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Instituto de Ingeniería, UNAM
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Instituto de Ingeniería, UNAM, México

Contacto

revista_aidis@pumas.iingen.unam.mx (Principal)
revista.aidis@gmail.com

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IMPACTO DAS MUDANÇAS CLIMÁTICAS NA ESTIMATIVA DA CAPACIDADE REQUERIDA DE RESERVATÓRIOS DE DETENÇÃO PARA FORTALEZA (CE)

* Inêz Gifone Maia Sales [1]
Anísio de Sousa Meneses Filho [1]

IMPACT OF CLIMATE CHANGE ON THE ESTIMATED CAPACITY REQUIRED OF DETENTION RESERVOIRS FOR FORTALEZA (CE)

Recibido el 1 de noviembre de 2022. Aceptado el 31 de marzo de 2023

Abstract

The study aims to: estimate the required capacity of detention reservoirs for the return times of 5, 10 and 25 years for each of the three micro-basins: A3.5 – Vertente Marítima; B1.4 - Coco, and C5.2 - Maranguapinho, using the generalized methodology from particularized equations for Fortaleza (CE) and perform the pre-dimensioning from the new IDF equations for the current scenario and those prospected for the future using global circulation models in different climate change scenarios – representative concentration pathways – optimistic (RCP 4.5) and pessimistic (RCP 8.5). It was observed the relevant impact of global warming on the volume to be stored, the maximum flow and the specific volume for the IDF of the global circulation model - CESM1-CAM5, when compared to the current IDF and the BCC-CSM1 model in both scenarios. Which may indicate the need to design a more robust and costly structure to mitigate the effects of climate extremes. On the contrary, the IDF results of the BCC-CSM1 model are lower for both the 4.5 and 8.5 levels, in relation to the current IDF and the CESM1-CAM5 model, implying a possible undersized. Bearing in mind that climate change and the various models of global circulation with their different responses, bring difficulties for decision-making, presenting an uncertain and challenging future for decision-making processes. We recommend future studies associating circulation models global and other types of isolated compensatory techniques.

Keywords: envelope curve, environmental sustainability, compensatory techniques, climate uncertainties.

[1] Centro de Ciências Tecnológicas, Universidade de Fortaleza, Brasil.
* *Autor corresponsal:* Centro de Ciências Tecnológicas, Universidade de Fortaleza. Avenida Washington Soares, 1321 – Edson Queiroz, Fortaleza, Ceará. CEP 60811-905. Brasil. Email: inezgifone@edu.unifor.br

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DIAGNÓSTICO DE IMPACTOS AMBIENTAIS EM UM TRECHO DO RIO PIANCÓ – PIRANHAS – AÇU, NORDESTE BRASILEIRO

* Daniele de Almeida Carreiro [1]
Laércio Leal dos Santos [1]
Ricardo de Aragão [3]
José Cleidimário Araújo Leite [2]
William de Paiva [1]
Tássio Jordan Rodrigues Dantas da Silva [1]
José Ludemario da Silva Medeiros [3]

DIAGNOSIS OF ENVIRONMENTAL IMPACTS IN A SECTION OF THE PIANCÓ – PIRANHAS – AÇU, RIVER, NORTHEASTERN BRAZIL

Recibido el 20 de noviembre de 2022. Aceptado el 17 de abril de 2023

Abstract

The degradation of aquatic environments has become one of the main ecological concerns of today, mainly due to the essential role of water resources for the proper functioning of ecosystem services and economic development. In this research, we aimed to perform a diagnosis of the environmental impacts on the waters of the stretch of the Piancó-Piranhas-Açu River between the cities of Paulista-PB and São Bento-PB. For data collection, photo documentation, field visits and consultations with municipal agencies were carried out. For the georeferencing of the area of influence, the QGIS software was used. Subsequently, the anthropic activities in the area were catalogued, and using the Ad Hoc methods, Check Lists, Interaction Matrix, and Networks, the environmental impacts were identified, significant impacts were selected and classified, and, finally, environmental control measures were indicated. From the results obtained, 13 anthropic activities were identified, with 86 environmental impacts on the stretch considered. Of this total, 32% were selected as "significant" and 50% as "significant". Most of the observed impacts are related to urbanization, textiles activities, the discharge of untreated effluents into the water body, and extensive livestock farming commonly developed in preservation areas, which causes water pollution and the eutrophication process. Finally, it is expected that the results and control measures indicated will help in the environmental recovery of the river stretch, as well as in the management of the hydrographic basin by the competent agencies.

Keywords: environmental impact assessment, environmental management, water pollution, water resources.

[1] Centro de Ciências e Tecnologia, Universidade Estadual da Paraíba, Brasil.
[2] Centro de Ciências e Tecnologia Agroalimentar, Universidade Federal de Campina Grande, Brasil.
[3] Centro de Tecnologia e Recursos Naturais, Universidade Federal de Campina Grande, Brasil.
[*]*Autor corresponsal:* Centro de Ciências e Tecnologia, Universidade Estadual da Paraíba, Rua Baraúnas, 351, Universitário, Campina Grande - PB, CEP 58429-500, Brasil. Email: danielealmeida23@gmail.com

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AVALIAÇÃO DA LEPTOSPIROSE E SUA RELAÇÃO COM CHUVAS E SITUAÇÃO DE RISCO ASSOCIADA A ENCHENTES

