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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



Es todo un gusto presentar el primer número de 2022 de la *Revista AIDIS de Ingeniería y Ciencias Ambientales: Investigación, desarrollo y práctica*. En este número, el trabajo titulado **METHANE PRODUCTION IN THE CO-DIGESTION OF LANDFILL LEACHATE WITH DOMESTIC SEWAGE AND THE METHANOGENIC ACTIVITY OF FULL-SCALE UASB REACTORS** ha sido reconocido como la Selección del Editor. Enhorabuena a los autores **Jéssica Aline Menezes Lima, Edinéia Lazarotto Formagini, Pedro Branco de Oliveira y Fernando J. Correa Magalhães Filho** de la Universidade Católica Dom Bosco, Brasil y de la Universidad Politécnica de Valencia, España.

Por otra parte, damos la bienvenida al Dr. Iván Moreno Andrade como nuevo integrante del Consejo Editorial. Agradecemos su compromiso y trabajo en la revista durante muchos años como revisor habitual, y ahora como parte del equipo editorial.

[Guillermo Quijano](#)

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El Dr. Moreno Andrade es biólogo por la Universidad Veracruzana (2000), obtuvo el doctorado en Ciencias Biológicas en la UNAM (2006) especializándose en el tratamiento biológico de aguas residuales. De 2007 a 2008 realizó una estancia postdoctoral en la Universidad de California-Berkeley, USA. Es Investigador Titular en la Unidad Académica Juriquilla-Querétaro del Instituto de Ingeniería de la UNAM. Entre las distinciones que ha recibido destacan el ser nombrado IWA Fellow por la International Water Association (IWA), el Premio “Weizmann- Kahn” de la Academia Mexicana de Ciencias, ha sido miembro del Committe Board del Programa Young Water Professionals y del grupo especialista en Digestión Anaerobia de la IWA, entre otros. Sus investigaciones se centran en el tratamiento y valorización de residuos (sólidos y líquidos) con un enfoque multidisciplinario. Actualmente trabaja en la producción de biocombustibles gaseosos (hidrógeno y metano) a partir de residuos sólidos orgánicos y el tratamiento biológico de aguas residuales.

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MERCÚRIO TOTAL EM DUAS ESPÉCIES DE PEIXE DO RESERVATÓRIO E ADJACÊNCIAS DE UMA USINA HIDROELÉTRICA NA AMAZÔNIA, PARÁ, BRASIL

TOTAL MERCURY IN TWO SPECIES OF FISH IN THE RESERVOIR AND SURROUNDINGS OF A HYDROELECTRIC PLANT IN THE AMAZON, PARÁ, BRAZIL

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José Reinaldo Pacheco Peleja¹
Ynglea Georgina de Freitas Goch¹

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Abstract

Total Mercury (HgT) concentrations were analyzed in *Serrasalmus rhombeus* (Linnaeus, 1766) and *Hemiodus unimaculatus* (Bloch, 1794), occurring in periods of high and low water and in different environments of the Curuá-Una HPP (Hydroelectric Power Plant). The collections were carried out in March and November 2017, in three environments (reservoir, river system upstream of the reservoir and river system downstream of the reservoir). Posteriorly, tissue samples from the dorsal part were solubilized with HNO₃ and HCl to determine the HgT concentration by Cold Vapor Atomic Fluorescence Spectrometry. The average concentrations of HgT for the species *S. rhombeus* ($318.33 \pm 236.82 \text{ ng.g}^{-1}$), were significantly higher ($p=0.000$) when compared with the concentrations for *H. unimaculatus* ($113.76 \pm 79.97 \text{ ng.g}^{-1}$). Significant differences ($p=0.000$) were detected between HgT concentrations for *H. unimaculatus* between periods of high ($143.51 \pm 79.18 \text{ ng.g}^{-1}$) and low water ($69.06 \pm 45.26 \text{ ng.g}^{-1}$), for *S. rhombeus*, average concentrations of HgT were also observed significantly higher ($p=0.014$) in the high water period ($395.69 \pm 226.95 \text{ ng.g}^{-1}$). The average concentrations of HgT for the species *H. unimaculatus* were significantly different ($p=0.002$) throughout the collection environments, with the highest concentrations for the samples collected in the reservoir ($150.24 \pm 96.26 \text{ ng.g}^{-1}$). For the specimens of *S. rhombeus*, the highest concentrations were recorded upstream of the reservoir ($377.98 \pm 245.51 \text{ ng.g}^{-1}$), differing significantly ($p=0.010$) from the concentrations found for samples collected in the downstream river system ($168.53 \pm 60.77 \text{ ng.g}^{-1}$). In addition to highlighting the biomagnification process, this work suggests that the concentrations of HgT found are being influenced by the supply of allochthonous HgT, made available from the soil to the aquatic environment through anthropic actions, such as deforestation.

Keywords: biomagnification, eating habit, heavy metal.

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**GESTÃO MUNICIPAL DE RESÍDUOS SÓLIDOS DE
JIJOCA DE JERICOACOARA, BRASIL/CE**

Bianca Freire ¹
* Andreza Santos ¹
Ana Bárbara Nunes ¹

**MANAGEMENT OF MUNICIPAL SOLID WASTE IN JIJOCA DE
JERICOACOARA, BRAZIL/CE**

Recibido el 4 de agosto de 2020. Aceptado el 28 de abril de 2021

Abstract

This work presents an evaluation of the solid waste management in Jijoca de Jericoacoara, Brazil, of significant environmental and tourist relevance. It was elaborated from the evaluation stages of the Integrated Solid Waste Management Plan, data collection with the municipality of Jijoca of Jericoacoara, on-site visit and subsequent analysis of the information obtained. Overall, the Plan, launched in 2015 and planned for 20 years, meets the minimum requirements required by law; in addition, 57% of its proposed actions have already been completed. Currently, the major problem of the municipality in relation to solid waste management is the large generation (mainly due to the intense tourist flow) and the inadequate waste disposal, which occurs in an open dump. However, the municipality has obtained interesting results with the selective collection program and the support to the wasterpickers Cooperative. From March 2016 to December 2018, 380 tons of recyclable materials were sold by the Cooperative, avoiding their disposal in the dump. Glass residue with undefined degradation time, comprised to more than 50% of the mass sold. The success presented so far by the Cooperative can be explained by the Cooperative's articulation with the Prefecture and with local entrepreneurs, a strategy that can serve as a model for other organizations of this type. The diagnosis provided the knowledge of the local reality, however, there is a need to develop more effective actions that better guide the city's decisions regarding the management of its waste.

