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IOP Conf. Series: Earth and Environmental Science **623** (2021) 011001 doi:10.1088/1755-1315/623/1/011001

Preface

After being successfully held in 2019, the 2nd International Conference on Environment, Sustainability Issues and Community Development (INCRID) 2020 was held at a full teleconference in a virtual environment on October 21st, 2020, by "ZOOM". The reason is, active cases of COVID-19 in Indonesia are still increasing, and it is not sure whether October 2020 has returned to normal. Besides, we want this conference to be held regularly. INCRID 2020 is hoped to bring innovative ideas from academics and industrial experts in the field of environment. The conference's primary goal is to promote research and developmental activities in environmental sciences and promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world. The conference was held every year to make it an enabling platform for people to share views and experiences in an environmental context. The conference featured five keynotes (40 minutes each, including Q&A). The plenary session was divided into 2 sessions, which 2 of the 5 speakers gave their talk in the first session and the last 3 in the second session. The speakers shared their slides (through share screen mode) by themselves. However, the committee helped them to share the slides whenever the speakers were getting trouble. Discussion and Q&A in the plenary session were included in the time that was given to them. The moderator gave a sign if the time was over through Zoom's personal chat. Also, we passed 10 minutes for each presentation through the zoom's breakout room. We divided the parallel session into 8 rooms, which can be attended by 10 people (minimum) for each room. Apart from using the zoom platform, We also try to use any other system such as youtube and Instagram for plenary session live streaming and google forms for ensuring the participant attends the conference from beginning to the end. There were around 110 participants, 5 keynotes speakers, 10 moderators (2 in keynote session and 8 in parallel session), 8 co-host, and 48 committees. Participants can share their thoughts remotely (from their home).

We invited some international participants as asked speakers in parallel sessions, including Uganda, Egypt, Japan, Malay, Aussie, and other countries. We were incredibly honored to have invited Dr. Haryono Setiyo Huboyo, S.T., M.T, from Diponegoro University, Indonesia, to serve as our General Conference Chair. The rest of the committee was composed of Indonesia, Italy, Australia, Japan and other countries. In the keynote presentations part, we invited Dr. Swaib Semiyaga from Makerere University (Uganda), Mario Rosario Guarracino, Ph. D from National Research of Council of Italy (Italy), Prof. Dr. Ir. Ambariyanto, M.Sc. from Diponegoro University (Indonesia), Prof. Toru Matsumoto from University of Kitakyushu (Japan), and Dr. Mai Sayed Fouad from Fayoum University (Egypt). The conference provided a forum for discussing environmental topics and, in particular, for promoting the exchange of new ideas and the presentation of the latest developments in this field. This conference also provided an ideal environment for developing new collaborations and meeting experts on the fundamentals, applications, and products of the mentioned fields.

We are glad to share with you that we received lots of submissions from the conference, and we selected a bunch of high-quality papers and compiled them into the proceedings after rigorously reviewed them. These papers feature the following topics: environment, health, and safety, environmental science, technology, and education, green infrastructure, and energy conservation and efficiency. All the papers have been through rigorous review and process to meet the international publication standard's requirements. Lastly, we would like to express our sincere

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gratitude to the Chairman, the distinguished keynote speakers, and all the participants. We also want to thank the publisher for publishing the proceedings. May the readers could enjoy the gain some valuable knowledge from the proceedings. We expect more and more experts and scholars from all over the world to join this international event next year. We gave a technical evaluation of the conference to those who needed them. The virtual conference's main problem is signal loss and the presence of technical error by its participant. In this regard, we gave awareness and notice to all of the participants about these problems.

The Organizing Committee of INCRID 2020

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Preface

Papers

IOP Conf. Series: Earth and Environmental Science **623** (2021) 012074 doi:10.1088/1755-1315/623/1/012074

OTTV recalculation of Suara Merdeka Tower: a recommendation design towards energy efficient building

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Abstract. This paper discusses how a building facade design possess an immense significant effect on thermal value transfer on building envelopes. The thermal transfer from outside into the building through the building envelope affects the thermal conditions in the building. Hence it determines the energy requirements in the room, such as the need for indoor air conditioning. Calculation on the southwest facade of Suara Merdeka Tower Semarang using the Ecotect software with the result that the OTTV (Overall Thermal Transfer Value) reaches above 35 W/m^2 that is 59.44 W/m^2. This facade is the face of the building as well as the smallest facade area. This smallest area remarkably influences on conditions in the building since the combination of glass types dominate and no shading devices on the entire side of the building. Solar radiation falls directly on the Southwest side after 12.00 pm and is not shadowed at all (overshadowed by 0%). This study simulates the redesign of the southwest façade and recalculates the OTTV value after the redesign process using the Ecotect software. The result obtained is a decrease in OTTV value by up to 35% after redesign recommendation applied.

1. Introduction

The facade turns as the most significant architectural element for communicating the function and sign of a building. The building facade is a building envelope that is second intensely exposes to solar radiation after the roof. Indonesia is a humid tropical climates country, apart from humidity and the influence of wind speed factors, solar radiation is the main factor encountered by building facades [1]. The building envelope is not only a two-dimensional form of the outer surface but a transitional space that acts as a theatre of interaction between outer and inner space [2].

