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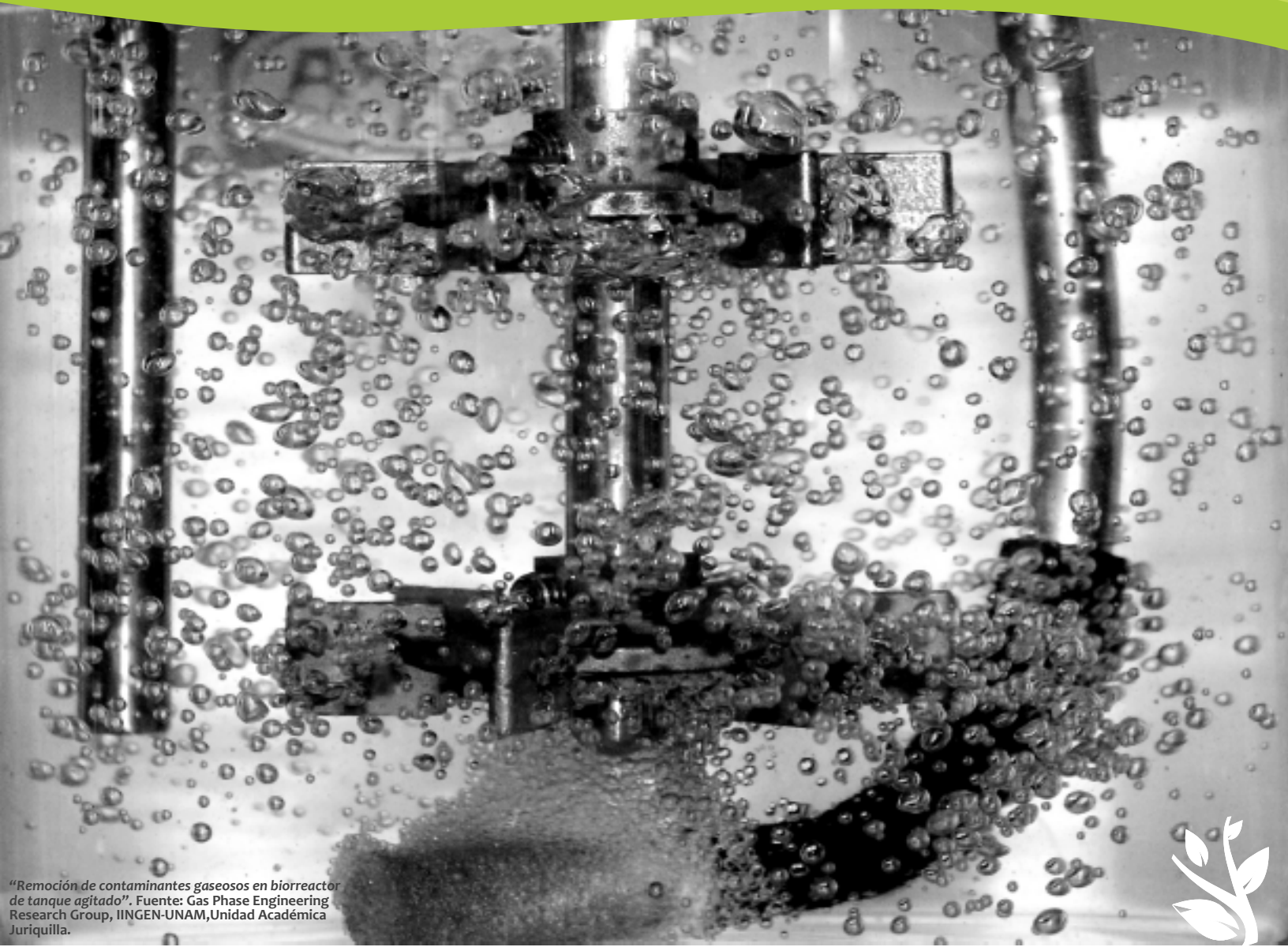

"Remoción de contaminantes gaseosos en biorreactor de tanque agitado". Fuente: Gas Phase Engineering Research Group, IINGEN-UNAM,Unidad Académica Juriquilla.

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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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Editorial

Tengo el gusto de presentar el número de Diciembre 2022 de la *Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica*. La Selección del Editor en este número es el trabajo "**Geoespacialização da COVID-19 no município de Campina Grande-PB com base na mobilidade populacional das regiões de influência das cidades (REGIC)**" de Bianca Amaral Honório y colaboradores. Este trabajo fue realizado en el Centro de Ciências e Tecnologia de la Universidade Estadual da Paraíba, Brasil. Felicitaciones a los autores por la calidad de esta investigación.

En este número participaron autores de Brasil, Argentina, México y España. El Comité Editorial reconoce la gran calidad y relevancia de todos los trabajos publicados en este número de diciembre de 2022. Asimismo, hacemos una cordial invitación 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. El Comité Editorial les desea felices fiestas y un año 2023 lleno de prosperidad.

Guillermo Quijano
Editor en Jefe
Instituto de Ingeniería, UNAM
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REVISTA AIDIS

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NONWOVEN DEVELOPMENT AND CHARACTERIZATION PRODUCED FROM CIGARETTE BUTTS

* Ana Silvia de Lima Vielmo [1]
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Fabíola Tomassoni [1]
Maria Eliza Nagel Hassemer [1]

Recibido el 9 de agosto de 2021. Aceptado el 25 de marzo de 2021

Abstract

The aim of this study was to develop and evaluate the performance of a nonwoven (NT) with cellulosic material from cigarette butts. The NT used as a filtering medium had a diameter of 7 cm, height of 24 cm, a surface area of 528 cm^2 and a total volume of 692 cm^3. The NT was applied for the filtration of water from a pond. To evaluate NT performance, NT characterization, grammage, absorption capacity and permeability analyzes were performed. The results showed that NT was characterized as a microporous material and presented a good absorption performance (values in the order of 4.01 g g^{-1} to 4.99 g g^{-1}), weight of 115 g m^{-2}, permeability between 3.787 L m^{-2} h^{-1} and 3.422 L m^{-2} h^{-1}. The NT developed showed potential for use as a filtering medium for the surface water pre-treatment. In addition to helping to reduce the negative environmental impacts caused by the residues of cigarette butts present in the environment.

Keywords: cigarette butt waste, filtration system, surface water.