Keywords: Jijoca de Jericoacoara, recycling, solid waste

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INFLUÊNCIA DA FONTE PRIMÁRIA DE CARBONO E DE MACRONUTRIENTES NA REMOÇÃO DE ÍNDIGO CARMIM POR *Aspergillus Niger* EM REATOR DE ESCOAMENTO CONTÍNUO

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INFLUENCE OF THE PRIMARY SOURCE OF CARBON AND MACRONUTRIENTS ON THE REMOVAL OF INDIGO CARMINE BY *Aspergillus Niger* IN A CONTINUOUS FLOW REACTOR

Recibido el 4 de agosto de 2020. Aceptado el 4 de mayo de 2021

Abstract

The primary carbon source influence and macronutrients on the efficiency of a continuous flow fungal reactor in the removal of indigo carmine dye (100 mg/L) was evaluated. Aspergillus niger was the species inoculated in the reactor that was operated under hydraulic detention time of 12 h, in three phases: phase I - addition of 1 g / L of glucose and macronutrients; phase II - addition of 0.5 g/L of glucose and macronutrients and phase III - addition of 0.5 g/L of glucose and absence of macronutrients. The average removals of dye and organic matter in phases I, II and III were 93%, 98%, 36% and 65% and 74% and 35%, respectively, and those for ammonia nitrogen were 30%, 12.5 % and 96%, respectively, in phases I, II and II. Nitrate was removed less efficiently than ammoniacal nitrogen in phases I and II, except in phase III, when both were removed with an average efficiency of 96%. The largest mass of affluent dye was removed biologically. The results also indicated that there was a better removal of dye when glucose and macronutrients were added to the medium, with performance being impaired when the nutritional solution had its addition suppressed (phase III). This showed that the efficiency of the system regarding the removal of the dye was influenced by the extra addition of nutrients, as well as by the concentration of the co-substrate (glucose), demonstrating the potential of the technology for use in the treatment of textile effluents.

Keywords: continuous reactor, co-substrate, mycorremediation, textile dye.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

FILTRAÇÃO INVERSA EM MARGEM APLICADA PARA O TRATAMENTO DE ÁGUA DE AMBIENTES AQUÁTICOS LÊNTICOS: AVALIAÇÃO DA DISTÂNCIA DE FILTRAÇÃO NO DESEMPENHO DE TRATAMENTO

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REVERSE FILTRATION IN THE MARGIN APPLIED FOR WATER TREATMENT OF LACTIC AQUATIC ENVIRONMENTS: EVALUATION OF THE DISTANCE OF FILTRATION IN THE TREATMENT PERFORMANCE

Recibido el 18 de agosto de 2020. Aceptado el 28 de enero de 2021

Abstract

The aims of this study was to evaluate the filtration distance in an inverse riverbank filtration (IRB) system, used for the lentic environment water treatment. The system was applied in a full scale lake (volume of 2,156 m³) in southern Brazil. The treatment unit consists of four related stages, to the capture of water from the lake, followed by an infiltration ditch, from where the water seeps towards the lake, treating it by filtering the soil sediments and by the microbial action and a set of piezometers were installed to monitor flow and sample collection. During a period of 9 months, the classic parameters of water quality were monitored. The mean removal efficiency and average concentration was of 46.52% (134.09 – 71.71 mg L⁻¹), 60.71% (57.94 – 46.83 mg L⁻¹), 37.23% (6.3 – 3.98 mg L⁻¹), 50.75% (4.65 – 2.29 mg L⁻¹), 47.40% (2.70 -1.42 mg L⁻¹), 90.81% (1.85 – 0.17 mg L⁻¹) e 20 % (0.05 – 0.04 mg L⁻¹) for TSS, COD, TN, NH₄⁺-N, TP, IR and Mn, respectively. Moreover, the results showed that the treatment performance increased significantly as the filtration distance increased and Denitrification was the main mechanism associated with the removal of de N-NH₄⁺.

Keywords: bank filtration, filtration distance, pollutant, removal, denitrification, nitrogen series.

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REVISTA AIDIS

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APLICAÇÃO DO CURVE NUMBER COMO FORMA DE AVALIAR OS IMPACTOS NAS MUDANÇAS NO USO E OCUPAÇÃO DO SOLO E NA RESPOSTA HIDROLÓGICA DE UMA PEQUENA BACIA SEMIÁRIDA

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APPLICATION OF THE CURVE NUMBER IN ORDER TO ASSESS THE IMPACT OF CHANGES IN THE LAND USE AND IN THE HYDROLOGICAL RESPONSE OF A SMALL SEMIARID CATCHMENT IN JUAZEIRO DO NORTE-CE

Recibido el 29 de agosto de 2020. Aceptado el 14 de abril de 2021

Abstract

Information on human land use occupation are important tools for the establishment of urban expansion policies as well as for the management of water resources, since the lack of control in the management of vegetation and soil can cause changes in infiltration characteristics and changes in the hydrological response of watersheds. Thus, this study evaluated the efficiency and feasibility of using the Soil Conservation Service (SCS) parameter CN, curve number, to determine the temporal evolution of the change in the land use, in the infiltration capacity and in the concentration time of the Batateiras river basin of the region of Juazeiro do Norte (CE), from 1985 to 2018, through data on land use and occupation available through the MapBiomias platform. The results showed that there was a strong change in land use and occupation in the region, presenting a 25% loss in the forest area and an increase of 323% in the urban area from 1985 to 2018. The soil's infiltration capacity, consequently, suffered a reduction in areas with high infiltration potential, from 70% in 1985 to 50% in 2018. The municipality's average curve number increased from 79.4 to 82.1 in the 33 years of the evaluated period and the concentration time of the Batateiras river basin, located in the interior of the county, reduced from 13.1 hours to 11.9 hours, accumulating a reduction of 1.2 hours as a consequence of the county's land use changes.