The building envelope as a building's outer skin reacts directly to climatic conditions is determined by the type of material used. Building material becomes an intermediary medium between outdoor temperature and solar radiation and indoor temperature. Climate considerations influence the choice of building materials used. The factors that need to consider are the material's characteristics and thickness and the colour of the outer surface of the material. The most determining factors of material characteristics are the heat transmission value or u-value and thermal resistance [3]. Researches revealed that solar radiation becomes the largest contributor to the amount of thermal transfer to the building [4]. The amount of solar radiation transmitted through the building envelope is influenced by

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Simulation sediment transport in development location of a diesel power plant using Computational Fluid Dynamic (CFD) methods

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Abstract. Research about Sediment Transport is important for the sustainability of coastal buildings. The infrastructure construction of the Halmahera Diesel Power Plant (PLTD) in the coastal area requires water supply as a cooling system. The supply of cooling water can be reduced because of erosion or sedimentation. This study uses CFD modelling of ANSYS FLUENT applications with variations in mass flow rates. The Eulerian-Lagrangian approach is used to predict the rate of erosion and accretion that occur around the place of Halmahera. Methods of Particle Size Distribution (PSD) numerical simulation is uniform. The simulation process results consist of particle mass, erosion, and accretion rate in the seabed. Variations in mass flow rates of 0.05 kg/s, 0.1 kg/s, 0.15 kg/s, 0.2 kg/s, 0.25 kg/s obtained the erosion rate respectively 5.425 x 10^{-7} mm/year, 1.085 x 10^{-6} mm/year, 1.626 x 10^{-6} mm/year, 2.170 x 10^{-6} mm/year, 2.712 x 10^{-6} mm/year. The result of the accretion rate obtained from the variation in mass flow rates is 301.43 mm/year, 602.87 mm/year, 904.30 mm/year, 1205.50 mm/year, 1507.77 mm/year. From this research. The result of simulation to be important to predict the rate of sediment transport for consideration in the development location of construction Halmahera PLTD.

1. Introduction

A natural process that often happens in the coastal area will have resulted in sediment transport. These conditions will result in accretion and erosion. Sedimentation or erosion across the coastline will have impacted the form of coastal buildings (ex: pier, jetty, wave breaker, groin, artificial sea wall, etc.). Halmahera East Ternate island is a specified location for Diesel Power Plant Construction (PLTD). The diesel power plant is usually used for fulfilling the electric in low capacity, new isolated place, village, and industrial needs. The diesel power plant needs a huge water consumption for its cooling system. The lack of water needs for cooling system because of sediment transport, will prevent diesel power plant to work properly [1]. The research uses the data from the temporal change of shoreline that needs expensive cost and longtime research so that simulation needed to be efficient processes [2].

Research about sediment transport conducted by Javaherci and Aliseda (2017) used Discrete Random Walk (DRW) method on simulation to obtain sediment transport rate which marine hydrokinetic turbine

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Numerical simulation of detailed airflow distribution in newly developed photosynthesis chamber

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Abstract. Predictive numerical simulation of airflow uniformity in canopy plants could provide a suitable environment for plant growth. A numerical investigation of airflow in a photosynthesis chamber was conducted using the Computational Fluid Dynamics (CFD) model. This research-validated the numerical model with measurements performed in a bare bottom open chamber. The chamber has bottom openings with three exhaust fans on the roof. After model validation, airflow patterns and their uniformity were evaluated in different fan arrangements and doubled air volume rates. The obtained results showed that a more uniform airflow distribution was observed with increasing the fan's air volume rate (0.0187, 0.0172, and 0.0177 m^3s^{-1}), particularly fan in the middle position and diagonally position inside the plant with coefficients of variation of 14.36%, 9.3% and 10%, respectively. Moreover, increasing the fan's air volume rate and moving the fan positions to the middle and diagonally can significantly help produce uniform air velocity distribution inside the plant.

1. Introduction

The response of net photosynthesis to air velocity has become vital in increasing and maintaining airflow uniformity in the plant canopy. Many researchers have conducted air velocity studies in the plant canopy to investigate its influence on plants. For example, Shibuya et al. (2006) experimentally clarified that upward and downward airflows enhanced the CO_2 exchange rate of the canopy and dry masses of the seedlings from 1.4–1.5 and 1.2–1.3 times, respectively, compared with a conventional horizontal airflow [1]. Okayama et al. (2008) reported (that fans set on both sides of the space and opposed fans not set coaxially) could provide more uniform airflow distribution than the conventional airflow pattern (fans set on one side of the room) [2]. It also enhanced the net photosynthetic rate more than that in the traditional airflow pattern with the same energy input. Furukawa (1975) showed that changing the air temperature did not significantly affect airflow rate efficiency on photosynthesis but increasing the light intensity enhanced it significantly [3].

Primary data on adequate air circulation to enhance plant growth in a closed plant culture system (chamber) were obtained by investigating the effects of the current airspeed ranging from 0.01–1.0 ms^{-1}. Researchers also found that the plant canopy's net photosynthetic rate doubled with increased air