* Karoline de Souza Cardoso [1]
Carlos Magno de Sousa Vidal [1]
Jeanette Beber de Souza [1]

EVALUATION OF LEPTOSPIROSIS AND ITS RELATIONSHIP WITH RAIN AND RISK SITUATION ASSOCIATED WITH FLOODING

Recibido el 20 de noviembre de 2022. Aceptado el 19 de mayo de 2023

Abstract

Leptospirosis is a disease transmitted by bacteria present in the excreta of infected animals (mainly rodents) and usually presents an increase in its notification rates in rainy and flooding periods. This article aimed to assess whether there is an association between cases of leptospirosis and periods of flooding in the region covered by the 4th Health Regional of Paraná, as well as with the rainfall levels recorded at the site during the period studied. To this end, a survey of epidemiological data made available by the Epidemiological Surveillance Section of the 4th Regional Health (SCVGE/04RS) was carried out, based on the organization and tabulation of information and statistical analysis of the factors of interest. Based on the data, no correlation was found between the incidence of leptospirosis and the risk of contact with water or mud from flooding in the 30 days prior to the first symptoms of the disease, nor with the rates of precipitation accumulated in the period studied. This work showed specific characteristics in relation to the assessed disease that can help managers in the region in decision making for improvements in the areas covered by the addressed theme that can bring benefits to public health.

Keywords: waterborne diseases, leptospirosis, precipitation.

[1] Universidade Estadual do Centro-Oeste, Brasil.
Autora corresponsal: Programa de Pós-Graduação em Engenharia Sanitária e Ambiental, Universidade Estadual do Centro-Oeste, Campus de Irati. Rua Profª Rosa Zanon de Almeida, Bloco H, Bairro Engenheiro Gutierrez, Irati-PR, CEP: 84.505-677.
Email: karolinesouza0596@gmail.com

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SELEÇÃO DE ÁREAS ADEQUADAS PARA IMPLANTAÇÃO DE ATERRO SANITÁRIO INTERMUNICIPAL NO SUDESTE PARAENSE-BRASIL, UTILIZANDO SIG VINCULADO AO MÉTODO AHP

* Bruna de Araújo Almeida [1]
Larissa Grasielly Vieira Cantão [1]
Aline Furtado Louzada [2]
Raisa Rodrigues Neves [3]
Antonio Carlos Novaes Moreira [4]

SELECTION OF SUITABLE AREAS FOR IMPLEMENTATION OF AN INTERMUNICIPAL LANDFILL IN SOUTHEASTERN PARÁ, BRAZIL USING SIG LINKED TO THE AHP METHOD

Recibido el 23 de noviembre de 2022. Aceptado el 25 de mayo de 2023

Abstract

The environmental problems arising from solid waste have been gradually worsening with the increase in consumption and the depletion of areas for waste disposal. Thus, in Brazil, since the update of the New Sanitation Framework (Law 14026/2020), the deadlines for states and municipalities to adequately dispose of their waste was between the years 2021 and 2024. However, finding suitable areas for the implementation of a sanitary landfill is not an easy task. Because it is an environmentally appropriate measure, it has several criteria for its economic, technical, social, environmental, and political feasibility. In this sense, the present study sought to select suitable areas for landfill implementation in municipalities of the Eastern Amazon. To this end, the methodology used in the selection of suitable areas was the use of the Geographic Information System, combined with multicriteria analysis. The result materializes in maps that indicate the suitability and selection of the best areas for the implementation of landfills. The municipalities presented a restrictive scenario, with only 19 excellent areas. Finally, the study showed that geoprocessing in conjunction with multicriteria analysis is an effective and low-cost tool for analyzing the choice of areas for landfills.

Keywords: geoprocessing, landfill, multi-criteria analysis, solid waste.

[1] Faculdade de Engenharia Sanitária e Ambiental – Campus Tucuruí, Universidade Federal do Pará, Brasil.
[2] Faculdade de Engenharia Sanitária e Ambiental, Universidade Federal do Pará, Brasil.
[3] Faculdade de Engenharia Civil – Campus Tucuruí, Universidade Federal do Pará, Brasil.
[4] Programa de Pós-Graduação em Ciências Ambientais, Universidade Federal do Pará, Brasil.
* *Autor corresponsal:* Faculdade de Engenharia Sanitária e Ambiental, Universidade Federal do Pará, Rodovia BR 422 km 13, Canteiro de Obras UHE - Vila Permanente, Tucuruí, Pará, CEP: 68464-000. Brasil. Email:almeidaaraujo_bruna@hotmail.com

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USE OF HYDRAULIC SIMULATION AS A TOOL IN DECISION MAKING IN WATER SUPPLY NETWORK: A CASE STUDY IN THE BRAZILIAN CITY OF SÃO GABRIEL, RS

Matheus Rodrigues Martins [1]
Débora Missio Bayer [2]
* Luiza Chiarelli Conte [2]
Luiz Antonio de Brito Bertazzo [3]

Recibido el 8 de diciembre de 2022. Aceptado el 31 de marzo de 2023

Abstract

Population care by water supply networks has evolved in the world but it is still not a reality for the entire population. In the existing systems, almost 40% of the volume of water available does not reach the user. An important variable that influences water losses in the system is the pressure. In this work, part of the water distribution system in the Brazilian city of So Gabriel, in the state of Rio Grande do Sul (RS), was evaluated through hydraulic simulation using [public domain, water distribution system modeling software package developed by the United States Environmental Protection Agencys (EPA) Water Supply and Water Resources Division] EPANET in three different scenarios: maximum, minimum and sustainable water consumption. In the simulations, the pressures and speeds in the distribution system were analyzed, which allowed the proposition of interventions such as: installation of accessories (pump and pressure reducing valves), reducing diameters of some pipe sections, alteration of the operating regime of already existing pumps, system sectorization and estimates of loss reduction resulting from these interventions.