Keywords: MapBiomias. land use. curve number. concentration time.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

LINER PARA IMPERMEABILIZAÇÃO DE ATERROS SANITÁRIOS UTILIZANDO RESÍDUOS DE CONSTRUÇÃO E DEMOLIÇÃO

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UTILIZATION OF CONSTRUCTION AND DEMOLITION WASTE AS
ALTERNATIVE LANDFILL LINER

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Abstract

Studies addressing waterproofing systems in landfills, are seeking the replacement of mineral liner (clay) by alternative layers that ensure its tightness, but reduce construction costs and environmental impacts. This research evaluated, using the concept of particle packing, the application of a combination of local soil (SL) from a municipal solid waste disposal area, and construction and demolition waste containing red ceramic (RCD-CV) and / or concrete (RCD-C). From the materials characterization, a particle packing study was performed and the geotechnical parameters of the liners were determined. Their compaction was tested in three different energies: normal, intermediate and modified. Finally, tests were performed to determine the hydraulic conductivity index. Three (3) mixtures with potential application as landfill sealing system can be determined: SL 60% + 40% RCD-C; SL 60% + 40% RCD-CV; SL 60% + 20% RCD-CV + 20% RCD-C. However, after the hydraulic conductivity tests, the $k_{20} = 10^{-7}$ cm/s, required by environmental legislation and indicated by research as a reference for this type of application, the parameter was reached for all alternative liners tested by applying only one compatibility with modified energy. Due to the operational difficulties of implementing this type of procedure in the field and, from the result of $k_{20} = 10^{-7}$ cm/s for normal energy compaction for all evaluated liners, the research concludes that the best application is related to final coverage of landfills.

Keywords: landfill, bottom waterproofing, RCD, alternative landfill liner.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

CONSTITUENTS OF THE CONSTRUCTED WETLANDS WITH VERTICAL SUBSURFACE FLOW FOR WASTEWATER TREATMENT: A REVIEW

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Recibido el 14 de septiembre de 2020. Aceptado el 11 de noviembre de 2021

Abstract

*In this work, it is presented a summary of research articles on the main constituents of the constructed wetlands with vertical subsurface flow as well as the state of the art of this technology. Data collection was carried out at the databases Science Direct® and Springer® and the words vertical, up flow, constructed wetland, treatment, macrophyte and substrate were used. In the first stage, they were found 164 articles and, among these, only 42 had reported aspects about the objective of this study. The results indicated that nearby 66% of wetlands constructed with vertical flow are on a pilot scale. In addition, 100% of the systems used emergent macrophytes, with the emerging species *Phragmites australis* (Cav.) Steud. (PH) in 21% of the wetlands. Conventional materials such as sand and gravel are still used as substrate in most systems (59%). It was also observed that 59% of the wetlands were used for domestic and/or municipal wastewater treatment and that the Asian continent had the largest number of publications of this type of system, with 50% of articles with Asian origin. The constructed wetlands with vertical subsurface flow stood out in nitrogen removal because of the depletion of oxygen in the medium existing in the base of the unit, creating anaerobic / anoxic conditions. In this way, the right choice of the constituents of this system presents an important alternative for the treatment of wastewater.*

Keywords: ecotechnology, macrophytes, microorganisms, substrates, phytoremediation.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

ANÁLISE DO COMPORTAMENTO DE INDICADORES QUE INFLUENCIAM A TOXICIDADE DE LIXIVIADO DE ATERRO SANITÁRIO NO SEMIÁRIDO BRASILEIRO

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BEHAVIORAL ANALYSIS OF INDICATORS THAT INFLUENCE THE TOXICITY OF LEACHATE IN THE BRAZILIAN SEMI-ARID LANDFILL

Recibido el 24 de septiembre de 2020. Aceptado el 12 de abril de 2021

Abstract

Due to the complexity of the biodegradation process of urban solid waste in landfills, leachate liquids are generated, which present in their composition significant concentrations of toxic compounds and when disposed without prior treatment in the environment, they offer risks to public health and the environment. In this sense, the objective of this work was to analyze the behavior of chemical indicators capable of influencing the toxic potential of the leachate generated at the Sanitary Landfill in Campina Grande, Paraíba, Brazil. For that, tests of pH, volatile fatty acids (AGV), total ammoniacal nitrogen (NAT) and metals (Fe, Mn, Zn and Cr) were carried out every two weeks over 150 days of monitoring. The results indicated that, during the acidic degradation phase (up to $t = 60$ days) of the waste deposited in the investigated landfill, the toxicity of the leachate was mainly influenced by the acidic pH values (5.48 to 6.27), the high concentrations of AGV (5928 to 6450 mgHAC.L^{-1}) and high Fe (77 to 172 mg.L^{-1}), Mn (27.7 to 37.2 mg.L^{-1}) and Cr (1.24 to 1.89 mg.L^{-1}). Therefore, it is concluded that the concentrations of NAT (up to $t = 150$ days), Fe, Mn and Cr (up to $t = 60$ days) in the leachate, exceeded the maximum allowed values established in Resolution n. 430 of the National Environment Council, representing a risk to public health and the environment.

Keywords: biodegradation of solid urban waste, metals, total ammoniacal nitrogen, toxic potential, volatile fatty acids.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

INCORPORATION OF TANNERY WASTE AND SUGARCANE BAGASSE ASH IN SOIL-CEMENT BRICKS

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Abstract

Seeking to use wastes disposed in the environment by incorporating them into low environmental impact materials, the study aimed to analyze the effect of using sugarcane bagasse ash and leather dust generated in tanneries in soil-cement brick mixtures. The experiment involved the characterization of used soil mixtures in various ratios, brick molding, and the analysis of performance parameters after an assessment of the material microstructure and heavy metal leaching (chromium). The comprehensive strength against compression decreased with an increasing ratio of waste in the mixtures, where mixtures containing 5.56% ash ratio reached a maximum of 2.52 MPa, and those with leather dust reached 3.69 MPa for the same ratio. Microscopically generated images with a scanning electron microscope indicated differences in the internal structure of the bricks, where ash joined the soil-cement structure whereas the leather dust remained inert and separated from the soil cement composite. Leached hexavalent chromium values were below 0.06 mg.L⁻¹ for up to 20% waste, which, according to the NBR 10005 standard, does not pose any health risks. Following the acceptable standards, up to 7.14% by volume of sugarcane bagasse ash can be incorporated into bricks without any harm in relation to the standards. Leather dust indicated usage potential of up to 14.29% in the analyzed mixtures.

