

A Critical Review of Air and Water Pollution in Hyderabad and Teleganna Districts & Optimization Performance Using Data Envelope Method (DEA)

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Abstract: In this paper, we have made a comprehensive review of air and water pollution in Hyderabad urban and rural area, where the industrial pollution emissions are uncontrollable. Apart from Hyderabad area, we will be focusing on Teleganna districts industries which are discharging emission to atmosphere and as well as ground water pollution. We will be collecting the data of NO_x, SO_x and particulate matter from field surveys and experimental analysis from sample collection of smoke, air and water. The main purpose of this project is to evaluate the collected observe Results using data envelope method (DEM).

Keywords: air water pollution, data envelope method and emissions.

Introduction:

Srisailam Gogula, David Wilson Narisinga, Mohammed Vaseem, Sunder Kumar [4] presented in their technical paper the ground water samples are collected in different seasons that is pre-monsoon and postmonsoon in the year 2016 for analysis from various places of Rangareddy district (Medchal) in Telangana State. The Physico-chemical parameters such as pH, total dissolved solids, chloride, fluoride, nitrate, Sulphate, hardness (CaCO₃, MgCO₃), sodium, potassium are analyzed with different analytical methods used by technical instruments. P Mahammed Rafi and Acharya Jyothi Kusuma [5] presented in their technical paper that the Hussain Sagar lake water body over Arulneyam D and Premsudha R [7] presented in their technical paper assessing groundwater quality of Saroor Nagar Mandal in Hyderabad City of Telangana state. The study has been carried out in 6 locations of Saroornagar Mandal during pre-monsoon and post monsoon seasons by collecting 12 nos of bore water samples. Nine parameters were chosen for the analysis. From this study, it was observed that calcium content was higher in few locations while other parameters were within the permissible limits.

Jianping Fan Weizhen Yue Meiqin Wu [8] presented in their technical paper interval data envelopment analysis by combining traditional data envelopment analysis models with error propagation and entropy, uses idea of the modified cross efficiency to get the ultimate cross efficiency of decision making units in the form of error distribution and ranks decision making units using the calculated ultimate cross efficiency by directional distance index. They proposed the feasibility and effectiveness of the method by applying it to measure energy efficiency of regions in China considering environmental factors.

Basem Shomar, Sami Abu Fakher, Alfred Yahya [9] presented in their technical paper about geographical information system tool was used to construct thematic maps for groundwater quality in the gaza strip. Environmental data were integrated and an overall picture about the spatial variation in the groundwater quality of the gaza strip was defined. An environmental hot-spots map was derived from potential contaminating sources, showed direct and indirect influences on groundwater quality. The geographical information system maps showed not only contaminant distributions but also illustrated the need to improve the groundwater quality management methods. Several contaminants pose great problems in the water of gaza.

Arun Paul Saini [10] presented in their technical paper the linear programming model utilizing the data envelopment analysis methodology to assess the relative efficiencies of thirteen airlines. The model consumes operational and financial performance indicators of the airlines, as well as abatement success measured as a function of the carbon dioxide emissions produced by the airline operations. The study analyzed airline activities from 2013 to 2015. The results of the study indicated that the linear programming model was successful in measuring the carbon dioxide emissions abatement. The study provides theoretical and practical contributions to airline efficiency research. The study was the first to include environmental impact abatement expense as an input into airline decision-making for an overall airline efficiency model, as opposed to an output which was calculated as part of an optimization strategy focused on capacity or revenue generation.

Danijela Rabar [11] presented in their technical paper a literature overview on the application of data envelopment analysis to studies that empirically explore socio-economic efficiency of organization for economic co-operation and development member countries.

Uri Dayan, Philippe Ricaud, Régina Zbinden, and François Dulac [12] presented in their technical paper about eastern mediterranean was one of the regions in the world where elevated concentrations of primary and secondary gaseous air pollutants

have been reported frequently, mainly in summer. This review discusses published studies of the atmospheric dispersion and transport conditions characterizing this region during the summer, followed by a description of some essential studies dealing with the corresponding concentrations of air pollutants such as ozone, carbon monoxide, total reactive nitrogen, methane, and sulfate aerosols observed there.

