Development of a Mobile APP for Establishing Thermal Sensation Maps using Citizen Participation

Authors : Jeong-Min Son, Jeong-Hee Eum, Jin-Kyu Min, Uk-Je Sung, Ju-Eun Kim

Abstract : While various environmental problems are severe due to climate change, especially in cities where population and development are concentrated, urban thermal environment problems such as heat waves and tropical nights are particularly worsening. Accordingly, the Korean government provides basic data related to the urban thermal environment to support each local government in effectively establishing policies to cope with heat waves. However, the basic data related to the thermal environment provided by the government has limitations in establishing a regional thermal adaptation plan with a minimum unit of cities, counties, and districts. In addition, the urban heat environment perceived by people differs in each region and space. Therefore, it is necessary to prepare practical measures that can be used to establish regional-based policies for heat wave adaptation by identifying people's heat perception in the entire city. This study aims to develop a mobile phone application (APP) to gather people's thermal sensation information and create Korea's first thermal map based on this information. In addition, through this APP, citizens directly propose thermal adaptation policies, and urban planners and policymakers accept citizens' opinions, so this study provides a tool to solve local thermal environment problems. To achieve this purpose, first, the composition and contents of the app were discussed by examining various existing apps and cases for citizen participation and collection of heat information. In addition, factors affecting human thermal comfort, such as spatial, meteorological, and demographic factors, were investigated to construct the APP system. Based on these results, the basic version of the APP was developed. Second, the living lab methodology was adopted to gather people's heat perception using the developed app to conduct overall evaluation and feedback of people on the APP. The people participating in the living lab were selected as those living in Daegu Metropolitan City, which is located in South Korea and annually records high temperatures. The user interface was improved through the living lab to make the app easier to use and the thermal map was modified. This study expects to establish high-resolution thermal maps for effective policies and measures and to solve local thermal environmental problems using the APP. The collected information can be used to evaluate spatial, meteorological, and demographic characteristics that affect the perceived heat of citizens. In addition, it is expected that the research can be expanded by gathering thermal information perceived by citizens of foreign cities as well as other cities in South Korea through the APP developed in this study.