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REVISTA AIDIS

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ANÁLISE DE DESEMPENHO DOS DISPOSITIVOS DE SAÍDA PARA RESERVATÓRIOS DE DETENÇÃO NO CONTROLE DE CHEIAS URBANAS EM FORTALEZA

* Gustavo Siebra Lopes [1]
Anísio de Sousa Meneses Filho [1]

PERFORMANCE ANALYSIS OF OUTPUT DEVICES FOR DETENTION RESERVOIRS IN URBAN FLOOD CONTROL IN FORTALEZA

Recibido el 24 de agosto de 2021. Aceptado el 10 de enero de 2022

Abstract

Hydrological and hydraulic studies are required to understand the dynamics of floods and to control their impacts, in order to better target effective alternatives, mainly in urban areas that are most often achieved by the harmful effects of excess runoff. In general, these studies are based on the estimate of the maximum flows that are reached in critical points of the hydrographic basin, in order to choose the hydraulic devices that transfer or mitigate their effects. In this perspective, it is necessary to simulate alternatives for inference of performance for the purpose of effective control of floods. This work focuses on evaluating the performance of various combinations of outlet devices, notably orifices and spillways of various sizes, applicable to detention reservoir, a compensatory technique based on the temporary storage of the excess flow, with two basic objectives: to reduce the peak flow rate and to delay peak time. In the development of the work, the empirical IDF (intensity-duration-frequency) relationship of Fortaleza (CE) is used to obtain the project hietograph and SCS model (Soil Conservation Service) is used to elaborate the inflow hydrograph to the reservoir. The Puls method is employed to generate the flow propagation. The methodological process is oriented towards decision in the choice of the device to be adopted in the executive project of the facility. The results show different levels of reservoir performance, according to the selection and dimensioning criteria of the hydraulic elements promoting the effluent hydrograph.

Keywords: detention reservoir, urban drainage, hydraulic devices, Puls method.

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REVISTA AIDIS

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TRATAMIENTO DE AGUAS RESIDUALES DE LA INDUSTRIA GALVANOPLÁSTICA MEDIANTE HUMEDALES INTENSIFICADOS A NIVEL MICROCOSMOS

Daniela González-Pereyra [1]
* Rodolfo Cisneros-Almazán [2]
Rodolfo Cisneros-Pérez [1]
Z. Arturo Guadiana-Alvarado [2]
Gerson A. Soto-Peña [2]

TREATMENT OF WASTEWATER FROM THE ELECTROPLATING INDUSTRY USING INTENSIFIED WETLANDS AT THE MICROCOSM LEVEL

Recibido el 5 de septiembre de 2021. Aceptado el 22 de marzo de 2022

Abstract

Constructed wetland (CW) prototypes were tested as a non-conventional treatment of wastewater from an electroplating industry, the systems worked with the subsurface vertical flow with water recirculation. Two types of substrates were evaluated, natural zeolite and metallurgical slag. The prototypes were designated as PCW-Z and PCW-E, respectively. The PCWs were vegetated with Phragmites australis and worked for 29 weeks including a plant adaptation period and a treatment period. Industrial wastewater was added for 16 weeks and the initial and final values of copper, COD, TSS, detergents, electrical conductivity, and pH were evaluated. The contact of the wastewater with the plants generated a reduction in their population, at the end of the process the PCW-Z had an average loss of 9 plants, however, new shoots continued to be generated, showing the high resistance of the plants to copper-contaminated effluents. The wastewater treatment results showed copper removal percentages of 95.8 % for PCW-Z and 96.7 % for PCW-E, values corresponding to the first four weeks of treatment. After 16 weeks, the percentage of removal decreased in a range of 0 to 10% on average for both substrates. PCWs proved to be efficient in the removal of TSS and detergents during the whole treatment process with percentages of 95.1 % and 94.8 %, respectively. Based on the results, it can be said that PCWs are efficient in the treatment of wastewater from the electroplating industry when low copper concentrations are present; however, a key aspect to be taken care of is the high salinity that this type of water contains since it was not possible to reduce the concentration with these systems, generating negative effects on the plants and the substrate; therefore, prior treatment is recommended before applying the effluent to the constructed wetlands.

Keywords: copper, metallurgical slag, *Phragmites australis*, zeolite.

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REVIEW: REMOÇÃO DE PARABENOS POR PROCESSO DE OZONIZAÇÃO

Amilcar Machulek Junior [1]
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Diego Aparecido Silva de Brito [1]
Maria Lúcia Ribeiro [1]

REVIEW: PARABENS REMOVAL BY OZONIZATION PROCESS

Recibido el 12 de septiembre de 2021. Aceptado el 25 de abril de 2022

Abstract

The presence of parabens and other emerging compounds in wastewater is a reality that must be studied and discussed by physical, legal and research entities in the environmental and sanitation areas, given their potential risks to human health and natural ecosystems. Understanding these new pollutants is necessary for the development and improvement of effective treatment technologies, as current processes are not able to remove them. Researchers from all over the world study and bet on Advanced Oxidative Processes (AOPs), such as Ozonization process, as one of these solutions. As any other remediation process, important operational parameters must be considered, such as the effects of pH, ozone doses, reaction time and addition of oxidizing agents, catalysts and UV irradiation, given that the simple ozonation process has low rates of mineralization due to the generation of organic compounds refractory to the action of ozone, which will be the subject of this study.

Keywords: parabens, ozonization, AOPs.

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REVISTA AIDIS

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A NEW EVALUATION METHODOLOGY APPLICATION OF DRY SEVERITY FOR THE CITY OF CAMPINA GRANDE-PB

* Maxsuel Bezerra do Nascimento [1]
Tássio Jordan Rodrigues Dantas da Silva [1]
José Ludemario da Silva Medeiros [1]
Janaína Aparecida Cezario [1]
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William de Paiva [1]

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Abstract

Droughts come from natural factors, and when they occur, cause changes in the climate, whether on a punctual or diffuse scale, and this cycle is constantly repeated, but in recent decades these impacts have increased with human actions from deforestation and burning of fossil fuels. Thus, the objective of this work is to employ a new application of the Drought Index methods (IAC, IPN and MD) to the data from the historical rainfall series of the municipality of Campina Grande - PB in the state of Paraíba, in order to classify the data on a monthly and annual scale, in order to identify the intensity over the years studied in this research. The pluviometric data used in the research correspond to the historical series from 1980 to 2019, which are divided into monthly precipitation data, provided by the Northeast Development Superintendence, National Institute of Meteorology and the Paraíba Water Management Executive Agency. The proposed methodology, in addition to the new standardization of the Drought Intensity Index (IIS), proposes a new characterization of the final rainfall condition or drought severity index. Finally, it allows environmental agencies and managers better conditions to adapt to problems related to drought and extreme rainfall, for greater management of water resources.

Keywords: drought intensity index, drought severity index, classes.