Keywords: waste; sustainability; construction materials.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

AVALIAÇÃO DE IMPACTOS AMBIENTAIS DO LIXÃO DO IGUAÍBA, PAÇO DO LUMIAR/MA

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ENVIRONMENTAL IMPACT ASSESSMENT OF IGUAÍBA DUMP,
PAÇO DO LUMIAR/MA

Recibido el 29 de septiembre de 2020. Aceptado el 12 de abril de 2021

Abstract

A still very common reality in developing countries is the use of dumps as a way of final disposal of municipal solid waste. Considering the problems caused by this practice, the present study aimed to identify the damage caused over the years by the deactivated dump of Iguaiaba, located in the municipality of Paço do Lumiar/MA, through environmental impact assessment instruments, in addition to proposing mitigating measures for some of these impacts. The study was carried out through field research, with direct observations under the study area, regarding the evaluation of environmental impacts, a checklist and the Impact Index method were used as a basis to identify and describe the possible environmental impacts that occurred, and propose measures aimed at the recovery of the area. It was observed that among the main environmental impacts caused in the area are soil compaction, soil and groundwater contamination, unhealthy catation, among others. In the case analyzed, it is evidenced that the Iguaiaba dump has a degrading character in relation to local natural resources, thus harming the environmental quality of the area.

Keywords: irregular final device, negative impacts, solid urban waste.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

CARACTERIZAÇÃO DA BACIA HIDROGRÁFICA DO RIO COMEMORAÇÃO, SITUADO NA BACIA AMAZÔNICA

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CHARACTERIZATION OF THE COMEMORAÇÃO RIVER, SITUATED IN THE AMAZÔNICA BASIN

Recibido el 14 de octubre de 2020. Aceptado el 25 de octubre de 2021

Abstract

The morphometric characterization of river basins is an important tool for understanding the processes that occur in the basin. The aim of the study was to characterize the morphometric attributes of the watershed of the Comemoração River. For this purpose, QGIS Desktop 2.18.7 with GRASS 2.7.0 was used, with SRTM images obtained from the TOPODATA project, as well as vector data on the territorial division, rivers and rainfall information from the IBGE and ANA agencies. The results showed that rainfall between 1991 and 2005 in this basin averaged a total annual of 1935 mm.ano-1. The predominant soil type was Neossolo, representing 74% of the total area of the basin. With respect to relief, the basin presented 54% of its area as smooth wavy and an altimetric amplitude of 420 meters. It was also observed, a well branched dendritic drainage pattern, however, with a low drainage density and a low roughness index. In view of the results obtained, it is concluded that the basin is not susceptible to flooding under normal conditions of precipitation and has great ease of infiltration of water into the soil.

Keywords: watershed, morphometric characterization, geotechnology.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

ANÁLISE DA DISPONIBILIDADE HÍDRICA PARA O APROVEITAMENTO DE ÁGUA DE CHUVA NO ESTADO DO MARANHÃO, BRASIL

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ANALYSIS OF WATER AVAILABILITY FOR THE USE OF RAIN WATER IN THE STATE OF MARANHÃO, BRAZIL

Recibido el 15 de octubre de 2020. Aceptado el 21 de junio de 2021

Abstract

The capture of rainwater is used as an alternative way to reduce the consumption of water produced by concessionaires, which for low-income consumers means important savings. In this context, the seasonality of rainfall was studied for use and reuse in the state of Maranhão, Brazil. For this, rain series of 12 rainfall gauge stations were analyzed, following the methodology used in the Climatological Norms of Brazil. The six months with the highest and lowest rainfall levels were taken to generate the total rainfall in the rainy season and the total dry period, respectively. The monthly volume of water collected was calculated according to the area of residential roofs in the rainy and dry periods. Thus, the possible reduction in water consumption by the concessionaire was compared and verified in both periods of the year for households with 2, 4 and 6 people. It was found that for the State of Maranhão the quantity of rainwater for reuse can be used for non-potable purposes, aiming to reduce the production of potable water by the concessionaire and the value of the population's bills.

Keywords: water reuse, non-potable purposes, environmental feasibility, seasonality.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

ACOUSTIC PERFORMANCE OF SUBFLOORS PRODUCED WITH RICE HUSK AND DIFFERENT COATINGS

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Recibido el 22 de octubre de 2020. Aceptado el 5 de noviembre de 2021

Abstract

The building industry has a large environmental impact. The replacement of natural aggregates by residues in cement composites it is an alternative. By another side, acoustic performance is very important to provide comfort to the users, and it is still more important in Covid-19' outbreak, because people stay much more time at home. There are some requirements in the standards for the evaluation of construction systems to be used in vertical buildings and the effects of waste in building materials need to be verified. The aim of this study is to analyse the impact on sound insulation of mortar subfloors produced with the replacement of 50% of the fine aggregate by rice husk. It was applied three types of coatings of common use in the local buildings: porcelain, vinyl, and laminated wood. The tests were carried out on reduced samples of subfloors with 1 m² of surface area and thickness of 5 cm in laboratory environment, following the requirements of ISO 10140-3:2010. It was verified that the substitution of the fine aggregate by rice husk did not present significant variations in the attenuation of the sound transmission in relation to the conventional subfloor. These results could be viewed as positive since the use of waste as a substitute for natural resources and could to contribute to the advance of sustainability in the construction sector.

Keywords: acoustic performance, subfloor, waste, rice husk, sustainability.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

**INDICADOR DE SALUBRIDADE AMBIENTAL
APLICADO A UM MUNICÍPIO DO SERTÃO
PARAIBANO. ESTUDO DE CASO:
CAJAZEIRINHAS/PB – BRASIL**

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Graziela Pinto Freitas ¹
Priscilla Gomes Barbosa ²

**ENVIRONMENTAL SALUBRITY INDICATOR APPLIED TO A
CITY IN THE HINTERLAND OF PARAÍBA. CASE STUDY:
CAJAZEIRINHAS/PB – BRAZIL**

Recibido el 21 de noviembre de 2020. Aceptado el 6 de mayo de 2021.

Abstract

As a way of measuring the salubrity level of cities, the Environmental Salubrity Indicator (ISA) was created by the State Sanitation Council (CONESAN) of São Paulo, in order to be applied in São Paulo cities. However, its methodology has been used in several regions of the country, as it allows adaptations according to local characteristics. Therefore, this paper aims to present the application of ISA in the city of Cajazeirinhas-Paraíba / Brazil, aiming to characterize the potential and problems related to basic sanitation. The indicators used were: water supply, sewage, solid waste management, vector control, urban drainage and socioeconomic factors, and the ISA/SP methodology adapted according to the availability of information was applied. The data referring to the indicators came from the Paraíba Water and Sewage Company (CAGEPA), the Cajazeirinhas City Hall (Social Action, Planning and Health Secretariats) and national platforms (IBGE and SNIS). The results of the Environmental Salubrity Indicator of Cajazeirinhas ISA/CJ, showed that the city is in situations of average salubrity, 55.72%. Its worst results were found in the Sanitary Sewage Indicator, followed by the Socioeconomic indicator. There is a remarkable need for improvements mainly in sewage collection and treatment services, treatment and final disposal of solid waste, insertion of solid waste selective collection, urban drainage infrastructure and paving of streets. It is concluded that the applied methodology was successful in the evaluation of local healthiness, contributing as a starting point to guide plans and solutions to basic sanitation problems.

