

Urban Microclimate Management Directions

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Summary

- 1) Korea microclimate management policy should pursue socioeconomic benefits by improving public health and environmental sustainability
 - In summer in Korea, major cities pay a lot of social cost due to the urban heat island, which cause thermal stress in people, summertime peak energy demand and health risks due to the rise in power plant emissions (fossil fuel combustion) and ensuing increase in the ozone level.
 - An integrated direction for microclimate management is required to mitigate the effects of the urban heat island, enhance air quality and reduce summertime energy demand.
- 2) Urban heat island (UHI) occurs mainly due to the higher level of net radiation (greater heat retention) in artificial surfaces such as asphalt and concrete.
 - The results of a Seoul Metropolitan Area UHI survey at night showed that large UHIs are more abundant in the city's Gangbuk district than in Gangnam, in a first-class residential region than a third-class one and in an industrial complex than in a residential area
 - Large UHIs are more occasional when an urban area has more heat storage proportions, distance between buildings is narrow, a thermal energy storage of an artificial surface is bigger and ventilation in the area is poor.
- 3) Strategies for an integrated microclimate management system (land and environment)
 - Management strategies in phases are required for better implementation of urban microclimate in consideration of Korea's socioeconomic conditions
 - Expansion of urban green space and shadow areas should be conducted through utilization of both natural (i.e., urban forests and green roofs) and artificial mulching (i.e., cool roofs, solar parasols and PV panels) in a collaborative manner.
 - Sophisticated strategies and methods are required to better adopt urban microclimate and raise the environmental value of microclimate management.

Policy direction

- 1) Two directions are recommended for a microclimate-friendly urban environment:
 - ① improvement of ventilation via reconstruction of urban land cover and
 - ②

expansion of the smart urban shadow area to mitigate the effects of urban heat island due to the interaction between solar insulation and materials of higher thermal energy storage (e.g. asphalt and concrete).

- 2) Three types of management should be considered to prevent citizen complaints due to the expansion of artificial land cover in urban areas: ① esthetic urban landscape, ② durable and safe urban structure and functions and ③ sustainable coexistence between artificial systems and the ecosystem.