Findings on Modelling Carbon Dioxide Concentration Scenarios in the Nairobi Metropolitan Region before and during COVID-19

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Abstract : Carbon (IV) oxide (CO_2) is emitted majorly from fossil fuel combustion and industrial production. The sources of interest of carbon (IV) oxide in the study area are mining activities, transport systems, and industrial processes. This study is aimed at building models that will help in monitoring the emissions within the study area. Three scenarios were discussed, namely: pessimistic scenario, business-as-usual scenario, and optimistic scenario. The result showed that there was a reduction in carbon dioxide concentration by approximately 50.5 ppm between March 2020 and January 2021 inclusive. This is majorly due to reduced human activities that led to decreased consumption of energy. Also, the CO_2 concentration trend follows the business-as-usual scenario (BAU) path. From the models, the pessimistic, business-as-usual, and optimistic scenarios give CO_2 concentration of about 545.9 ppm, 408.1 ppm, and 360.1 ppm, respectively, on December 31st, 2021. This research helps paint the picture to the policymakers of the relationship between energy sources and CO_2 emissions. Since the reduction in CO_2 emission was due to decreased use of fossil fuel as there was a decrease in economic activities, then if Kenya relies more on green energy than fossil fuel in the post-COVID-19 period, there will be more CO_2 emission reduction. That is, the CO_2 concentration trend is likely to follow the optimistic scenario path, hence a reduction in CO_2 concentration of about 48 ppm by the end of the year 2021. This research recommends investment in solar energy by energy-intensive companies, mine machinery and equipment maintenance, investment in electric vehicles, and doubling tree planting efforts to achieve the 10% cover.
Keywords : forecasting, greenhouse gas, green energy, hierarchical data format