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FOREST FRAGMENTATION IN AN UNREGULATED PROTECTED AREA ON THE ATLANTIC COAST OF BRAZIL

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Joaquim Lemos Ornellas [1]
* Elfany Reis do Nascimento Lopes [1]

Recibido el 17 de septiembre de 2021. Aceptado el 21 de febrero de 2022

Abstract

Brazilian protected areas are subjected to an intense process of fragmentation due to the lack of environmental regularization and anthropic activities inside them. This study evaluates the forest fragmentation of the Alto Cariri National Park inside the Atlantic Forest of northeastern Brazil. The mapping of forest fragments was performed with the visual interpretation of a satellite image, analyzed based on landscape metrics and physical and topographic conditions. The results show a high forest fragmentation, which is responsible for the segmentation of the forest patch into 120 fragments, predominantly smaller than 5 ha, with an irregular shape and incident edge effect. The obstacles to the preservation of the Atlantic Forest are due to the irregular use of these areas for the production of cattle in pastures and the lack of agility of the public power to implement the expropriation of the population, the drafting of a management plan and decision make.

Keywords: national park, edge effect, landscape management, remote sensing.

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MORFOMETRIA EM ÁREA DE DISPOSIÇÃO DE RESÍDUOS SÓLIDOS NO MUNICÍPIO DE NORMANDIA, RORAIMA, BRASIL

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Lena Simone Barata Souza [2]
Adriano Frutuoso da Silva [1]

MORPHOMETRY TO THE SOLID WASTE DISPOSAL AREA OF THE MUNICIPALITY OF NORMANDIA, RORAIMA, BRAZIL

Recibido el 25 de septiembre de 2021. Aceptado el 26 de marxo de 2022

Abstract

The development of new urban centers necessarily requires planning and disposal of solid waste. The absence of morphometric analysis in areas with the potential to negatively impact the environment and its natural resources can make it difficult to properly understand the contaminant flow in the local hydrological dynamics. The area under consideration in this research comprises the open-air dump in the municipality of Normandia, State of Roraima. Morphometric analysis based on physical characterization were used in the present work with the aid of remote sensing images and radar images to obtain thematic maps and infer how the contaminant flow can interact with the environment and possible directions flow. The drainage basin of the Passarinho stream (water body present in the area) is characterized by a preferential flow in the NE-SW direction, with a predominance of moisture conservation slopes in the perimeter of the disposal area, which favors infiltration. Although the area is strategically positioned away from water bodies, it is in a sedimentary cover, which has a high vulnerability to groundwater contamination, in addition to being an area with a high propensity to flooding, which allows for the dilution of surface contaminants, being able to reach the adjacent streams and lakes.

Keywords: landfill, hydrographic basin, solid waste, Normandia.

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EVALUACIÓN DE LA PRESENCIA DE MICROPLÁSTICOS EN PLAYAS DEL RÍO DEL LA PLATA: CIUDAD DE BUENOS AIRES Y ALREDEDORES

Judith Elizabeth Lacava [1,2]
Agustina Schmaedke [3]
María Azul Denaro [3]
Pamela Romina Bernabeu [3]
* Romina Mariel Gargarello [1,4]

EVALUATION OF THE PRESENCE OF MICROPLASTICS IN BEACHES OF LA PLATA RIVER BASIN: BUENOS AIRES CAPITAL CITY AND SURROUNDINGS

Recibido el 28 de septiembre de 2021. Aceptado el 15 de febrero de 2022

Abstract

Due to their low cost and wide use, plastics are nowadays an unavoidable consumable. The effects microplastics have on the environment is a recent field of research in Argentina. Two campaigns for studying microplastics presence in La Plata River (Buenos Aires, Argentina) coastal sediments were managed during winter and spring 2019: beaches in Buenos Aires Capital City and surroundings (AMBA) were selected, sampled and characterized. Presence of microplastics were confirmed, classified, and characterized according to their morphology and color. Microplastics were separated by flotation techniques and visually identified by microscopy observation. The winter campaign reported more microplastic items (a total of 464 over 280 of the spring campaign) with fibers and microbeads being the most representative. Although this is a preliminary work, microplastic found are consistent with economic activities of the studied area and hydrogeological dynamics of La Plata River basin. Monitoring should continue to elaborate an environmental base line, elucidate microplastics origin and fate, and implement control actions.

Keywords: AMBA, microplastics, monitoring, beaches, La Plata River Basin.

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BIOFILTRAÇÃO DE METANO EM BIOGÁS DE ATERRO SANITÁRIO: UM ESTUDO DE CAMPO

* Waldir Nagel Schirmer [1]
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Douglas Luiz Mazur [1]
Matheus Vitor Diniz Gueri [2]
José Fernando Thomé Jucá [3]
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BIOFILTRATION OF METHANE IN LANDFILL BIOGAS: A FIELD STUDY

Recibido el 30 de septiembre de 2021. Aceptado el 9 de marzo de 2022

Abstract

The release of landfill biogas (LFG) into the atmosphere as fugitive emissions (through the cover layer) is quite representative. Given the high potential of biogas in the greenhouse effect (GHG), the study of different technologies for its use in energy production has been increasingly studied. In addition to the biogas recovery to the energy purposes, use of biosystems (biocovers, biofilters, etc.) in cover layers aimed at optimizing the biotic consumption of methane, the main component of biogas in terms of global warming potential (GWP), has also been widely evaluated as a system complementary in GHG mitigation. Thus, the present study evaluated the performance, in terms of methane oxidation efficiency, of a biofilter filled with conventional landfill soil enriched with scum from a domestic wastewater treatment plant. This "improved" biofilter, with high organic matter content (≈4.5%) in the upper portion of the bed, was compared to a "control" biofilter, containing only conventional landfill soil and therefore with low organic matter content. (≈0.5%). Both biofilters were fed with a loading rate of ≈44 $g_{CH4}.m^{-2}.d^{-1}$ over nine monitoring campaigns. Parameters as methane concentration in raw biogas (LFG), moisture and temperature of biofilter beds were also related to the methane oxidation efficiencies. The average efficiency of methane oxidation in the improved biofilter was 95.2%, compared to the control biofilter (84.7% efficiency), confirming the effectiveness of WWTP scum as a cover layer soil amendment in GHG mitigation.

Keywords: atmospheric pollution, biotreatment, greenhouse gases, methane, solid wastes valorization.

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ADAPTAÇÃO DO INDICADOR DE SALUBRIDADE AMBIENTAL (ISA): ESTUDO DE CASO NO POVOADO BOM JARDIM, ITABAIANA – SE

Jordan de Melo França [1]
* Taísa Andrade Barbosa [1]
Luciana Coelho Mendonça [1]

ADAPTATION OF THE INDICATOR OF ENVIRONMENTAL HEALTH (ISA): A CASE STUDY IN POVOADO BOM JARDIM, ITABAIANA – SE

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Abstract

Environmental health is a citizen right and must be ensured by public policy. This work aim to adapt the original model of the Environmental Salubrity Indicator (ISA) and to apply in a rural community called Bom Jardim, in Itabaiana/SE, Brazil. The proposed model (ISA/BJ) contains eight sub-indicators that take into account characteristics of the study's area, and data were collected though the application of questionnaire. The community status was of "Average Health", with a final score of 66.97 points. The main weaknesses found were in relation to aspects of basic sanitation, such as water supply, sewer systems, irregular final disposal of solid waste and lack of vector control, besides deficient level of education. In contrast, it was identified a great level of solids waste collection, acceptable public space, admissible housing conditions for majority and population apparently satisfied with their residences. Thus, it was considered that investments in the region should be prioritized to improve basic sanitation conditions, considering the direct impact of these aspects on environmental health conditions and low values encountered.

