

## **Analysis of the Impact of Physical Land Use Parameters on the Dispersion of Air Pollution Case Study: Sirjan Steel Industrial Area**

**Introduction:** Air pollution in industrial zones remains a significant environmental challenge, with land use and its physical characteristics playing a crucial role in determining the dispersion patterns of airborne pollutants. This study aims to analyze the impact of key physical land use parameters albedo, surface roughness, and surface moisture on the dispersion of air pollutants within the Sirjan Steel Industrial Area.

**Material and Methods:** The research employs the AERMOD model, a widely validated air dispersion model, using five years of meteorological data along with land use characteristics to simulate pollutant distribution.

**Results and Discussion:** The study finds that the measured pollutant concentrations in the Sirjan Industrial Area remain within acceptable environmental standards, suggesting that land use characteristics play a role in naturally regulating air pollution levels. This insight is crucial for urban and environmental planners, as it highlights the importance of considering land surface properties in industrial zone design. The findings advocate for strategic urban planning that integrates green spaces and modifies surface characteristics to enhance air quality.

**Conclusion:** To mitigate pollution and enhance air quality in industrial settings, the study recommends implementing land use planning strategies that increase albedo in industrial areas and optimize vegetation cover to manage pollutant dispersion effectively. Additionally, integrating urban greening initiatives and adjusting zoning policies could contribute to more sustainable industrial development. This research underscores the necessity of incorporating physical land characteristics into air pollution control strategies, particularly in industrialized regions. Future studies should explore dynamic land use changes over time and their long-term implications for air quality management, particularly under evolving climatic conditions.

**Keywords:** Physical parameters of land, albedo, surface roughness, pollutant dispersion, AERMOD modeling.