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A GRID-SQUARE STATISTICAL APPROACH IN DATA ORGANIZATION FOR URBAN GROWTH IMPACT ASSESSMENT ON IN-AND-OUTDOOR THERMAL CONDITION IN MANILA CITY, PHILIPPINES

Abstract

Urban growth has been observed to be progressively increasing globally as the world's population tends to live in the cities and its surrounding areas. This change, the urban heat emergence for example, affects human living conditions. Results such as thermal discomfort, high prevalence of heat related health conditions, air pollution, increased water usage and energy demand for air conditioning is now receiving more attention. Because of this impact, it is of utmost importance to understand the cause and trends of urban growth in relation to the changes in thermal conditions. Once we understand the relationships between the factors mentioned, it will be possible to predict future trends and therefore assess their impacts before they even happen. This paper provides the use of world grid square statistical approach as a preliminary method in organizing the data to be used in urban growth impact assessment on in-and-outdoor thermal condition in Manila City, Philippines. This approach is aligned with the Japanese national standard for grid-square code (JIS X0410) which is extended for worldwide usage. It is implemented by dividing the locale into small mesh based on latitudinal and longitudinal line with a fixed partition. With these small meshes representing a small area in the locale, parameters from different range of sources such as land surface temperature from remotely-sensed (satellite imagery) and in-situ terrestrial data, population, energy and water consumption and weather data can be incorporated in the generated mesh grids. This method shall allow easy comparison of area characteristics without being affected by the change of administrative boundaries of towns, municipalities and districts. In addition, the mesh grid shall serve as a basic boundary unit to provide additional statistical data in the future. Moreover, the proposed system shall allow ease in data linkage and data processing, mapping, data creation in each area, observation area definition and numerical unit in simulation. Once these data are organized in the mesh grids, matrix of values shall be inputs for statistical analysis of data and parametric inputs for predictive models using machine learning methods. Applying the approach in Manila City results to generating 2112 grids with maximum area of 0.02 sq. km and will consequently be populated with data for assessing the impact urban growth on in-and-outdoor thermal condition.