Keywords: basic sanitation, rural development, sub-indicators.

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REVISTA AIDIS

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ANÁLISE SAZONAL DA QUALIDADE DA ÁGUA DO AÇUDE AYRES DE SOUSA, CEARÁ, BRASIL

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SEASONAL ANALYSIS OF WATER QUALITY IN THE AYRES DE SOUSA RESERVOIR, CEARÁ, BRAZIL

Recibido el 20 de octubre de 2021. Aceptado el 8 de febrero de 2022

Abstract

Water is an indispensable resource for the maintenance of terrestrial life, however this resource has been inadequately treated, compromising the quality and various uses of water bodies. Given this scenario, the objective of this research is to evaluate the effect of seasonality on the water quality of the Ayres de Sousa reservoir, seeking to identify the variables that may be interfering with the natural state of this water body. The data used for analysis belong to the water quality monitoring database of the Water Resources Management Company - COGERH, and the period from 2016 to 2020 was analyzed, with data representative of the rainy (first semester) and dry periods (second half). The parameters used for the characterization of the weir water were: pH, dissolved oxygen (DO), electrical conductivity of water (EC), chlorophyll a, cyanobacteria, Escherichia coli, total nitrogen, total phosphorus, chlorides, color, magnesium, potassium, sodium, total solids and turbidity. To assess the quality of the water body, descriptive statistical analyzes were applied in the construction of box-plot graphs in seasonal periods, in order to represent the behavior of the water quality variables. Most of the values found are within the limits allowed by CONAMA Resolution 357/05 for class 2 fresh waters, the parameters total phosphorus, dissolved oxygen, Escherichia coli, chlorophyll and cyanobacteria did not meet the CONAMA resolution. The results point to possible changes due to seasonality, as well as contamination by anthropogenic interference, since the variables that did not comply with the legislation are indicative of contamination by organic matter.

Keywords: monitoring, water resource, reservoir, seasonal variation.

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REVISTA AIDIS

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PROPOSIÇÃO DE UMA METODOLOGIA DE AVALIAÇÃO HIDROSSEDIMENTOLÓGICA E DE SENSIBILIDADE DE PARÂMETROS ATRAVÉS DO MODELO SWAT

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APPLICABILITY OF THE SWAT MODEL FOR HYDROSEDIMENTOLOGICAL AND PARAMETER SENSITIVITY ASSESSMENT IN THE SUCURU RIVER BASIN

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Abstract

Many environmental problems, especially in the northeast region of Brazil, are a direct consequence of the frequent droughts and contamination of water sources in these regions, as well as the growing demand for water resources recorded in recent decades. Human activities have caused several changes in watersheds and environments, leading to changes in climate and hydrology. Changes in land use and occupation affect the behaviour of surface runoff. This work aims to develop a methodology to quantify surface runoff and soil erosion related to sediment production in a semi-arid basin, taking into account variations in land use conditions and variations in rainfall when fluviometric data are unavailable. Therefore, the SWAT (Soil and Water Assessment Tool) model is used as a tool for these assessments. This study evaluated the Sucuru River Basin downstream of the Sumé Dam using precipitation data, temperature and maps of soil type, land use and occupation and observed changes during this period, from 1994 to 2015. According to the rainfall series used for the simulation, 8 of the 22 years of analysis had annual rainfall below the historical average, with 500 mm in the Cariri region of Paraíba. On the other hand, seven years has a marked yearly total around the standard. The most sensitive parameters of the model are those related to physical properties and soil management, such as available water capacity.

Keywords: modeling, sediment production, semiarid, surface runoff, water resources.

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IDENTIFICAÇÃO DE ÁREAS FAVORÁVEIS A IMPLANTAÇÃO DE ATERROS SANITÁRIOS ENTRE MUNICÍPIOS DO SERTÃO NO ESTADO DA PARAÍBA, BRASIL

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IDENTIFICATION OF AREAS FAVORABLE FOR THE IMPLEMENTATION OF SANITARY LANDFILLS BETWEEN SERTÃO MUNICIPALITIES IN THE STATE OF PARAÍBA, BRAZIL

Recibido el 6 de noviembre de 2021. Aceptado el 25 de abril de 2022

Abstract

This work aimed to identify potential areas for the installation of landfills among the nine municipalities of the Region Geoadministrative of Pombal (RGP), located in the interior of the State of Paraíba, based on current environmental legislation. The methodology proposed for the study consists of the use of geotechnologies, mainly the Qgis software, version 3.10.12, for the preparation of thematic maps based on the minimum criteria for landfill implantation, established by the current environmental legislation and competent public agencies , which are standardized for the same unit, assigning weights according to their aptitudes, based on the Analytic Hierarchy Process (AHP) methodology, classifying them in proper, good, regular and inappropriate areas for the implementation of a landfill. Among the results obtained, it was found that the most suitable sites according to the established criteria correspond to 1.5% (4.5 thousand ha) of the total area of the RGP. On the other hand, the unsuitable localities cover about 47% (136 thousand ha) of the studied region. Finally, it is expected that the information collected from this study will serve as a technical and scientific basis for the preparation of projects and/or programs for the municipal solid waste sector in the municipalities of RGP.

Keywords: landfill implementation, geoprocessing. solid waste, Geoadministrative Region of Pombal.

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PROGRAMA DE COLETA SELETIVA SOLIDÁRIA: INSTRUMENTOS DE EDUCAÇÃO AMBIENTAL NA ANÁLISE QUALI-QUANTITATIVA DE MATERIAIS RECICLÁVEIS COLETADOS EM UMA IES DA AMAZÔNIA BRASILEIRA

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SOLIDARY SELECTIVE COLLECTION PROGRAM: ENVIRONMENTAL EDUCATION INSTRUMENTS IN THE QUALI-QUANTITATIVE ANALYSIS OF RECYCLABLE MATERIALS COLLECTED IN A HEI IN THE BRAZILIAN AMAZON

Recibido el 8 de noviembre de 2021. Aceptado el 31 de enero de 2022

Abstract

The generation of solid waste and its environmentally correct final disposal have been some of the biggest challenges currently faced in the world and has led to the creation of new public policies to improve waste management. In Brazil the Decree No. 5940/2006 stands out, which establishes the implementation of the program Solidary Selective Collection in federal public institutions. In the University City Prof. José da Silveira Netto - Universidade Federal do Pará (UFPA), the University City Prefecture is responsible for the program and forwards the recyclable materials collected from the Voluntary Delivery Places (VLP) of the institution to associations and cooperatives of collectors of recyclable materials from the Metropolitan Region of Belém. The objective of this study was to quali-quantitatively evaluate the recyclable materials contained in the UFPA's LEV in the years 2015, 2018 and 2019; to analyze the results of environmental education actions developed in this period; and to estimate the gross value with its possible commercialization. The results revealed that the portion of paper/cardboard was the most significant in terms of quantity in relation to the other recyclable materials. The estimated gross value for the commercialization of three categories of recyclable material (paper/paperboard, plastic and metal), by the associations and cooperatives in 2019, was almost R$ 30,000.00 (thirty thousand reais).