Keywords: water supply network, water losses, pressure.

[1] Universidade Paranaense, Toledo, Paraná, Brazil.
[2] Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul, Brazil.
[3] São Gabriel Saneamento, São Gabriel, Rio Grande do Sul, Brazil.
* *Autor corresponsal:* Departamento de Engenharia Sanitária e Ambiental, Universidade Federal de Santa Maria. Av. Roraima, 1000, Campus, Prédio 10 – Camobi, Santa Maria, Rio Grande do Sul. Brasil. Email: cconteluiza@gmail.com

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SIMULAÇÃO DO CO-TRATAMENTO DE RESÍDUO DE TANQUE SÉPTICO E ESGOTO DOMÉSTICO EM PROCESSO DE LODOS ATIVADOS

* Josiane Pistorello [1]
Antônio Domingues Benetti [2]

SIMULATION OF CO-TREATMENT OF SEPTIC TANK RESIDUE AND WASTEWATER IN ACTIVATED SLUDGE PROCESS

Recibido el 10 de diciembre de 2022. Aceptado el 8 de mayo de 2023

Abstract

This study investigated the possibility of receiving and treating septic tank residue in a wastewater treatment plant using extended aeration activated sludge process, designed for an average flowrate of 180 m^3/h. The ASM1 model was used to simulate the removal of carbonaceous organic matter, nitrification and denitrification. In WRc Stoat 5.0. software simulations of four groups of scenarios were made and, in each group, the system operated with a fixed flowrate and different portions of septic tank residue. Each group of scenarios would be equivalent to a stage of operation of the wastewater treatment plant over the years, with gradual increase in the flow of domestic sewage. The simulations results showed that is possible, in a system operating with a domestic sewage flowrate of 45 m^3/h, to receive 4.3 m^3/h of septic tank residue without compromising the effluent standards for BOD, COD, total suspended solids and ammonia required by the state regularions. For systems operating at 90 m^3/h, 135 m^3/h and 162 m^3/h, the possible contributions to be received from septic tank residue without compromising standards defined in the legislation were, respectively, 3.6 m^3/h, 3.3 m^3/h and 2.9 m^3/h. The results allow the conclusion that it is feasible to co-treat septic tank residue with sewage and at the same time meet the standards defined in the regularions as long as the limiting flowrates and maximum loads are respected.

Keywords: septic tank residue, activated sludge process, co-treatment septic tank.

[1] Prefeitura Municipal de Caxias do Sul/RS, Secretaria do Meio Ambiente, Brasil.
[2] Universidade Federal do Rio Grande do Sul – UFRGS, Brasil.
** Autor corresponsal:* Prefeitura Municipal de Caxias do Sul/RS, Secretaria do Meio Ambiente, Rua Dom José Barea,1501 - Bairro Exposição, Caxias do Sul/RS, CEP 95084-100 - Brasil. Email: josi.pistorello@gmail.com

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EFETIVIDADE DA COLETA SELETIVA COMO ESTRATÉGIA DE REDUÇÃO DOS RESÍDUOS SÓLIDOS DOMICILIARES A SEREM DISPOSTOS EM ATERROS SANITÁRIOS

* Mariana Moreira de Oliveira [1]
Gilson Barbosa Athayde Júnior [1]
Rémy Bayard [2]
Joácio de Araújo Morais Júnior [1]

EFFECTIVENESS OF SELECTIVE COLLECTION AS A STRATEGY FOR REDUCING HOUSEHOLD SOLID WASTE TO BE DISPOSED IN LANDFILLS

Recibido el 24 de enero de 2023. Aceptado el 13 de marzo de 2023

Abstract

Given the amount of household solid waste (HSW) generated and the impacts associated with its management, this study aimed to measure the effectiveness of the selective collection of the dry fraction of household solid waste (DFHSW) in reducing the HSW to be disposed of in landfills as well as the benefits of this activity. For this, the following parameters were analyzed: the rate of separation of the selective collection (Rsc), the efficiency of the selective collection (Efsc), the index of recovery of the selective collection (IRsc), the index of potential recovery of the selective collection (IRpsc) and the index of participation in selective collection (IPcs). The main difficulties for carrying out the selective collection were also determined. For DFHSW, a Rsc of 19%, an Efsc of 87%, an IRsc of 17% and an IRpsc of 21% were observed. The main obstacle pointed out by residents (40%) was the difficulty in changing their own habits and those of others. It was observed that the implementation of selective collection represented a reduction of 18% (actual scenario) to 21% (potential scenario) of HSW sent to landfills. This situation would save 78% of the amount of energy that would be consumed to produce the same amount of virgin material, would avoid the emission of around 99% of greenhouse gases and would correspond to a gain of R$ 18.5 per R$ 22.8 per resident. Even with observed benefits, it was verified that the implementation of selective collection in vertical residential condominiums faces operational and infrastructure difficulties, requiring the collaboration of actors related to waste management.

Keywords: gravimetric composition, avoided energy, avoided greenhouse gases.