Tropospheric ozone concentrations observed in the summer over the eastern Mediterranean are among the highest over the Northern Hemisphere. The three essential processes controlling its formation are long-range transport of polluted air masses, dynamic subsidence at mid-tropospheric levels, and stratosphere-to-troposphere exchange are reviewed. Airborne campaigns and satellite-borne initiatives have indicated that the concentration values of reactive nitrogen identified as precursors in the formation of Troposphere ozone over the eastern Mediterranean were found to be 2 to 10 times higher than in the hemispheric background troposphere. Several factors favor sulfate particulate abundance over the eastern Mediterranean. Models, aircraft measurements, and satellite-derived data have clearly shown that sulfate has a maximum during spring and summer over the eastern Mediterranean. The carbon monoxide seasonal cycle, as obtained from global background monitoring sites in the eastern Mediterranean was mostly controlled by the troposphere concentration of the hydroxyl radical and therefore demonstrates high concentrations over winter months and the lowest concentrations during summer when photochemistry was active. Modeling studies have shown that the diurnal variations in carbon monoxide concentration during the summer result from long-range carbon monoxide transport from European anthropogenic sources, contributing 60 to 80% of the boundary-layer carbon monoxide over the eastern Mediterranean. The values retrieved from satellite data enable us to derive the spatial distribution of methane, identifying August as the month with the highest levels over the eastern Mediterranean. The outcomes of a recent extensive examination of the distribution of methane over the troposphere Mediterranean Basin, as part of the Chemistry-Aerosol Mediterranean Experiment program, using model simulations and satellite measurements, are coherent with other previous studies. Moreover, this methane study provides some insight into the role of the Asian monsoon anticyclone in controlling the variability of methane pollutant within mid-to-upper troposphere levels above the eastern Mediterranean in summer.

Ali Al-Hemoud, Layla Al-Awadi, Mufreh Al-Rashidi, Khan Abdul Rahman, Ahmed Al-Khayat and Weam Behbehani [13] presented in their technical paper to assess indoor air quality during a complete school calendar year and covered all climatic seasons. IAQ parameters were examined to assess pollutant levels in Kuwait schools in multiple settings (classrooms, painting rooms, computer labs, science rooms, teachers' rooms, and roofs). Indoor air investigation included: CO₂, SO₂, NO₂, H₂S, formaldehyde, acetaldehyde, TVOC, and nine elemental concentrations of PM₁₀, namely: As, Co, Cr, Fe, Pb, V, Al, Cd, and Hg.

Maher Elbayoumi Nor Azam Ramli Noor Faizah Fitri Md Yusof [14] presented in their technical paper potential adverse effects on children health may result from school exposure to airborne particles. The variations of indoor and outdoor PM₁₀ and PM_{2.5} concentrations in inner urban city and overpopulated camps school buildings located in the Mediterranean area were evaluated. Thirty six classrooms in twelve school buildings were investigated during fall, winter and spring seasons of 2011 and 2012. The results of the study show there were greater masses of PM₁₀ and PM_{2.5} indoors that controlled by outdoor sources. For urban schools, the average concentration of indoor PM₁₀ and PM_{2.5} were 320.0 µg/m³ and 86.2 µg/m³, respectively. Meanwhile, the average concentration of indoor PM₁₀ and PM_{2.5} for overpopulated camps schools were 396.5 µg/m³ and 109.0 µg/m³, respectively. Almost all PM showed I/O ratios higher than one which denotes an important contribution from indoor source at urban and overpopulated camps schools.