Keywords: gravimetric analysis, solidary selective collection, recyclable materials.

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REVISTA AIDIS

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CARACTERIZAÇÃO MORFOMÉTRICA DA BACIA HIDROGRÁFICA DO RIACHO CATOLÉ, PARAÍBA, BRASIL

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Milena Ketlem de Souza Ferreira [1]
Franklin César de Araújo Medeiros [1]

MORPHOMETRIC CHARACTERIZATION OF THE CATOLÉ RIVER WATERSHED, PARAÍBA, BRAZIL

Recibido el 12 de noviembre de 2021. Aceptado el 7 de abril de 2022

Abstract

The study of watershed morphometry has become an occurring and important procedure in environmental studies and water resources management, because it enables the knowledge of its local and regional dynamics, occurrence of environmental processes and identifying the risks and potentialities that will subsidize planning measures of these cells. Thus, the study aimed to perform the morphometric characterization of the Catolé Creek Watershed, located in the Sertão of Paraiba. Alos Palsar satellite images with 12.5 meters resolution were obtained, made available on the Alaska Satellite Facility (ASF - Earthdata) platform, and processed using geographic information systems (ArcGIS/ArcMap 10.5) for the confection of the indices and maps. The basin covers an area of 2189.09 km² and a perimeter of 2189.09 km, with an oval shape, suggesting a medium susceptibility to flooding. According to its fluvial hierarchy, it was classified as 5th order, with few ramifications, and presented low drainage values, indicating poor drainage and low capacity to generate new water courses. The results obtained regarding relief show an average altitude of 471 meters and average slope of 11.8%, in which the wavy relief was predominant in the area, covering 38.4% of the basin, which favors surface runoff and erosive processes. The use of Geographic Information Systems proved to be efficient in the processing of data, enabling reliable results that can later subsidize adequate planning for the watershed and management measures for the environmental resources of the area studied.

Keywords: digital elevation model, geographic information systems, hydrology.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

AVALIAÇÃO DA PRESTAÇÃO DOS SERVIÇOS DE ÁGUA E ESGOTO EM SÃO LUÍS – MA

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EVALUATION OF THE PROVISION OF WATER AND SEWAGE SERVICES IN SÃO LUÍS – MA

Recibido el 30 de noviembre de 2021. Aceptado el 9 de marzo de 2022

Abstract

Sanitation is a basic right of extreme importance, secured by Brazilian Constitution, that directly affects people's quality of life and the environment. Furthermore, the capital of Maranhão, as well as the rest of the country, presents lack of sanitation services. The main purpose of this essay is to evaluate the provision of services of water supply and sewage of São Luís - MA through the usage of sanitation indicators. To perform this study, some performance indicators were chosen at the database of the National System of Sanitation Information (SNIS) and also some reference parameters (satisfactory or unsatisfactory) with the purpose of facilitating the comprehension about the acquired and analyzed data. In the last evaluated year, the services such as water supply, sewage, total coliforms analysis and expense margin showed satisfactory results, meanwhile the sewage treatment system and water loss at distribution showed unsatisfactory results. Through this study it was possible to identify divergences between the data provided to the SNIS and the real sanitary conditions of the city and it was also brought to light the need of further investments so that the universalization of these services can be attained.

Keywords: water, sewer, performance indicators, sanitation.

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AVALIAÇÃO DAS PRÁTICAS DE GERENCIAMENTO DE RESÍDUOS DE SERVIÇOS DE SAÚDE POR MEIO DE AUDITORIA AMBIENTAL: ESTUDO DE CASO

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Aline Aparecida Thomaz Pereira [2]
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EVALUATION OF WASTE MANAGEMENT PRACTICES OF HEALTHCARE FACILITIES ADOPTING ENVIRONMENTAL AUDIT: CASE STUDY

Recibido el 1 de diciembre de 2021. Aceptado el 7 de abril de 2022

Abstract

Brazilian legislation defines that the management of healthcare waste (HCW) must occur based on a waste management plan and this must be monitored to verify the effectiveness of the proposed actions. Audits are tools widely adopted in the business environment, which allow the verification of the status of processes. The audit related to waste management can point out inefficiencies, estimate the real costs of management and indicate the auditee's level of compliance with regulations and legislation. The aim of this study was to evaluate the benefits of environmental auditing as a monitoring tool for the implementation of the PMHCW in an institution, as well as the analysis of non-conformities identified in the period studied. One audit was carried out per year from 2016 to 2018, with 33 laboratories being audited in 2016, 41 in 2017 and 47 in 2018. The biggest nonconformities identified in the period between 2016 and 2018 were related to the absence of records/procedures on cleaning dumps (29 nonconformities) and lack of identification of dumps (13 nonconformities). For items related to incorrect disposal of PPE, the presence of recyclables dumps in the laboratory, inadequate replacement of waste bags and unmarked storage places, no non-conformities were found. There is an increase in the number of non-compliances in 2017 compared to 2016. This fact may be related to the increase in the number of laboratories audited in 2017. In 2018, 6 more laboratories were audited compared to 2017 and the number of non-conformities recorded was lower, which may indicate an improvement in waste management processes. The audit tool adopted in this case study allowed for an emphasis on the recurrent problems, indicating to the manager potential focuses to be prioritized for decision-making aiming at the continuous improvement of the process.

Keywords: healthcare waste, waste management, environmental audit, monitoring, risk management.

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Investigación, desarrollo y práctica.

OPTIMIZATION OF THE OPERATION OF PUMPING SYSTEMS AND RESERVOIRS OF WATER DISTRIBUTION SYSTEMS WITH EMPHASIS IN ENERGY EFFICIENCY

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Abstract

Electricity costs for pumping account for the majority of operating expenses for water distribution systems. Therefore, researchers and technicians in the water sector have sought to develop techniques that minimize the consumption of electricity in these systems. The large number of elements, which can change state at any time, generates a range of possibilities that makes it difficult to determine which operational scheme is most efficient. Defining the best operating rules for pumping systems is often a complex activity. In this context, the present work presents an optimization model for water distribution systems that combines the efficient use of reservoirs with the best operational rule for activating pumping systems. Using a genetic algorithm, the developed model aims to minimize the operating costs of electrical energy in the systems. The results obtained indicated that, with a better use of the water storage infrastructure, it is possible to reduce the electricity costs of the system as a whole.

