Management of Urban Heat Island Effect for enabling More Climate-Resilience Cities based on Urban Ecological Planning as a basic unit of Land Administration Domain Model

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SUMMARY

Each human intervention in nature causes ecological disturbances in the ecosystem. Uncontrolled and unplanned urbanization results in degradation of natural land areas, inadequacy of open green spaces in urban lands and practices such as industrialization infrastructure not compatible with planning, all of which accelerate these deteriorations. This situation particularly has negatively impacts climate change and reduces the resilience of cities because of climate change. Thus, these changes in urban climate, urban ecological degradation and the increase in energy usage are interrelated. All of these disturbances affect the urban climate and lead to urban heat island(s) effect(s). This study focuses on the real time identification and definition of the urban heat island (UHI) effect as a major component in the urban planning process and to apply it as a core standard in the urbanization process using Unified Modeling Language (UML) tools. Thus, the ecological effects of urban green and urban blue infrastructure, which are significant components of the cities mainly on building urban ecological corridor(s), are aimed to be evaluated regarding their impact on the UHI. Efforts have been made to develop an urban ecological planning infrastructure integrated with spatial unit(s) of Land Administration Domain Model (LADM). It has been outlined that representation of (i) urban heat island effects index (ii) ecological indicators and (iii) climate resilience methods on mitigation of UHI effects on cities need to be integrated with geo-spatial domains. To this end, the UHI effect should be mapped and analyzed in real-time using Geographic Information Systems (GIS) and Remote Sensing Technologies. As a result of this analysis, the ecological importance of urban greenery and urban blue infrastructure have a crucial role on urban cooling. Especially (i) the influence of urban green parks on the formation of urban heat islands, and (ii) the requirements within the framework of urban green infrastructure sustainability and (iii) conservation have been identified. Additionally, it has been concluded that the urban climate concept, along with urban ecological data, should be a significant parameter in establishing sustainable urban climate resilience infrastructure.