Keywords: environmental salubrity indicator, environmental sanitation, public health.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

USO DE BIOINDICADORES COMO AUXÍLIO NO MONITORAMENTO DE RIOS COM PRESENÇA DE DEJETOS DE ANIMAIS: REVISÃO DE LITERATURA

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THE USE OF BIOINDICATORS AS AN AID IN MONITORING RIVERS WITH THE PRESENCE OF ANIMAL WASTES: A LITERATURE REVIEW

Recibido el 27 de noviembre de 2020. Aceptado el 17 de diciembre de 2021

Abstract

Animal waste has a high amount of nutrients and can be used as fertilizer or for energy generation. When improperly disposed of, they cause damage to the environment and may cause eutrophication of the aquatic environment. Bioindicators are living beings that present ethological, physiological or morphological alterations in the face of abiotic modifications, and can be water monitors. This aims to assess whether *Brachionus calyciflorus* and *Brachionus havanaensis* can be considered ideal bioindicators for water monitoring. The bibliographic survey was summarized in a table for each species. Then, qualitative analysis was performed using ten pre-defined parameters, with variable weights and notes. These results were multiplied generating an indicator for each of the characteristics. These values were summed and stipulated ranges from the result of the average between the sum of the weights and the sum of the total notes of the parameters. Both species present poorly defined taxonomy, small size and difficulty of recognition by non-specialists, which shows a disadvantage in the study of the species. However, these were used recurrently in the laboratory and with wide geographical distribution. *B. calyciflorus* was shown to be a good environmental bioindicator and *B. havanaensis* was rated as regular for eutrophic zones, and may be a good option for monitoring the presence of animal waste.

Keywords: environmental parameters, environmental pollution, rotifers, water quality.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

PROJEÇÕES DOS IMPACTOS DAS MUDANÇAS CLIMÁTICAS SOBRE AS BACIAS DO HIDROSSISTEMA JAGUARIBE, CEARÁ, BRASIL, UTILIZANDO INFORMAÇÕES DO CORDEX DO MODELO CLIMÁTICO REGIONAL RCA4

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PROJECTIONS OF CLIMATE CHANGE IMPACTS ON THE JAGUARIBE HIDROSYSTEM BASINS, CEARÁ, BRAZIL, USING INFORMATION FROM THE CORDEX REGIONAL CLIMATE MODEL RCA4

Recibido el 1 de diciembre de 2020. Aceptado el 5 de mayo de 2021

Abstract

The objective of this work was to analyze the projections of precipitation, temperature and streamflow fields over the Banabuiú, Castanhão and Orós Hydrographic Basins (HBs) from five models (CSIRO-Mk3-6-0, ICHEC-EC-EARTH, IPSL-CMSA-MR, HadGEM2-ES and NOAA-GFDL-ESM2M) participating in the Coordinated Regional Climate Downscaling Experiment. The methodology consisted in evaluating the representation of the present climate through seasonality and inter-annual variability and in analyzing the medians of anomalies and trends of variables. In general, the models showed good representation of the climatological average observed over the basins, especially in the driest months: August to October. Castanhão HB showed greater inter-annual variability in its observed rainfall pattern. In the analysis simulations of the future climate of precipitation and streamflow, the results indicated a distribution of projections in different directions among the analyzed periods, with a pattern of anomaly reductions for the first period (2006-2035) and of increase for the last 30-year cycle of the century (2066-2095) in the two scenarios and in all the basins. In the second period (2035-2065) and between the scenarios, a greater dispersion between the modules and the directions of the medians were observed. The annual temperature averages showed an increase throughout for 21st century for the RCP 4.5 and RCP 8.5 scenarios, with higher intensity in the latter. In the trend analysis, the CSIRO-Mk3-6-0 model projected the greatest impacts of increasing temperature and reducing streamflow and precipitation, while the IPSL-CMSA-MR model indicated the greatest positive trends of rain and streamflow.

Keywords: climates changes, CSIRO-Mk3-6-0, Jaguaribe System.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

APROXIMACIÓN AL RIESGO DE CÁNCER POR EXPOSICIÓN DÉRMICA AL CLOROFORMO DURANTE EL BAÑO. CASO DE ESTUDIO EN LA CIUDAD DE BOGOTÁ – COLOMBIA

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EVALUATION OF THE RISK OF DERMAL CANCER BY EXPOSURE TO CHLOROFORM DURING THE BATHING PERIOD. CASE STUDY IN THE CITY OF BOGOTÁ – COLOMBIA

Recibido el 9 de diciembre de 2020. Aceptado el 2 de junio de 2021

Abstract

Quantitative risk analysis (QRA) methodology was applied to determinate the cancer risk probability occurrence by dermal exposure to chloroform based in the concentration value of 96 water samples taken in Bogotá – Colombia. The objective was to investigate the risk of increased occurrence of cancer by dermal exposure to chloroform in potable water across different seasons. Trihalomethanes in tap water samples obtained during 2016-2019 were analyzed by the purge and trap method with limits of detection (LoD) of 5 µg/L. The average concentration value of chloroform presented gradual increments in analyzed periods, being found the minor average concentration in the period 2016-I with a value of 24.1 µg/L and the maximum value in the period 2018-I with a value of 35.8 µg/L. In conclusion, although there were increases in the average concentrations of chloroform, dermal exposure to the disinfection by-product analyzed, in the period of the present study, does not present a serious health risk.