Keywords: water supply, operational rules, genetic algorithm, optimization.

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REVISTA AIDIS

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MINIMIZAÇÃO DOS IMPACTOS AMBIENTAIS CAUSADOS POR PEÇAS DO VESTUÁRIO DESCARTADAS PÓS FABRICAÇÃO: UMA PROPOSTA DE MODELO DE NEGÓCIO PARA O POLO CONFECCIONISTA

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MINIMIZATION OF ENVIRONMENTAL IMPACTS CAUSED BY CLOTHING PIECES DISPOSED AFTER MANUFACTURING: A BUSINESS MODEL PROPOSAL FOR THE CLOTHING POLO

Recibido el 3 de diciembre de 2021. Aceptado el 22 de marzo de 2022

Abstract

The accelerated production of garments has become a constant problem in the current world, mainly due to the generation of solid residues from both the production process, as well as the inadequate disposal of these post-production pieces. In the municipality of Divinópolis, recognized by State Law 22.895 / 18, as the main manufacturing center in the state of Minas Gerais, this situation is no different. In this sense, one of the objectives of this study was to analyze the quantity of pieces produced and not sold by the clothing manufacturers in this municipality. To fulfill the proposed objective, a questionnaire was used for data collection. The results indicated an estimate of 100 million pieces of clothing in balances per year. In this way, it is proposed to minimize the environmental impacts caused by the early disposal of such parts through a business model: the implementation of a multi-brand outlet store to exclusively sell products on sales of companies in the manufacturing sector. In order to provide a secondary life for fashion articles, in addition to conserving the natural resources contained in the products and providing an appropriate destination in accordance with Law No. 12,305 / 10 (PNRS), this study is expected to contribute to the economic development of clothing manufacturing industries and minimizing environmental impacts caused by excess clothing items sent directly to landfills.

Keywords: environmental impacts, business model, confectionist polo, sale of garments.

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REVISTA AIDIS

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PÓS-TRATAMENTO DE EFLUENTES DA INDÚSTRIA DE PANIFICAÇÃO E CONFEITARIA POR WETLANDS CONSTRUÍDAS CONSIDERANDO DIFERENTES TEMPOS DE DETENÇÃO HIDRÁULICA

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POST TREATMENT OF EFFLUENTS FROM THE BAKERY AND CONFECTIONERY INDUSTRY BY CONSTRUCTED WETLANDS CONSIDERING DIFFERENT HYDRAULIC DETENTION TIMES

Recibido el 8 de diciembre de 2021. Aceptado el 9 de mayo de 2022

Abstract

Phytoremediation with macrophytes is an alternative for recovering environments contaminated with effluents. Thus, Constructed Wetlands Systems (SAC's) were developed, which are designed to reproduce natural wetlands systems. The objective of this work was to evaluate the performance of Wetlands built on a pilot scale, as post-treatment of effluents from the Bakery and Confectionery Industry, operated at different times of hydraulic retention, collecting effluents after treatments in anaerobic reactors followed by an aeration lagoon. The activities were separated into two phases: (1) Characterization of the raw effluent, construction of the SAC's pilot units, period for bed stabilization and application of aquatic macrophyte seedlings (*Juncus effusus* and *Syngonium podophyllum*). 2. Application of liquid effluents in pilot beds, collection of the final effluent to evaluate the removal efficiency of specific parameters according to pre-stipulated hydraulic detention periods of 5, 10, 15, 20, 25, 40 and 45 hours. To evaluate the removal efficiency, the following parameters were considered: chemical oxygen demand (COD) and ammoniacal nitrogen (NH_4^+). The results showed that the longer hydraulic detention time (> 40 h) were significant and positively influenced the reduction of COD values. Among the species of macrophytes tested, it was observed significance and better efficiency of *J. effusus* in reducing ammonia nitrogen values, while the species *S. podophyllum* obtained better results for the variable COD. Therefore, it is possible to conclude that the wetlands system was efficient in reducing NH_4^+ from the aerated lagoon effluents and COD from the effluents from the anaerobic reactor.

Keywords: effluent from the bakery and confectionery industry, phytoremediation, macrophytes, wetlands built systems, hydraulic detention time.

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REVISTA AIDIS

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DICOTOMIA ENTRE O SABER E O FAZER: A REALIDADE DO MANEJO DE RESÍDUOS DE SERVIÇOS DE SAÚDE GERADOS EM LABORATÓRIOS DE ENSINO E DE PESQUISA DA UFSCAR

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* Ana Paula de Vechi Corrêa [1]
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DICHOTOMY BETWEEN KNOWLEDGE AND DOING: THE REALITY OF THE MANAGEMENT OF MEDICAL WASTE GENERATED IN UFSCAR TEACHING AND RESEARCH LABORATORIES

Recibido el 13 de diciembre de 2021. Aceptado el 6 de junio de 2022

Abstract

This study aimed to make a diagnosis on the management of Medical Waste (MW) generated in teaching and research laboratories of the Federal University of São Carlos (UFSCar), Campus São Carlos. It is a descriptive and exploratory research, developed with 168 university professors and technicians responsible for teaching and research laboratories of the Center for Biological Sciences and Health and the Center for Exact Sciences and Technology inserted at UFSCar. The data collection was done through a self-respond questionnaire, adapted from Veiga (2011). The data were analyzed by means of descriptive statistics. The collection began after the approval of the Research Ethics Committee. The results showed that UFSCar laboratories generate MW, especially chemical, biological and perforating residues. Regarding the management of MW, the segregation and conditioning stages were performed adequately; on the other hand, the lack of knowledge of the professionals regarding the storage stages, external collection and final disposal was identified. Also, it is noteworthy that 82.1% of laboratories did not have Medical Waste Management Plan. It is concluded that the management of MW in the teaching and research laboratories of UFSCar is being performed adequately; however, the participants presented gaps in knowledge about the management of MW.

Keywords: urban solid waste, medical waste, waste management, laboratories, higher education.