[1] Departamento de Engenharia Civil e Ambiental, Universidade Federal da Paraíba, Brasil.
[2] Laboratoire Déchets Eaux Environnement Pollutions-DEEP, Institut National des Sciences Appliquée, França.
** Autor corresponsal:* Departamento de Engenharia Civil e Ambiental, Universidade Federal da Paraíba. Campus I Loteamento Cidade uniersitária – Castelo Branco, João Pessoa, Paraíba, 58051-900. Brasil. Email: marianamoreiraa@hotmail.com

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ESTUDO COMPARATIVO DE METODOLOGIAS DE COBRANÇA DOS SERVIÇOS PÚBLICOS DE MANEJO DE RESÍDUOS SÓLIDOS URBANOS PARA FINS DE ORIENTAÇÃO MUNICIPAL

* Rafaella de Moura Medeiros [1]
Ana Luiza Araújo Medeiros [2]
Aline Carolina da Silva [3]
Maria Josicleide Felipe Guedes [4]

COMPARATIVE STUDY OF METHODOLOGIES FOR PUBLIC SERVICES CHARGING OF MUNICIPAL SOLID WASTE MANAGEMENT FOR MUNICIPAL GUIDANCE PURPOSES

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Abstract

The economic-financial sustainability of municipal solid waste management is one of the sector's many impasses and challenges, which - although it is foreseen by Brazilian legislation - does not receive due attention from managers. With the aim of guiding municipalities towards the implementation of charging for the management of municipal waste, through a fee or a tariff, with a view to the financial self-sufficiency of Municipal Governments, this study analyzed different charging models existing until the year 2022, in the sphere of the Brazilian federal public government. For that, a bibliographical survey and analysis of 5 (five) existing charging models were carried out, from the perspective of applicability parameters, advantages, and disadvantages; 3 (three) models proposed by the National Health Foundation (FUNASA) and 2 (two) models proposed by the Ministry of Regional Development (MDR)/Cooperation for climate protection in the management of urban solid waste (ProteGEEr). The results showed that the charging model to be set up by the municipality may vary over the years, according to the advances in the management of solid waste and the information linked to it. In addition, municipalities must promote the reduction of waste generation, following the instruments of selective collection and reverse logistics, so that there is no burden on public expenses and economic-financial unsustainability.

Keywords: economic-financial sustainability, collection models, subsidies to managers, solid waste fee/tariff, decision making.

[1] Universidade Federal de Pernambuco, Pernambuco, Brasil.
[2] Universidade Federal de Campina Grande, Paraíba, Brasil.
[3] Centro Universitário do Planalto Central Apparecido dos Santos Uniceplac, Brasília, Brasil.
4 Universidade Federal Rural do Semi-Árido, Rio Grande do Norte, Brasil.
** Autor corresponsal:* Universidade Federal de Pernambuco. Avenida da Arquitetura, s/n, Cidade Universitária, CEP: 50740-550, Recife, Pernambuco, Brasil. Email: rafaellamouraa1@gmail.com; rafaella.moura@ufpe.br

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SIMULAÇÃO PRELIMINAR DA GERAÇÃO DE SUBPRODUTOS EM REATORES BIOLÓGICOS TRATANDO VINHAÇA

* Luís Paulo Lima Cardoso [1]
Antonio Pedro de Oliveira Netto[1]

PRELIMINARY SIMULATION OF KINETIC PARAMETERS IN BIOLOGICAL REACTORS TREATING VINASSE

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Abstract

Anaerobic digestion is shown as a solution to meet the demand for wastewater treatment and generate electricity indirectly through hydrogen gas and methane. Therefore, this study performed a kinetic analysis by calculating the kinetic constants and subsequent simulation of mathematical models, in two Anaerobic Fluidized Bed Reactors (AFBR) in series: one acidogenic (AFBR1) and the other methanogenic (AFBR2), treating agroindustrial waste from sugar cane (vinasse) for the production of hydrogen and methane. Vensim PLE ® software was used to simulate the adapted models. For each reactor and variable analyzed (COD, butyric acid, acetic acid, and propionic acid) the hydraulic behavior of plug flow and complete mixing were considered, and reaction orders 1 for COD and 1 and 2 for the others, for comparison between simulated and experimental data. Such considerations were also compared with experimental data obtained under the different operational conditions (TDHs of 12 and 16 for RALF1; 12, 6, and 4 for RALF2). The adherence of the curves generated through the simulations was analyzed through Pearson's correlation coefficient (r), with values between 0.90 and 1.0, corresponding to a strong correlation, especially for the degradation of organic matter in terms of Chemical Oxygen Demand (COD). For this condition, the highest value of the kinetic constant was obtained for the consideration of the complete mixing regime in RALF2 operating with a TDH of 12 hours (KDQOM = 0.0419 ± 0.007 h-1). Regarding the simulation of organic acids, the order 2 perfect mixing flow model best represented the behavior for the experimental conditions of the research. The results found to confirm that simulation under conditions that satisfactorily represent the treatment unit behavior can compose operational benefits for biological systems.

Keywords: flow models, simulations, renewable energy, environmental systems.