Keywords: cancer, chloroform, disinfection by-products, health risk, trihalomethanes.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

AVALIAÇÃO DA COMPOSIÇÃO HIDROGEOQUÍMICA DE ÁGUAS SUBTERRÂNEAS DE POÇOS PROFUNDOS SITUADOS NO MUNICÍPIO DE CAUCAIA – CE E SUAS LIMITAÇÕES DE USOS

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EVALUATION OF THE HYDROGEOCHEMICAL COMPOSITION OF UNDERGROUND WATERS OF DEEP WELLS LOCATED IN THE MUNICIPALITY OF CAUCAIA -CE AND ITS USE LIMITATIONS

Recibido el 12 de diciembre de 2020. Aceptado el 8 de noviembre de 2021

Abstract

The use of underground water resources in northeastern Brazil is an important alternative for meeting multiple uses. However, the quality of this type of water is conditioned to a series of physical-chemical parameters, often providing little information when analyzed in isolation. In this context, this study had as objective to evaluate the hydrogeochemical composition of the water of five deep wells in the Municipality of Caucaia - CE through ionic indexes and reasons aiming to evaluate the limitations of uses of this type of water. The results obtained showed that the samples have high electrical conductivity (2935 to 8350uS/cm) and are classified as very hard water ($> 300\text{mgCaCO}_3 / \text{L}$). The indexes studied show that the waters have a tendency to corrosion and are classified as chlorinated sodium. In addition, the analyzed samples have a degree of restriction in relation to sodicity classified as high risk (average $\text{RAS} > 18$) and the samples represent a risk of soil salinization ranging from very high ($2250\text{uS/cm} < \text{EC} < 5000\text{uS/cm}$) and exceptionally high ($> 5000\text{uS/cm}$). Thus, the use of these waters for drinking purposes presupposes a treatment aimed at removing mainly high concentrations of salts and in irrigated agriculture the need for specific management techniques for the use of waters with these characteristics.

Keywords: groundwater, ionic indexes, multiple uses.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

METHANE PRODUCTION IN THE CO-DIGESTION OF LANDFILL LEACHATE WITH DOMESTIC SEWAGE AND THE METHANOGENIC ACTIVITY OF FULL-SCALE UASB REACTORS

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Recibido el 22 de diciembre de 2020. Aceptado el 31 de enero de 2022

Abstract

The study aimed to individually assess the specific methanogenic activity of the sludge of 10 UASB reactors from a full-scale domestic sewage treatment plant (STP) and the sludge behavior under conditions of anaerobic co-digestion of leachate with domestic sewage in dilutions (v/v) of 0.1%, 1.0%, 2.5%, 5.0%, 10.0%, 25.0%, 50.0%, 75.0% and 100%. In order to compare the influence of the activity on co-digestion sludge, a parallel test was performed with sludge coming from the treatment of swine wastewater under the same conditions as the test with STP sludge. Specific methanogenic activity results showed the difference between STP sludge conversion capacities at each reactor, as well as preponderant conversion routes, which can have several origins within the mesh of factors that affect the units. Co-digestion analyses pointed out a better adaptation of piggery sludge to higher organic loads, such as the viability of up to 50% of leachate in relation to treated sewage volume, while the STP sludge showed a more delayed response in methane production. The best co-digestion condition was 10% leachate. The study highlights the possibility of increased leachate fractions in the co-digestion with domestic sewage with methane production potential, with incorporation of sludge from agro-industrial wastewater treatment.

Keywords: agro-industrial sludge, SMA, co-treatment, wastewater, biogas.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

ULTRAFILTRAÇÃO NO PÓS-TRATAMENTO DE EFLUENTE DE LAGOA FACULTATIVA: CONDIÇÕES OPERACIONAIS E QUALIDADE DO PERMEADO

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ULTRAFILTRATION IN THE POST TREATMENT OF STABILIZATION LAGOON EFFLUENT: OPERATIONAL CONDITIONS AND PERMEATE QUALITY

Recibido el 26 de diciembre de 2020. Aceptado el 17 de junio de 2021

Abstract

The membrane separation processes have been applied in secondary effluents to enable reuse in various modalities. The present work evaluated the performance of a pilot ultrafiltration system in the post-treatment of facultative waste stabilization pond effluent at the Mangabeira Wastewater Treatment Plant in João Pessoa/PB. The pilot system was evaluated from two perspectives: operational, under different conditions and the permeate evaluation with the physicochemical and biological characterization of the raw sewage, feed, permeate and backwash samples. Through the operational evaluation, it was found that the system remained stable in relatively low flux (27.5 and 37.5 L. m⁻². h⁻¹), limited by the characteristics of the feed effluent (high organic fraction and presence of microalgae) and by operating conditions (perpendicular filtration and inadequate pretreatments). The permeate presented low organic concentration (average of 5 mg O₂. L⁻¹ BOD_{5,20} and 26 mg O₂. L⁻¹ COD) and no thermotolerant coliforms, complying with several reuse standards. Finally, in addition to reuse water, the algae-rich backwash concentrate has the potential to generate biofuel.

Keywords: algal biomass, membranes, reuse water, stabilization pond.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

PROPOSTAS DE COMBINAÇÕES DE MACRÓFITAS PARA USO EM WETLAND CONSTRUÍDOS A PARTIR DE MODELOS NATURAIS DE LAGOAS RASAS

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PROPOSALS OF MACROPHYTES COMBINATIONS FOR USE IN CONSTRUCTED WETLAND FROM NATURAL MODELS OF SHALLOW LAKES

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Abstract

Constructed wetland systems tend to maintain the model of monospecific macrophyte formations. This trend continues due to the lack of applied studies on the interaction of aquatic flora with the functioning of the natural ecosystem. However, the increase in species richness and the knowledge of their respective interactions can optimize the efficiency of treatment due to the integral occupation of the water depth. The objective of this work was to survey the aquatic macrophyte communities in the shallow lentic environments of the semiarid region, as well as the trophic status of 27 water bodies, in order to find models with greater species richness to propose models of macrophyte combinations to be used in a built wetland system. Most water bodies were classified as permanent and ultraoligotrophic. The aquatic flora was composed of 42 species belonging to 21 families. The species *Echinodorus subalatus* (48%) was the most abundant in the region. Based on the results, four models of macrophyte combinations were suggested for use in a constructed wetland system, each showing variations in the combinations of different forms of macrophyte growth, in the frequency of association between them in natural environments, in the index of similarity of species and nitrogen contents of the lakes.

Keywords: aquatic macrophytes, residual waters, temporary pools, trophic state.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

MANAGEMENT OF NATURAL RESOURCES FROM NEXUS PERSPECTIVE: CASE OF STUDY IN CEARA, BRAZIL

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Abstract

The Nexus approach seeks to consider the connections between water, energy and food at local, regional and global level. This study proposes to explore some characteristics and synergies of local ecosystems and possible interventions in order to develop a generalist local water, energy and food Nexus model for the effective and sustainable management of natural resources and treatment of the waste. The methodology was built in four stages: (i) elaboration and application of questionnaires to survey the water and energy demands and to understand the eating habits of the actors under study; (ii) analysis of soil quality in the laboratory in order to verify the need to use fertilizers and treatments to recover degraded areas; (iii) proposing alternatives for water supply, energy and food production; and (iv) elaboration of the local Nexus model. The proposed alternatives integrate the elements of the model. Among them are the use of solar panels, the use of cisterns, composting, biodigester, evapotranspiration basin, artisanal fish farming and permaculture design. Considering the inputs and outputs of each element it was found that all of them are dependent on water supply except for solar panels. Based on the model's interconnections, a new structural design for the study area was proposed to contribute to the development and applicability of the Nexus approach at the local level.