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POTENCIAL DE REDUÇÃO DE MICRORGANISMOS TERMOTOLERANTES DE EFLUENTES DA PECUÁRIA BOVINA LEITEIRA POR MEIO DA BIODIGESTÃO ANAERÓBIA COM E SEM INOCULAÇÃO

Júlio Maiorquino Manzoli [1]
Amanda Gutierrez de Souza [2]
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POTENTIAL OF REDUCING THERMOTOLERANT MICROORGANISMS FROM LIVESTOCK WASTEWATER THROUGH ANAEROBIC DIGESTION WITH AND WITHOUT INOCULUM

Recibido el 4 de enero de 2022. Aceptado el 2 de mayo de 2022

Abstract

Brazil has agribusiness as one of its major economics components, representing about 21.4% of the Gross Domestic Product (GDP) in the year 2019, according to Brazilian Ministry of Agriculture, Livestock Industry and Supply report. Further, the dairy cattle herd has an important role such as economically, with a gross income amount of production around R$33 billion annually, as well as socio-environmentally, because of its great volume of livestock waste that is a source of contamination and proliferation of pathogenic microorganisms, which can be led to significant public health issues and environmental pollution. Thus, anaerobic digestion appears as an available solution for these major problems, likewise as a profitable opportunity with its byproducts - biogas and biofertilizer. There are a lot of concerns about the reintroduction of the biofertilizer in the field and one of them relates to the minimum quantity allowed of thermotolerant microbes, related to fecal contamination. In such manner, the objective of this work was to identify the potential of reduction of thermotolerant microorganisms during the process of anaerobic digestion of dairy cattle manure, in two separate treatments, with and without inoculum, utilizing information from the database gathered by the DNA extraction of these microorganisms. The result obtained with the inoculum treatment was a 100% reduction of the thermotolerant organisms, in a different manner the non-inoculum group encountered an 80% reduction. With the present study, the hypothesis from the inoculum's determinant role of thermotolerant-reduction from animal manure during anaerobic digestion was corroborated.

Keywords: biofertilizer, metagenomic, sustainability.

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WATER SCARCITY AND RAW WATER CHARGES IN THE STATE OF CEARÁ, BRAZIL

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Abstract

Economic instruments, such as water charges, have been used to promote water conservation and raise funds for basin management. However, there is a need to improve the water collection model in Brazil. The aims of this study were to analyze the evolution of raw water charges in the State of Ceará and verify the effect of drought on the costs and water collection from 2011 to 2019 to answer two questions: does the water collection fulfill its function of financing the water resources system? Is the pricing model flexible to absorb the effects of climate variability? We conducted a content analysis to determine the presence of certain words in selected documents, and then analyzed the costs of system operation. The results show that the payment capacity is lower than the tariff applied to water. The Status Index is negatively correlated with the Administration (ADM) and Operation and Maintenance (O&M) costs. The generated revenue is mainly used to cover the management costs (ADM and O&M); however, it is insufficient to finance the implementation of measures, programs, and projects to improve the water management in respective basins. Thus, a floating tariff should be established in which the water scarcity and effects of climate variability are incorporated.

Keywords: economic instrument, management water cost, water resources management, water collection.

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GEOESPACIALIZAÇÃO DA COVID-19 NO MUNICÍPIO DE CAMPINA GRANDE-PB COM BASE NA MOBILIDADE POPULACIONAL DAS REGIÕES DE INFLUÊNCIA DAS CIDADES (REGIC)

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Laércio Leal dos Santos [1]
Francisco Miqueias Sousa Nunes [1]
Janaína Aparecida Cezario [1]
Ana Sabrina Barbosa Machado [1]
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COVID-19'S GEOSPACIALIZATION IN THE CAMPINA GRANDE-PB BASED ON THE POPULATION MOBILITY OF THE CITIES INFLUENCE REGIONS (REGIC)

Recibido el 11 de enero de 2022. Aceptado el 18 de abril de 2022

Abstract

The coronavirus showed a tendency to spread in large cities, caused by the intense movement of people, generating an intense concern for humanity. In large urban centers, the virus finds it easy to disperse due to population mobility, largely due to issues of health, trade, among others. To meet the needs of COVID-19 evolution data in the city of Campina Grande-PB, the concept of Regions of Influence of Cities (REGICs) developed by the Brazilian Institute of Geography and Statistics (IBGE), which analyzes population displacement was used between cities that develop a link between specific uses. Thus, the objective of the study was to geospatialize COVID-19 in the city of Campina Grande based on the population mobility of the REGICs. Through the GIS environment, the data made available by the state health departments were spatialized through the organization in Excel spreadsheets, enabling the elaboration of graphs with the help of the R-studio software. The results obtained showed that the evolution of COVID-19 in the State of Paraíba, more precisely in the city of Campina Grande-PB, had as its main dissemination route the BR-230, which connects the state of Paraíba - PB from the coast to the hinterland. analyzed, confirmed cases intensified in the sertão and rural areas with the cities of Patos and Campina Grande, respectively, both in the state of Paraíba, reaching neighboring municipalities, which depend mainly on medical-hospital services, commerce, education, among others.

Keywords: public health, coronavirus, state of paraiba, vulnerability.

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REVISTA AIDIS

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CARACTERIZAÇÃO DOS EFLUENTES LÍQUIDOS EM UM HOSPITAL PÚBLICO: ESTUDO DE CASO EM BELO HORIZONTE, BRASIL

Elci de Souza Santos [1]
Jéssica Blenda Martins Teles [2]
Luely Miguel Pereira [3]
Luiz Carlos Moutinho Pataca [4]
Olívia Maria de Sousa Ribeiro Vasconcelos [4]
* Marcos Paulo Gomes Mol [4]

LIQUID EFFLUENTS CLASSIFICATION IN A PUBLIC HOSPITAL: A CASE IN BELO HORIZONTE, BRAZIL

Recibido el 19 de enero de 2022. Aceptado el 20 de septiembre de 2022

Abstract

Liquid effluents generated by hospital activities can cause negative environmental impacts if poorly managed. The continuous operation and service to a large and heterogeneous public often contribute to a significant consumption of water resources and the consequent generation of liquid effluents. In this research, the characterization of the liquid effluents generated and the diagnosis of possible reasons for the occurrence of non-conforming parameters were carried out. The study was carried out from July to October 2019, in a public hospital in Minas Gerais. Data collection took place from the consolidated institutional record of effluent analyzes in the period 2016 to 2019. The results show that the main parameters that differ from those established by Technical Standard 187/5 is the Chemical Oxygen Demand. Among the 22 parameters analyzed, the medians of point AM01 were higher for 16 parameters. At the AM02 point, only the parameters total boron, total phenols, total fluorides, total suspended solids, surfactants and sulfates presented medians higher than the AM01 point. A positive and high correlation can also be observed between the BOD and COD parameters for both points. Variation in the effluent toxicity characteristics of the studied hospital was observed, especially due to the monitored parameters that are associated with the discarded materials.

Keywords: hospital effluent, liquid effluent, wastewater, environmental impact.