[1] Centro de Tecnologia, Universidade Federal de Alagoas, Brasil.
** Autor corresponsal:* Programa de Pós Graduação em Recursos Hídricos e Saneamento, Universidade Federal de Alagoas (UFAL), Maceió-AL, Brasil. Email: luisplcardoso@gmail.com

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NÍVEL DE COMPROMETIMENTO, DISPONIBILIDADE HÍDRICA E PRINCIPAIS USOS CONSUNTIVOS NA SUB-REGIÃO HIDROGRÁFICA GUAMÁ, NORDESTE DO PARÁ

Anderson Abdon Santos da Silva [1]
* Francisco Carlos Lira Pessoa [1]
Rafael da Silva Ferreira [1]
Lorena Conceição Paiva de Ataide [1]

LEVEL OF COMMITMENT, WATER AVAILABILITY AND MAIN CONSUMPTIVE USES IN THE GUAMÁ HYDROGRAPHIC SUB-REGION, NORTHEAST PARÁ

Recibido el 14 de febrero de 2023. Aceptado el 8 de mayo de 2023

Abstract

The study presents an overview of the level of commitment and water availability of the Hydrographic Sub-Region (SRH) Guamá, located in the Hydrographic Region of the Atlantic Coast-Northeast of the State of Pará. The grants issued by the Pará State Department of Environment and Sustainability (SEMAS) were analyzed and, considering the data from the river gauge stations available at the site, a water balance of the region and the level of commitment of the respective sub-basins that compose it were obtained. The results revealed that, from a global perspective, the Guamá SRH fits into a condition of water comfort, according to the criteria of the European Environment Agency and the United Nations, since the total flow rate granted for the various water uses is equivalent to 1.57% of the reference flow rate, considering 70% of the Q95%, according to CERH Resolution No. 10/2010. However, when analyzed in detail, three sub-basins of the SRH Guamá showed a significant degree of water impairment, classified as worrying and critical, indicating that the demand for water use is reaching levels higher than the region can support, thus requiring appropriate management measures to ensure the sustainable use of this resource. Therefore, this study provides subsidies for the management of water resources in a watershed in the state of Pará, since the scenario of water availability of the SRH Guamá, reflects the reality, in terms of data and economic and environmental characteristics, of the various watersheds in the northern region of Brazil.

Keywords: level of water commitment, water availability, water balance and grant.

[1] Instituto de Tecnologia, Universidade Federal do Pará, Brasil.
* *Autor corresponsal:* Faculdade de Engenharia Sanitária e Ambiental, Instituto de Tecnologia, Universidade Federal do Pará, Rua Augusto Corrêa, Nº 1 – Guamá, Belém, Pará, Brasil – CEP: 66075-110. Email: fclpessoa@ufpa.br

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COMPARACIÓN DE METODOLOGÍAS PARA EL FRACCIONAMIENTO DE LA DQO DE AGUAS RESIDUALES MUNICIPALES Y SU APLICACIÓN EN EL MODELO ASM1

* Miguel Ángel Espinosa Rodríguez [1]
Raúl Delgado Delgado [1]
Antonio Hidalgo Millán [1]

COMPARISON OF METHODOLOGIES FOR FRACTIONING THE COD OF MUNICIPAL WASTEWATER AND ITS APPLICATION IN THE ASM1 MODEL

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Abstract

The ASM1 model is applied in wastewater treatment processes and is capable of predicting the removal of organic matter, nitrification and denitrification. For the ASM1 calibration, it is necessary to characterize the influent and effluent of the biological treatment system, and particularly, fractionate the COD into biodegradable, inert, particulate and soluble components. The objective of this work was to make a comparison of different calculation procedures to fractionate the COD (STOWA, ATV-A131 and Influent Advisor) using filters with pores of 0.45 μ_m. The results obtained with the 3 methods indicated a percentage of 58% of soluble COD and 42% of particulate COD, being then a greater contribution of soluble COD and, therefore, the characterized wastewater is of municipal or domestic origin. According to the methodologies and results of the COD fractions, the 3 methods can be used for their application in the ASM1 model.

Keywords: filtration *0.45 μ_m, ASM1 model, GPS-X*.

[1] Universidad Autónoma de Nayarit, México.
** Autor corresponsal*: Programa Académico de Ingeniería Química, Universidad Autónoma de Nayarit. Ciudad de la Cultura Amado Nervo S/N, Tepic, Nayarit. C.P. 63155. México. Email: emiguel@uan.edu.mx

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ANALYSIS OF HEALTHCARE WASTE GENERATED BY DRUGSTORES IN BELO HORIZONTE, BRAZIL

Ana Teresa Rodrigues de Sousa [1,4]
Camila Costa Maia [2]
Maria Esther de Castro e Silva [2]
Kryscia Palhares Napoli Affonso [2]
Luiz Carlos Moutinho Pataca [1]
Max Filipe Silva Gonçalves [3]
Gisele Vimeiro Vidal [4]
* Marcos Paulo Gomes Mol [1*]

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Abstract

Healthcare wastes (HCW) are generated in establishments involved in human and animal healthcare activities, including pharmacies and drugstores. These activities also generate HCW, although they have been little studied in the scientific context. The present study aims to quantify and characterize the HCW generated by drugstores in Belo Horizonte, Brazil. Information contained in the Healthcare Waste Management Plans (HCWMP) was used and statistical analyzes were conducted in order to obtain the average generation by waste groups and by regions of the city. From the available data, an average global daily generation of 1218 kg/day (8140 L/day) of HCW was obtained in Belo Horizonte city, with an estimated generation per establishment of 8.98±1.50 kg/day (60±10 L/day), ranging from 0.03 kg/day (0.21 L/day) to 39.64 kg/day (265 L/day). The study revealed that the majority of the waste is non-hazardous, accounting for 97% of the total generated (1185 kg/day; 7900 L/day), while hazardous waste constituted only 3%. Most of the hazardous waste was chemical in nature.

