elaborated, the information was georeferenced, and the data were statistically analyzed. The results indicated that fifteen of the twenty-three study micro-areas had unsatisfactory environmental health conditions and the statistical and spatial analyzes indicated a relation between low EHI scores and higher concentration of individuals with antibodies against Leptospira. In conclusion, the prevention and control of the disease must involve integrated and integral actions for basic sanitation in the territory, surpassing a medical-assistance approach.

Keywords: leptospirosis, environmental health index, basic sanitation.

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DETERMINACIÓN DEL ESTADO TRÓFICO DEL EMBALSE SAN JACINTO, CON IMÁGENES DE SATÉLITE LANDSAT 8, TARIJA, BOLIVIA

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DETERMINATION OF THE TROPHIC STATE OF THE SAN JACINTO RESERVOIR, USING SATELLITE IMAGES LANDSAT 8, TARIJA, BOLIVIA

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Abstract

The values of the trophic status indicators such as chlorophyll-a (Chl-a), transparency (Z_{SD}) and turbidity, have contributed to the increase in the trophic levels of reservoirs and lakes. The objective of this research is to demonstrate that it is possible to estimate and predict the trophic state of the San Jacinto reservoir, with a high spatial resolution through the use of Landsat 8 satellite images, in combination with in situ data and through multiple linear regression models of Chl-a and Z_{SD} parameters in the dry and wet seasons of 2018 and 2019.The results categorize the reservoir as hypereutrophic in the wet period with an average Z_{SD} of 0.35 m. and eutrophic in the dry period with an average Z_{SD} of 1.94 m. For the Chl-a values, the average value in the wet period was 12.65 µg / l., Categorizing the reservoir as eutrophic and in the dry season as Ultraoligotrophic with an average value of 0.83 µg / l, with a variation with The classification using the Z_{SD} values, it is deduced that the low transparency of the water would not be due to a high concentration of phytoplankton or algae, but rather to high amounts of matter or solids in suspension (turbidity). This phenomenon occurs in the San Jacinto reservoir due to the dragging of sediment discharged by the waters of the Grande, Chico rivers and the Tablada Grande stream of the Tolomosa basin. The determination coefficient for each variable and each season varied in Chl-a from 80.06% in the wet season and 73.79% in the dry period. The R^2 of Z_{SD} of 74.83% in the wet season and 74.93% in the dry period. The results showed positive equations that allowed estimating the parameters of the trophic levels of the San Jacinto reservoir.

Keywords: San Jacinto Reservoir, trophic status, Landsat 8, OLI sensor, multiple linear regression models.

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