Building Greener Cities: Utilizing Geospatial Data for Sustainable Urban Planning

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Research Motive

The research motive stems from the pressing environmental challenges facing major Indian cities, notably chronic air pollution and frequent flooding. As a megacity, Delhi bears an annual environmental degradation cost of $80 billion, with only 19% of its area planned as green space, contributing to its status as one of the most polluted cities globally. The research is primarily sparked by the observed correlation between high vehicle exhaust concentrations and elevated PM2.5 levels in Delhi, inferred from satellite imagery data. Leveraging geospatial analysis, the study aims to prioritise interventions to mitigate pollution levels and improve public health outcomes.

Aim & Objectives:

The research aims to develop a comprehensive framework for sustainable urban planning in Delhi, utilizing geospatial data to address prevalent environmental challenges. Specific objectives include

- **Air Quality Analysis:** Utilizing satellite imagery and ground-based monitoring data to map the spatial distribution of PM2.5 concentrations across Delhi for 2020-2023.
- **Flood Risk Assessment:** Leveraging DEMs, LiDAR data, and historical flood maps to create a detailed flood risk map for Delhi, identifying areas vulnerable to inundation during various flood scenarios.
- **Rainwater Harvesting Potential:** Analyzing rainfall data to identify suitable areas for implementing rainwater harvesting systems, aiming to reduce the city's dependence on groundwater resources and promote sustainable water management practices.

Value Proposition:

As a participant in Esri India's Young Scholar competition, my project, "**Building Greener Cities: Utilizing Geospatial Data for Sustainable Urban Planning**," offers a unique and comprehensive approach to addressing pressing environmental challenges in urban areas. Leveraging advanced geospatial data analysis techniques, my research provides actionable insights for policymakers and urban planners to create more sustainable and resilient cities.

By integrating geospatial data from satellite imagery, air quality monitors, and socioeconomic indicators, my project identifies key areas of concern such as air pollution hotspots, flood-prone zones, and water scarcity areas. This data-driven approach enables targeted interventions and strategic decision-making to mitigate environmental risks and improve the overall quality of life for residents.

Moreover, my research goes beyond mere analysis by proposing practical solutions and implementation strategies. From promoting rooftop rainwater harvesting to enhancing green infrastructure and optimizing land use planning, each recommendation is tailored to the specific needs and challenges of Delhi, demonstrating a commitment to tangible and impactful outcomes. Lastly, I also propose a practical four-stage framework for sustainable urban planning that integrates geospatial data analysis at every stage.

Why I Should Be Esri India's Young Scholar:

My project, "**Building Greener Cities: Utilizing Geospatial Data for Sustainable Urban Planning**," is not simply theoretical; it's a blueprint for action. Through meticulous research and advanced analytical techniques, I have uncovered invaluable insights into addressing some of the most pressing environmental challenges faced by urban communities like Delhi. From analyzing satellite imagery to mapping air pollution hotspots and identifying flood-prone areas, every aspect of my research demonstrates a profound understanding of the complexities of urban sustainability.

Moreover, my project's significance extends beyond academia—it has real-world implications for improving the lives of millions of people living in urban environments. Winning the Esri India Young Scholar program would be a tremendous honour. It would provide me with the platform and resources to refine my framework and collaborate with experts in the field.

As a Young Scholar, I would not only benefit from Esri's cutting-edge tools and resources but also gain access to a global network of experts and thought leaders in the field. Furthermore, being selected as Esri India's Young Scholar would not only validate my dedication and hard work but also catalyze future endeavours.

This Esri India Young Scholar program isn't just a competition for me – it's a platform to showcase the transformative potential of geospatial data analysis in tackling the very real challenges faced by Indian cities. I am Naman Agarwal, and I am confident that my passion, analytical skills, and commitment to data-driven solutions make me the ideal candidate for Esri India's Young Scholar program.