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

[1] Diretoria de Pesquisa e Desenvolvimento, Fundação Ezequiel Dias. Belo Horizonte, Brasil.
[2] Superintendência de Limpeza Urbana (SLU), Prefeitura Municipal de Belo Horizonte, MG, Brasil.
[3] Mackenzie Presbyterian University, Engineering School, São Paulo, SP, Brazil.
[4] Centro Federal de Educação Tecnológica de Minas Gerais. Belo Horizonte, MG, Brasil.
** Autor corresponsal:* Diretoria de Pesquisa e Desenvolvimento. Fundação Ezequiel Dias – FUNED. Rua Conde Pereira Carneiro, 80. Bairro Gameleira. Cidade Belo Horizonte. Estado Minas Gerais. Código Postal (CEP) 30510-010. Brasil. Email: marcos.mol@funed.mg.gov.br

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URBAN BIOMINING: LITHIUM RECOVERY FROM SPENT BATTERIES THROUGH MULTI-STEP BIOPROCESSES

Agustina Belén Buonomo [1]
Romina Esther Higa [1]
Laura Miriam Sánchez [2]
*Romina Mariel Gargarello [3,4]

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Abstract

Multi-step design to evaluate the bio-recovery of lithium from spent batteries was studied. The first step consisted of lithium extraction from spent batteries, using bacterial and fungal acid extrolites. The second step explored lithium recovery in the form of carbonate salts by using MICP (Microbial Induced Carbonate Precipitation) bacteria from *Sporosarcina* species. For lithium extraction (Step 1) sulfuric acid produced by sulphur oxidizing bacteria *Acidithiobacillus thiooxidans* was evaluated for its capacity to leach lithium. Extraction with biogenic sulfuric acid and with fungal bio- produ-cts (from *Aspergillus sp*. and *Simplicillum sp*. isolated at our facilities) were compared with commercial sulfuric acid. For biorecovery processes (Step 2), two type strains of *Sporosarcina sp.* were tested due to their capacity to precipitate lithium carbonate. Results showed fungal bioextracts gave a lithium leaching yield close to 60% and a global recovery yield of 27%. These observations are reported for the first time and lay the foundations for continuing the study and scaling up of this combined process for lithium recovery.

Keywords: biomining, lithium, *Acidithiobacillus thiooxidans*, fungi, *Sporosarcina sp*.

[1] Facultad de Ingeniería y Ciencias Exactas, Universidad Argentina de la Empresa, Argentina.
[2] Instituto de Tecnología Minera. Servicio Geológico Minero Argentino, Buenos Aires, Argentina.
[3] Instituto de Tecnología, Universidad Argentina de la Empresa, Argentina.
[4] *Adscripción actual:* Leitat Technological Center, Barcelona, Spain.
* *Autor corresponsal:* Leitat Technological Center, Carrer de la Innovaciò 2, 08225, Terrassa, Barcelona, Spain. Email: rgargarello@gmail.com

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MÉTODO PROCESSO ANALÍTICO HIERÁRQUICO COMO INSTRUMENTO DE APOIO NA GESTÃO DE RESÍDUOS SÓLIDOS: UMA REVISÃO

*Samara Avelino de Souza França [1]
Viviane Jin Hee Kim [1]
Raphael Tobias de Vasconcelos Barros [1]

ANALYTIC HIERARCHY PROCESS METHOD AS A SUPPORT TOOL IN SOLID WASTE MANAGEMENT: A REVIEW

Recibido el 25 de marzo de 2023. Aceptado el 22 de septiembre de 2023

Abstract

Decision-making processes based on Multicriteria Decision-Making Models (MDMM) have been used to solve several problems, including those related to solid waste management. One such model is the AHP (Analytic Hierarchy Process) method, which employs qualitative and quantitative criteria and the participation of different decision-makers. Thus, the aim of this article is to analyze the literature on the use of the AHP method in support of solid waste management. For this, a systematic literature review considered articles in English, available on the CAPES Periódicos Portal, from 2000 to 2022, with 12 studies that exclusively used the AHP method being discussed in depth. The studies used the method for destination or disposal decisions, solid waste treatment/utilization technologies, or in places for installing sanitary landfills, composting plants, etc. solid waste. All of them were based on the opinion of experts and stakeholders, revealing the AHP as a powerful decision-support tool. Some gaps found were that none of the studies detailed the source(s) and/or database of the literature review; some did not inform the number of participants; and only 5 studies explained how they proceeded with the sensitivity analysis. As main recommendations, it is suggested that these gaps be met, in addition to discussing whether the results met the expectations of the parties involved in the judgments.

Keywords: solid waste, multicriteria análisis, analytic hierarchy process.

