



**The 2020 University of Chicago Undergraduate Research Symposium Proceedings: Abstract**

**Comparative Urbanism in Island Cities**

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With continuously advancing technology, such as machine learning, new pathways into analyzing urban form have risen. Using street view imagery to detect infrastructure and other features of urban development, a novel human-centric analysis of urban form is applied to five island cities. With easily collectable data, high potential exists for applying this analysis in the fields of comparative urbanism and urban morphology. For comparative urbanism, the sequence of cities by level of development corresponds to the extent of protected land and stringency of conservation efforts on each of the islands and is not ordered by proximity to mainland as expected. The cities also order themselves with Global North and South classifications which is an unexpected but important result, supporting the relationship between development and wealth. For urban morphology, the use of street view imagery lends itself to defining continuous urban area as perceived by the residents of the city. The highest potential for growth and application is in this area as improvements in machine learning will lead to identifying more features and therefore creating more accurate distinctions of urban areas based on continuity of urban features.



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**The Relationship between Spatial Structures and Economic Activity in Puerto Baquerizo Moreno, Galápagos Islands**

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The Galápagos Islands is sacred due to its reputation as a premier location for wildlife-viewing and its high regard as the place that inspired a whole new generation of sciences. Its popularity with tourists climbs every year and mainland Ecuadorians seek to capitalize on the economic activities that tourism brings to the Islands. Tourism often paves way for urbanization, but on the Islands, this growth is capped at 3% of the Galápagos's land area while the rest is preserved for environmental conservation. The aim of this paper is to understand how spatial structure might affect economic activity on Puerto Baquerizo Moreno of San Cristobal Island within the context of limited urban growth and potential densification. Using amenity points from OpenStreetMap and store sign points and advertising sign points from Mapillary as proxies for economic activity, I run multivariate linear regression, linear regression, and Pearson Correlation tests to statistically determine the relationship between spatial structure and economic activity. These numbers are used to highlight a statistically backed understanding of how neighborhoods in Puerto Baquerizo Moreno are spatially structured and how their structures are related to areas of economic opportunity.



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**Calculating Solar Energy Potential for Energy Independence: An Assessment of the Galápagos Islands**

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Accelerating the transition of island communities away from dependence on fossil fuels is essential to improving livelihoods and community resiliency. Although various modeling tools have been developed to estimate solar potential, such tools require high-resolution data that do not exist for many developing countries or remote areas. In our study, we calculate the potential of rooftop solar systems using low-cost, readily obtainable data and methods. The methods can be replicated by decision makers to obtain an initial indication of potential before investing in a more detailed analysis. We demonstrate the methods on the two major urban centers on the Galápagos Islands, Puerto Baquerizo Moreno and Puerto Ayora. Our results show that a minimum of 21% and 27% of rooftop area must be covered with current solar energy production technology to meet the current electric energy demand of Puerto Baquerizo Moreno and Puerto Ayora, respectively. Additionally, results demonstrate that Puerto Baquerizo Moreno has a higher production potential than Puerto Ayora, making it an attractive option for solar development that does not compete with the scarce local land resources.



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**A Geospatial Analysis of Association Between Armed Conflicts and Educational Inequality in India (2016-2017)**

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This research is a primitive attempt to give an assessment on the spatial relationship between armed conflicts and educational inequality in India, in order to answer the question: are armed conflicts in India more likely to happen in areas with lower inclusion at primary education? Or in other words: is educational inequality a good standard to consider while analyzing the number of armed conflicts? My initial hypothesis is that there is a negative correlation: a higher rate of armed conflicts corresponds to lower educational equality. Using spatial and statistical analysis, I compare three different groups of parameters related to education: general educational situation (with parameters including literacy rate, enrollment rate, etc.), educational infrastructure (including running water, electricity, toilets, playground, etc.), and gender equality in education, to the rate of armed conflicts by districts (with more specific rates of protests, battles, explosions, etc.). The mathematical results give mostly insignificant correlative coefficients and suggest no supporting evidence for my initial hypothesis that a generally lower rate in educational equality would likely happen at a district with more conflicts. However, there is strong evidence for a positive correlation between the rate of protest and enrollment rate (correlative coefficient of 0.553). This finding suggests that in areas with a higher enrollment rate, people are generally more educated, thus they are more informed and aware of social inequality and more willing to fight against it. On the other hand, it is also possible that participating in, and being informed about, protests and their intention give people educational incentives. Therefore, this research is helpful to further examine the demographic of political activism and youth participation in demanding justice.