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APLICAÇÃO DE REDES NEURAIS ARTIFICIAIS NA PREVISÃO DA RESISTÊNCIA À COMPRESSÃO DE CONCRETOS PRODUZIDOS COM AGREGADOS RECICLADOS

André Aparecido de Moraes [1]
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APPLICATION OF ARTIFICIAL NEURAL NETWORKS IN THE PREDICTION OF COMPRESSION STRENGTH OF CONCRETE PRODUCED WITH RECYCLED AGGREGATES

Recibido el 19 de enero de 2022. Aceptado el 8 de agosto de 2022

Abstract

Due to the growth of civil construction, an increase in the levels of generation of construction waste was observed, which caused significant environmental impacts. Thus, the use of recycled aggregates that present valid technical aspects have been highlighted for being considered a sustainable means for the conservation of natural resources. However, since it involves aggregates with characteristics different from the natural, it is necessary to adapt the models to predict the concrete strength. In this sense, the use of Artificial Neural Networks (ANNs), which are mathematical models capable of recognizing patterns through numerical training, is a valuable alternative. Nevertheless, due to the variability of materials, the challenge of obtaining satisfactory results with a reduced database is imposed. Therefore, to achieve this aim, it was necessary to survey a plural database with recycled concrete from different papers to drive the neural network to the desired degree of generalization. Finally, an ANN architecture capable of predicting the final strength of concrete with acceptable accuracy was proposed. The results obtained were promising, so that the proposed architecture, trained with the selected database, presented results with an average deviation of approximately 3 MPa for the set of validation samples.

Keywords: solid waste, recycling, recycled concrete, compressive strength, artificial neural networks.

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ANAEROBIC CO-DIGESTION OF SUGARCANE VINASSE AND ELEPHANT GRASS JUICE FOR BIOMETHAN PRODUCTION

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Abstract

In the present study, biogas production was investigated by co-digesting elephant grass juice (EGJ) and sugarcane vinasse using batch reactor. Some factors that influence biomethane production were observed, including initial pH, inoculum concentration and proportions of each substrate. Two tests were carried out. In Experiment I, the following proportions (%v/v sugarcane vinasse/elephant grass juice) were tested: A - 25/75, B - 50/50, C - 75/25, D - 100/0, E - 0/100. In Experiment II, the effect of adding alkalizer to the condition that showed the highest methane production (in Experiment I) was also evaluated. In the Experiment I, the highest accumulated production was observed for the proportion 1:1 corresponding to 50% of EGJ and 50% of vinasse (370.94 $mLCH_4/g_{VS}$). Experiment II showed the higher values of accumulated methane production of 1,364.1 $mLCH_4/g_{VS}$. Regarding addition of alkalizing, a maximum production of 836.18 $mLCH_4/g_{VS}$ was obtained in the experimental condition with 50% EGJ and 50% vinasse, but with the lowest addition of alkalizer tested (0.05 g HCO_3/gCOD). In general, the use of elephant grass caused the acidification of the reactors and was unfavorable for biogas production.

Keywords: anaerobic co-digestion, methane, batch, methanogenic potential.

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ABORDAGEM SISTEMÁTICA PARA IDENTIFICAÇÃO DE LACUNAS NO TRATAMENTO DE LIXIVIADOS DE ATERROS SANITÁRIOS PELOS PROCESSOS FENTON E FOTO-FENTON HETEROGÊNEOS

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SYSTEMATIC APPROACH FOR GAPS IDENTIFICATION IN TREATMENT OF LANDFILL LEACHATE BY HETEROGENEOUS FENTON AND PHOTO-FENTON PROCESSES

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Abstract

The study aimed to determine the state of the art regarding the application of heterogeneous Fenton and photo-Fenton processes in the treatment of landfill leachate. For this, the ProKnow-C (Knowledge Development Process - Constructivist) method was used to guide the selection of a bibliographic portfolio (BP) about the topic and to perform the bibliometric and systematic analyzes of the BP, considering the publications in the period of 2015 to 2020. After the systematic filtering stages of articles, the final BP was constituded by 8 articles. Through bibliometric analyzes, it was found that the country and the year with the largest number of publications were India and 2018. The systematic analysis of the articles was developed based on three lenses and the gaps identified were related to: i) the lack of studies that contemplated simultaneous variations of the interfering variables (pH, hydrogen peroxide and catalyst dosages) in the process; ii) the need to investigate further the changes in the Dissolved Organic Matter (DOM) of the leachate after the application of the processes, as well as the removal of emerging contaminants; and iii) the need for studies related to the separation capacity between the catalysts and the treated leachate, in the reactive reusability cycles, at different scales of investigation.

Keywords: catalysts, COD, heterogeneous photocatalysis, iron, ProKnow-C.

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Investigación, desarrollo y práctica.

AVALIAÇÃO DO GERENCIAMENTO DOS RESÍDUOS DE SERVIÇOS DE SAÚDE EM UM HOSPITAL PÚBLICO: ESTUDO DE CASO EM BELO HORIZONTE (MG), BRASIL

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EVALUATION OF HEALTHCARE WASTE MANAGEMENT IN A PUBLIC HOSPITAL: A CASE IN BELO HORIZONTE (MG), BRAZIL

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Abstract

This study aimed to analyze the quantity and types of Healthcare Waste (HCW) generated in a hospital at the time of the HCW management plan implementation (2013) - comparing with the generation data of the current days (2020). Thus, we discussed potentialities and challenges inherent to the plan structuring in the hospital services, identifying seasonal changes or even those related to the Covid-19 pandemic. This is a descriptive and exploratory study of a quantitative nature. Data were obtained from the institution's HCW management plan, including daily generation of HCW. The data suggested a positive influence of the HCW implementation plan in the reduction of generated waste, although an increase in the quantity of infectious and chemical waste was observed, and a reduction in non-hazardous waste was identified, suggesting improvements in the segregation of potentially contaminated waste and that refer to the greatest risk to collective health and the environment.

Keywords: healthcare waste, waste management, healthcare waste management plan, hospital waste.

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BIOCHAR FROM ANDROPOGON GRASS (*Andropogon gayanus cv. Planaltina*) APPLICATIONS IN DYE REMOVAL BY ADSORPTION AND SLOW FILTRATION

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Argemiro Lima Pedrosa [2]
Iago Aguiar Dias Carmo [3]
Marcelo Mendes Pedroza [2]
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Abstract

Dyes represent a class of contaminants with a high impact on aquatic ecosystems due to their toxicity. As these pollutants are difficult to degrade, studies on the treatment methods for these compounds are highly important to minimize damage to water bodies that receive these effluents. In this work, the adsorption and slow filtration processes using charcoal produced from the pyrolysis of Andropogon grass (*Andropogon gayanus cv. Planaltina)* were individually evaluated for removal of the methylene blue dye. The adsorption studies included the evaluation of kinetic behavior, evaluating pseudo-first-order and pseudo-second-order models and adsorption isotherms using the Langmuir, Freundlich, and Dubinin-Radushkevich models. According to the results, it was found that the adsorptive process had greater efficiency between pH 8 and 10. The pseudo-second-order model better described the adsorption kinetic behavior (R^2 = 0.9722) and as for the adsorption isotherms, Freundlich's model best described the process. The maximum charcoal adsorption capacity of Andropogon grass for the removal of methylene blue was 17.63 mgg^{-1}. In the filtration process, dye removal reached an efficiency above 99% at filtration rates of 1.5 and 2.1 $m^3m^{-2}day^{-1}$.

Keywords: biomaterial, bioadsorbent, dye, filtration, adsorption.

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