[1] Departamento de Engenharia Sanitária e Ambiental, Universidade Federal de Minas Gerais, Brasil.
* *Autor corresponsal*: Departamento de Engenharia Sanitária e Ambiental, Universidade Federal de Minas Gerais. Av. Antônio Carlos, 6627 – Pampulha, Belo Horizonte, Minas Gerais. CEP 31270-901. Brasil. Email: avelinosamara@gmail.com

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CICLO DE VIDA NO BENEFICIAMENTO DO ARROZ EM PELOTAS-RS

* Lílian de Queiroz Firmino [1]
Gizele Ingrid Gadotti [2]
Viviane Farias Silva [3]
Rayanne Maria Galdino Silva [4]
Ana Paula Rozado Gomes [5]
Rafael Priebe Griep [6]

LIFE CYCLE IN RICE PROCESSING IN PELOTAS-RS

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Abstract

Rice is a cereal of great importance for human consumption. The industrialization of this grain has a high impacting potential and therefore the research was carried out aiming to identify the sector with the greatest polluting potential using the Life Cycle Assessment as a methodology verifying the balance of specific inputs and outputs of rice grain processing. For this, openLCA 1.10.2 software was used, fed with secondary data from the "Ecoinvent 3.6 apos unit" database and its method package, choosing within it the CML 2001 model containing the impact categories to be analyzed. For complete data modeling, the Life Cycle Inventory built from the grouping of activities was also inserted, forming and characterizing the processing inputs and outputs, with primary data, for three process areas: Sector 1-Reception, Sector 2-Processing and Sector 3-Packaging. For the production of 1 bale of white rice, this being the considered functional unit. In the Life Cycle Impact Assessment in rice processing, 6 categories of impacts were obtained that received greater contributions from the process. As a main conclusion, it appears that the activities analyzed are potential contributors to the six categories analyzed, these received 100% of contributions from the process, and as a result of the contribution of the activities grouped by sectors, it was concluded that the greatest impact potential is on Sector 1, with 72.2%, and then on Sector 2, with 23.9%, with the highest energy consumption and generation of the most waste. bulky and not used in the process.

Keywords: grain processing, impact categories, CML 2001, openLCA.

[1] Programa de Pós-Graduação em Engenharia e Gestão de Recursos Naturais - PPGEGRN, Universidade Federal de Campina Grande, Brasil.
[2] Programa de Pós-Graduação em Ciências Ambientais - PPGCAmb, Universidade Federal de Pelotas, Brasil.
[3] Unidade Acadêmica de Engenharia Florestal - UAEF, Universidade Federal de Campina Grande, Campus Patos/PB - Brasil.
[4] Departamento de Engenharia Civil e Ambiental - DECA, Universidade Federal da Paraíba, Brasil.
[5] Programa de Pós-Graduação em Ciência e Tecnologia de Sementes - PGCTS. Universidade Federal de Pelotas/RS, Brasil.
[6] Instituto Federal Sul-riograndense, Campus Pelotas, Brasil.
* *Autor corresponsal:* Programa de Pós-Graduação em Engenharia e Gestão de Recursos Naturais - PPGEGRN, Universidade Federal de Campina Grande. Av. Aprígio Veloso, 882, Bodocongó, CEP 58109-970, Campina Grande, PB - Brasil. Email: naililufcgccta@gmail.com

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PLANOS DE GESTÃO INTEGRADA DE RESÍDUOS SÓLIDOS DOS MUNICÍPIOS DO ESTADO DO RIO DE JANEIRO: AVALIAÇÃO QUANTO AO ATENDIMENTO DO CONTEÚDO MÍNIMO EXIGIDO PELA LEI FEDERAL 12.305/2010

Karine Coutinho Silva [1]
* Ana Ghislane Henriques Pereira van Elk [1]
Rosane Cristina de Andrade [1]

INTEGRATED SOLID WASTE MANAGEMENT PLANS IN THE MUNICIPALITIES OF THE STATE OF RIO DE JANEIRO: ASSESSMENT REGARDING COMPLIANCE WITH THE MINIMUM CONTENT REQUIRED IN FEDERAL LAW 12.305/2010

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Abstract

In Brazil, there was a breakthrough with the enactment of the National Solid Waste Policy (PNRS), which brought planning through the Municipal Plans for Integrated Management of Solid Waste (PMGIRS), to assist in the lack of systemic vision of local policies and minimize the impacts from the turnover of mayors and lack of social control. Within this context, the present study was aimed at evaluating the compliance of the Municipal Plans of the State of Rio de Janeiro with the minimum requirements established by the PNRS. Thus, a survey of the PMGIRS of the 92 municipalities of the state was conducted, through electronic research and institutional websites, during the period from January of 2020 to March 2021. Though information was found on 44 PMGIRS, this research has only considered a sample of sixteen PMGIRS because these were completed and made available on the internet. The municipalities were classified as small, medium, and large according to the number of inhabitants. As an evaluation instrument, a matrix was elaborated with items I to XIX of article 19 of the PNRS. The results showed that only 38% of the PMGIRS presented more than 60% of compliance with the minimum content established by the PNRS. The PMGIRS of small municipalities, had equal or superior compliance than large municipalities. The items that guarantee the sustainability of the system were not included in more than 60% of the management plans. The Item that deals with Environmental Education was met in 100% of the plans.

Keywords: municipal planning, municipal integrated solid waste management plans, national solid waste policy, Rio de Janeiro, waste management.