Dayan, U., Ricaud, P., Zbinden, R., and Dulac, F [15] presented in their technical paper Carbon monoxide was produced in the incomplete combustion of carbon-containing fuels, such as gasoline, natural gas, oil, coal, and wood. The largest anthropogenic source of carbon monoxide in the United States was vehicle emissions. Breathing the high concentrations of Carbon monoxide typical of a polluted environment leads to reduced oxygen transport by hemoglobin and has health effects that include headaches, increased risk of chest pain for persons with heart disease, and impaired reaction timing. In the 1960s, vehicle emissions led to increased and unhealthy ambient Carbon monoxide concentrations in many U.S. cities. With the introduction of emissions controls, particularly automotive catalysts, estimated Carbon monoxide emissions from all sources decreased by 21% from 1980 to 1999 (EPA 2001a). Average ambient concentrations decreased by about 57% over the same period (EPA 2001a).

Peng Zhou, Kim Leng Poh, Beng Wah Ang [16] presented in their technical paper This chapter gives an introductory text on applications of DEA to environmental performance measurement by describing the formulation of environmental DEA technologies as well as radial and non-radial DEA models for constructing pure environmental efficiency/productivity index. A case study on measuring the environmental performance of OECD countries is presented. Future directions of DEA applications to environmental modeling are discussed with reference to several recent developments in this area.

Anil Kumar Singhdeo and Nilamadhab Suna [17] presented in their technical paper the concentration of the pollutants sulphur dioxide, nitrogen oxides, particulate matter (PM₁₀) and total suspended particulate (TSP) generated from various sources like automobiles, industries over the ambient air quality of the NIT Rourkela campus. As such Rourkela was a big city and it is not possible to measure the concentration of these major pollutants in all areas, so we have restricted our study to our institute campus. The results will show the concentration of emissions of the above cited gaseous and suspended solid pollutants and will be compared with the permissible concentrations as per the standards given by CPCB for an industrial area and major precautions can be taken to reduce the concentration level of these pollutants.

Komalkirti Apte, Sundeep Salvi [18] presented in their technical paper to understand the various sources of household air pollution, the effects on health, and strategies to deal with this emergent risk factor of global mortality and morbidity. Jaesung Choi and

David C. Roberts [19] presented in their technical paper the Malmquist environmental productivity index to consider the effects of air pollution on productivity growth in the air and truck transportation industries, which are the biggest air polluters in the US. This study finds that on average, the air transportation industry does not increase actual productivity with an air pollution reduction, but the truck transportation industry positively grows with a reduction in one of the air pollutants studied (carbon monoxide, particulate matter) or both from 2008 to 2011, suggesting entering a period of environmentally sustainable transportation industry growth.

Xiaohua Song, Xiao Jiang, Xubei Zhang and Jinpeng Liu [20] presented in their technical paper the thermal performance of Chinese thermal power companies under the background of carbon trading as the study object, designs a measurement method for the environmental costs of thermal power companies, and analyzes the influence mechanism of the environmental cost based on the principle of system dynamics. Relying on the correlation analysis between environmental costs and business performance of thermal power companies, the company's business performance was evaluated by data envelopment analysis efficiency. This paper closely integrates the actual background of carbon trading, including carbon transaction costs into environmental costs, and conducts an econometric analysis. It constructs a composite measurement of environmental costs that accounts for carbon transaction costs and conducts performance evaluations of power generation companies based on factors such as environmental costs, which all has a certain degree of innovation. Timo Kuosmanen & Mika Kortelainen[21] presented in their technical paper The purpose of this paper is to present basic principles of data envelopment analysis and evaluate its application possibilities for a range of environmental valuation problems. We show how data envelopment analysis has to be adjusted to the context of environmental performance, eco-efficiency and Cost-Benefit analysis. By modifying the traditional data envelopment analysis framework to the specific features and purposes of environmental application we show that the valuation principles to which data envelopment analysis was based on can offer useful insights and complement the conventional toolbox of environmental economists in valuation of the environmental services in general.

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Conclusion:

1. Using data envelope method, the statically and experimentally, new model will developed in this project. Using modified theoretical liner model that is data envelope method for evaluating the inputs and outputs variables obtained from experiments carried out and other sources of water and air pollutants.
2. Using analytical equations from literature, the analysis of the data available for evaluating the performance of the efficiency from environments factors is our main aim in the present work.