Keywords: environmental security, sustainable development, natural resources.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

COLETA SELETIVA SOLIDÁRIA: UMA PROPOSTA PARA O CENTRO NACIONAL DE PRIMATAS DO BRASIL

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SOLIDARY SELECTIVE COLLECTION: A PROPOSAL FOR THE NATIONAL PRIMATE CENTER OF BRAZIL

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Abstract

In recent years, federal regulations have been established in Brazil with respect to the issue of solid waste and recycling, including Federal Decree nº. 5940/06, which instituted the need for the separation of recyclable materials discarded by federal public administration bodies and entities. The objective of the study was to characterize the solid waste generated at the National Primate Center (CENP) for the purposes of technical planning for the implementation of a Solidary Selective Collection (CSS). The study methodology consisted of collecting data on the physical characterization of the waste generated at CENP and identifying possible recycling materials. Based on the results, a mathematical modeling was proposed to quantify Voluntary Delivery Locations (LEV) of recyclable materials in the area covered by this institution. Economic viability was also identified, using the V.E.R.D.E.S software, for the implementation of CSS and the marketing of these materials by an association or cooperative of collectors. It was found that it is possible to implement CSS at CENP. The economic feasibility analysis allowed to identify that the commercialization of the materials can be representative when incorporated to other materials collected in organs located in the region covered by CENP.

Keywords: Software V.E.R.D.E.S, recycling, solid waste.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

INFLUÊNCIA DA RELAÇÃO C:N E DA UMIDADE DO SUBSTRATO NO PROCESSO DE BIOMETANIZAÇÃO DE RESÍDUOS SÓLIDOS ORGÂNICOS

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INFLUENCE OF C:N RATIO AND HUMIDITY OF THE SUBSTRATE ON THE BIOMETHANIZATION PROCESS OF ORGANIC SOLID WASTE

Recibido el 27 de enero de 2021. Aceptado el 21 de junio de 2021

Abstract

The anaerobic digestion of organic waste is considered a viable technique from an environmental and economic point of view to treat and reuse the by-products from this process. For the optimization of this process, it is necessary that some variables are taken into account. The objective of this article was to carry out a bibliographic survey regarding the influence of the C: N ratio and substrate moisture in the treatment of organic solid waste through the process of anaerobic digestion. A survey of data was carried out in the following databases: Science Direct, Scopus, SiELO and Web of Science, and studies were selected between the years 2010 and 2020. According to the reviewed literature, to obtain the best yields of biogas, the Carbon: Nitrogen (C: N) ratio must be between 20: 1 and 30: 1, depending on the type of waste to be digested. Studies report that the moisture content can vary from 50% to 97%, however, the best yields were found when the moisture content was above 90%. The interaction between these factors, as well as the appropriate proportions of organic residues within the biodigester, is characterized as an effective and promising way to enhance the amount of methane present in the biogas composition.

Keywords: anaerobic digestion, carbon/nitrogen ratio, co-digestion, moisture content, organic solid waste.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

AVALIAÇÃO DA QUALIDADE DA ÁGUA DO MANANCIAL DE ABASTECIMENTO PÚBLICO DO MUNICÍPIO DE JI-PARANÁ-RO E SUA RELAÇÃO COM O USO E OCUPAÇÃO DO SOLO DA BACIA DO RIO URUPÁ

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EVALUATION OF WATER QUALITY OF THE MANANTIAL OF PUBLIC WATER SUPPLY OF JI-PARANÁ-RO AND ITS RELATION TO THE USE AND OCCUPATION OF THE SOIL OF THE URUPÁ RIVER BASIN

Recibido el 5 de febrero de 2021. Aceptado el 27 de mayo de 2021

Abstract

The present study aimed to evaluate the quality of the manantial of public water supply of Ji-Paraná-RO city, and its interrelationships with the different land uses along the Urupá river basin. To this aimed, was analyzed a ten-year historical series of data of pH, turbidity and apparent color, and analyses for determination of the Water Quality Index (WQI), from water samples collections of five sample points, between April 2016 and January 2017. For the classification of land uses, images were acquired in the year 2006 and 2016, being defined eight thematic classes through Geographical Information System. For data analysis, non-parametric statistical tests were performed with significance level of 5% ($\alpha = 0.05$). The Urupá River's WQI framed as "acceptable" and "good" conditions, being satisfactory to its destination to the public supply. However, there was a progressive deterioration in its quality, as identified by the historical series, in particular of the apparent color (average increase of 39.8%) and turbidity (average increase of 117.5%). Was still verified a inversely proportional correlation between the land use class "vegetation" and the variables phosphorus ($r = -0.56$) in wet-dry period, and with the turbidity ($r = -0.9$), temperature and WQI ($r = 0.8$) in the dry period, indicating the importance of vegetation to maintain the quality of the source, mainly in the dry period.

Keywords: water quality index, soil cover, Urupá river.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

**ANÁLISE DA EFICIÊNCIA DO INSTRUMENTO DA
COBRANÇA PELA ÁGUA BRUTA NAS BACIAS
CEARENSES: UMA APLICAÇÃO DA FRONTEIRA
INVERTIDA EM ANÁLISE ENVOLTÓRIA DE DADOS**

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Sílvia Helena Dantas de Lima ⁴
* Rejane Felix Pereira ⁴

**EFFICIENCY ANALYSIS OF THE RAW WATER CHARGING
INSTRUMENT IN CEARÁ BASINS: AN APPLICATION OF
INVERTED BORDER IN DATA ENVELOPMENT ANALYSIS**

Recibido el 10 de febrero de 2021. Aceptado el 27 de julio de 2021

Abstract

Water Resource Management is extreme importance to ensure access to all water users. Water resource management policies in Brazil take a management instruments among which a charges for the use of water resources. Many criteria can be used to make analyzing efficiency implementation of the charges for use of water in the river basin. Such an analysis requires the use of a scientific methodology called multicriteria analysis. The main objective of this research is to evaluate relative efficiency, through Data Envelopment Analysis (DEA), instruments of fee for the use of untreated water of main categories of use in the river basin in Ceará state. Thus, it is obtained a general diagnosis of this instrument in all of the State of Ceará. DEA models generally result in a large number of efficient units thus, it was decided to apply the inverted frontier methodology in order to identify and eliminate efficient units who present themselves with false efficiency. Application of DEA for charges for use of water reached the objective that it was to obtain a diagnosis of all river basins of the State of Ceará while the inverted frontier method ordered all analyzed UTDs. In general, the charges to industrial units in river basins of State of Ceará showed better results than the others, while irrigation units obtained the worst results.