[1] Departamento de Engenharia Sanitária e Meio Ambiente, Universidade do Estado do Rio de Janeiro, Brasil.
* *Autor corresponsal:* Departamento de Engenharia Sanitária e Meio Ambiente, Universidade do Estado do Rio de Janeiro. Rua São Francisco Xavier, 564, 5º andar – Maracanã, Rio de Janeiro, Rio de Janeiro. 20550-900. Brasil. Email: anaghislane@eng.uerj.br

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DESENVOLVIMENTO DE FERRAMENTA DE MONITORAMENTO PARA PLANOS MUNICIPAIS DE GESTÃO INTEGRADA DE RESÍDUOS SÓLIDOS

* Andressa Aparecida Piovezan [1]
Darci Barnech Campani [1]
Rejane Maria Candiota Tubino [1]

DEVELOPMENT OF A MONITORING TOOL FOR MUNICIPAL PLANS FOR INTEGRATED SOLID WASTE MANAGEMENT

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Abstract

The objective of the research was to develop a monitoring methodology for Municipal Plans for Integrated Waste Management (PMGIRS) through macro-guidelines. The PMGIRS of the municipality of Novo Hamburgo - RS, was evaluated and, according to the theme, the actions of the projects were grouped into macro guidelines. A data collection method was developed for the actions of existing projects in the PMGIRS, by gradual levels of the current situation, the goals stipulated for the year of monitoring were adapted and weights for the actions were defined using the Likert Scale technique. The PMGIRS of the municipality of Novo Hamburgo has 4 major programs for monitoring the plan, a total of 31 actions, diagnosed at levels 1 to 5 in relation to their degree of achievement of goals. The actions of the Program for Urban Solid Waste (PRSU) achieved 50% of their targets, while the Program for Non-Urban Solid Waste (PRSNU) 37.5%, the Program for Environmental Education (PEA) 60% and the Program for the Improvement of Management (PMG) 16.6%. Subsequently, the actions of the programs were subdivided into 8 macro-guidelines, where 1 was considered satisfactory. The target achieved indicator of Macroguideline 1 (M_1): Appropriate Technologies and Management for Urban Cleaning Services and Solid Waste Management) reached a score of 7.80, while its stipulated target for the monitoring year was 9.55; M_2: Minimization of solid waste generation) 13.20 of 16.33; M_3: waste recovery 8.33 of 10.89; M_4: universalization and comprehensiveness 15.75 out of 17.00; M_5: social control 15.75 from 19.00; M_6: articulation with public policies 11.00 of 13.43; M_7: education for sustainability 16.85 out of 15.85 and M_8: Sustainability 10.26 out of 28.45. It is considered an innovative tool that will serve as an aid and guide for bodies, companies and municipalities that prepare their plans with the macro-guidelines monitoring methodology.

Keywords: macro guideline, indicator, solid waste management plans, municipal plan for integrated solid waste management, environmental performance.

[1] Universidade Federal do Rio Grande do Sul, Brasil.
** Autor corresponsal:* Universidade Federal do Rio Grande do Sul, Programa de Pós-Graduação em Engenharia de Minas, Metalúrgica e de Materiais, Av. Bento Gonçalves - Agronomia, Porto Alegre - RS, 91501-970. Brasil. Email: andressapiovezan@hotmail.com

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ANÁLISE DA VIABILIDADE TÉCNICA E AMBIENTAL DA ADIÇÃO DE DIFERENTES TAXAS DE RESÍDUOS DE AREIA VERDE DE FUNDIÇÃO A COMPOSTO MATURADO OBTIDO DE UM PROCESSO AUTOMATIZADO

* Carlos Atalla Hidalgo Hijazin [1]
Thais Gularte Marques [2]
Beatriz Alicia Firpo Vasquez [1]
Rejane Maria Candiota Tubino [1]

TECHNICAL AND ENVIRONMENTAL ASSESSMENT OF MULTIPLE RATE APPLICATIONS OF GREEN FOUNDRY SAND WASTE TO MATURED COMPOUND OBTAINED FROM AN AUTOMATED PROCESS

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Abstract

This study presents the results of the addition of different rates of waste green foundry sand (WGFS) and commercial substrate to a compost, obtained from the composting of organic solid waste (OSW) segregated from urban solid waste. The WGFS, as it has a sandy texture, due to silica (SiO_2), when used directly in the soil, makes it more permeable, causing its impoverishment due to a greater leaching of nutrients. The OSW, when disposed directly on the soil, generates leachate, biogas and water contamination. Currently, in Brazil, most OSW is sent to sanitary landfills and WGFS to non-hazardous industrial landfills. However, the high cost, the scarcity of areas and the increasingly demanding legislation for the disposal of this waste, have led industries and municipalities to seek alternatives for the reuse of WGFS and treatment of OSW. The methodology of this work begins with obtaining a compost produced from a composting system with automated monitoring of temperature, aeration rate and humidity. After obtaining this product, it was mixed with different rates of WGFS and commercial substrate and later the fertility of these materials was evaluated. To verify the use of these mixtures in agriculture, the nutrients of the plant tissue of Avena Strigosa Schreb (black oat) cultivated in these media were evaluated. The results indicate that there is the potential for using these mixtures as a plant substrate at a rate of 10-20% WGFS or as a corrective for soil acidity at a rate of 10-30% WGFS.

Keywords: waste green foundry sand, black oats, composting, organic solid waste, automation.

[1] Escola de Engenharia, Universidade Federal do Rio Grande do Sul. Brasil.
[2] School of Geography, Environment and Earth Sciences, Victoria University of Wellington. New Zealand.
** Autor corresponsal:* PPGE3M, Escola de Engenharia, Universidade Federal do Rio Grande do Sul. Av. Bento Gonçalves, 9500, Setor 6, Bairro Agronomia, Porto Alegre, RS, CEP: 91501-970. Brasil. Email: carloshijazin@hotmail.com