Keywords: water resource management, charging for water use, data envelopment analysis.

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REVISTA AIDIS

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Investigación, desarrollo y práctica.

DESENVOLVIMENTO DE UM SISTEMA DE INFORMAÇÃO WEB PARA QUANTIFICAÇÃO DA ARBORIZAÇÃO URBANA

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DEVELOPMENT OF A WEB INFORMATION SYSTEM FOR QUANTIFICATION OF URBAN ARBORIZATION

Recibido el 17 de febrero de 2021. Aceptado el 18 de agosto de 2021

Abstract

Urban green areas stand out in the ecosystem due to their ability to reduce temperature, improving thermal sensation, improving air quality, protecting the soil from erosion, improving the biodiversity of the environment. The objective of this work was the development of a software, called ARBOQuant - Web Information System for Urban Tree Delineation, with the purpose of providing tree census information, using the programming languages JAVA, HTML and CSS with the NetBeans framework and database of PostgreSQL data. The modeling of this software was performed using the UML modeling language. The software requires high definition images obtained at times when the sun provides good lighting in the region to carry out the processing correctly. Aiming to reduce the costs of obtaining images, this software can work with images obtained by means of drones equipped with high definition camera or satellites. ARBOQuant identifies the various shades of the green color of the RGB table and allows the user without in-depth computer skills to use it for a specific, direct and precise purpose. For the validation of the software, two methods were used, one in a controlled environment and the other using the city of Votuporanga/SP taken as a model for this case study. This software allows for the planning and control of afforestation, carried out significantly by providing reporting, robustness and storage of information. It helps municipalities to participate in environmental programs such as the Município Verde Azul Program - PMVA in the state of São Paulo.

Keywords: arboreal census, software ARBOQuant, Green Blue Municipality Program – PMVA, urban afforestation, environment.

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REVISTA AIDIS

de Ingeniería y Ciencias Ambientales:
Investigación, desarrollo y práctica.

OBTENÇÃO DE PARÂMETROS PARA DIMENSIONAMENTO DO SISTEMA DE SECAGEM NATURAL DO LODO DE ETA EM ESTUFA PILOTO

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OBTAINING PARAMETERS IN NATURAL SLUDGE DRYING SYSTEM DIMENSIONING WST USING A PILOT GREEN HOUSE

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Abstract

Sludge volume reductions techniques at water treatment stations, both natural and mechanized are being developed and improved in Brazil and many other countries. Concerning to that, this study sought to determine and evaluate parameters to WTS sludge natural drying in a pilot scale greenhouse already installed in an WTS in the state of Sao Paulo. This drying experiment was conducted in a different condition from the ones installed and studied so far in the same treatment unit, therefore it was made a structural modification for the existing pilot greenhouse that included closing its laterals in order to bring internal temperature to heighten. The total amount of solids obtained in a period of 76 days natural drying experiment at greenhouses were 82.20%, 74.40% and 50.30% respectively at layers of 15 cm., 30cm., and 60cm. The 40cm. sludge layer height was the one that needed the least drying area, this is, although the experiments showed that the 15cm. layers obtained better drying percentage (less time) by using this height requires on the other hand larger areas. And larger greenhouses structures. To consider a 90% range of sludge total solids, the Greenhouse of Natural Drying (after changings) was impaired. Although the temperature of the internal air had increased, it was not predicted a device for its recirculation and in this way the closed sides greenhouse took 123 days to perform the drying while the opened sides greenhouse took 111 days.

Keywords: basic sanitation, drying methods, greenhouse of natural drying, solar energy drying, WTS residues.

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OCORRÊNCIA, DETECÇÃO E ROTA DE TRATAMENTO DE EFLUENTES COM CONTAMINAÇÃO POR DROGAS ILÍCITAS NO BRASIL: UMA REVISÃO DA LITERATURA

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OCCURRENCE, DETECTION AND ROUTE OF TREATMENT OF EFFLUENTS WITH ILLICIT DRUG CONTAMINATION IN BRAZIL: A LITERATURE REVIEW

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Abstract

With the growth of the consumption of illicit drugs in Brazil and in the world, the potential of their contamination in surface water, groundwater and sewage is growing as well. The cycle of contamination by these and other micropollutants has received attention for the possibility of causing problems when exposed to humans and animals, despite the low quantified concentration. Due to the complexity of this type of matrix, it is used advanced procedures for its quantification, such as the coupling technique of liquid chromatography and mass spectrometry (UPLC-MS/MS). In order to retain and/or remove the micropollutants in the sewage and water treatment plants, the addition of tertiary treatment is necessary since conventional methods do not have a high removal efficiency. The quantification of these contaminants in waters and sewage has important relevance in the dissemination of the information of consumption of these illicit drugs.

Keywords: illicit drugs, contamination, sewage treatment, water treatment.

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IMPACTOS SOCIOAMBIENTAIS DOS DEJETOS DA PECUÁRIA NO ÂMBITO RURAL: UMA REVISÃO DE LITERATURA

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SOCIO-ENVIRONMENTAL IMPACTS OF LIVESTOCK WASTE IN THE RURAL SETTING: A LITERATURE REVIEW

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Abstract

Animal waste from livestock activities is potentially polluting when improperly disposed of. They can be used as fertilizer for the soil or as energy, serving as a source of income for small farmers. The objective of this work is to deepen the discussion of the use of the biodigester in the sustainable allocation of livestock waste, in order to help properties with less potential impact. A bibliographic review was carried out, in addition to the matrix of indicators adapted from Tommasi to visualize the intensity of each impact. The animal waste proved to be an impacting factor of livestock, being this branch responsible for part of the emission of greenhouse gases. The water pollution from the waste can occur through surface runoff; the compaction of the soil hinders the surface and underground waters, as the entire river, and alter the concentrations of phosphorus and sodium and the commitment of aquatic species. As a solution, it is proposed the use of the biodigester to generate biogas, from residual biomass for energy and fertilizer services, in order to increase the population's income and reduce the environmental impacts caused by waste. The use of this can contribute positively to environmental sanitation.

Keywords: animal waste, environmental pollution, rural environment, solid waste.

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