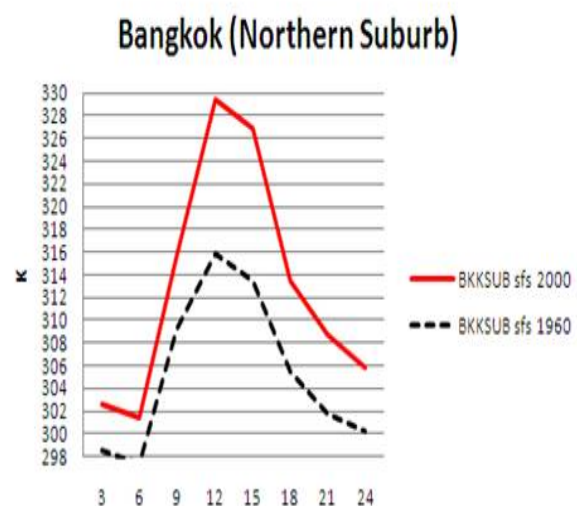
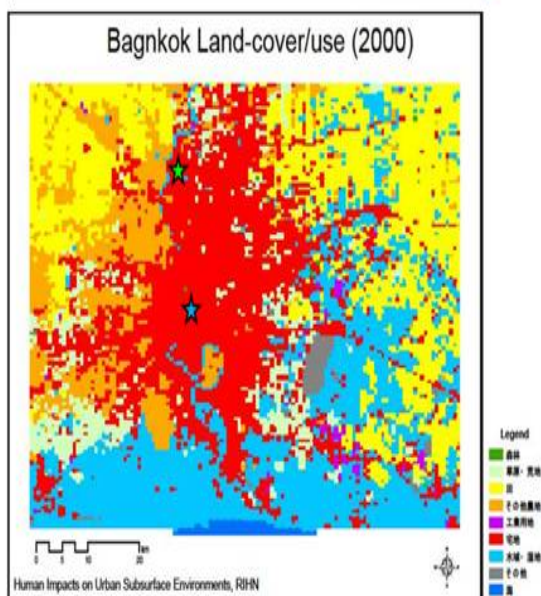
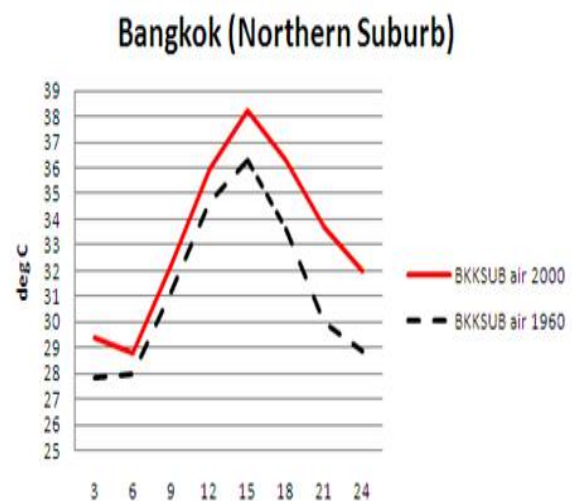
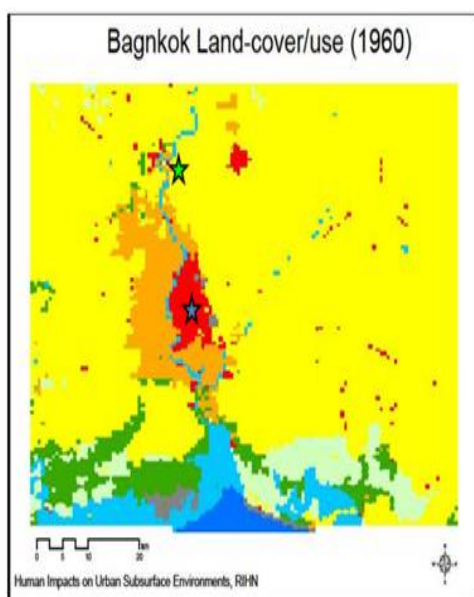


## Numerical simulations of recent urban warming in seven Asian mega-cities

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Land cover change in Bangkok  
 (by RIHN)

Warming of surface air temperature  
 and skin temperature  
 at the northern suburb of Bangkok  
 (Upper star in the map)

The authors applied a mesoscale climate model, CSU-MM (Pielke, 1974; Ichinose et al., 1999) to digital land use data of seven Asian mega-cities (Tokyo, Osaka, Seoul, Bangkok, Taipei, Manila, Jakarta) in two stages of the 20 Century, which were established by the following project, and performed numerical simulations ( $dx=dy=2\text{km}$ ;  $dt=15\text{sec}$ ) of urban warming related to recent urbanization. This research was financially supported by the project "Human Impacts on Urban Subsurface Environment" (Project Leader: Prof. Dr. Makoto Taniguchi), Research Institute for Humanity and Nature (RIHN). Variability of skin temperature computed in inputting these datasets to the numerical climate model as the surface boundary conditions will be compared to the vertical profile of subsurface temperature (Taniguchi et al., 2009) expected to recording historical series of skin temperature. Target date is typical fine and calm day in the hottest season. The end of March was assumed for cases of Bangkok and Manila, and the end of July was for cases of other cities. Most parameters used for these simulations are common with Ichinose (2003). In comparison of computed surface air temperature, Seoul showed the largest warming of 1 to 1.5 deg C in afternoon to dawn. However, difference of 2 to 3 deg C was given in the case of northern suburb of Bangkok where showed drastic land cover change from paddy field to urban area in the leeward of the city center. In cases of skin temperature, daily maximum temperature of every 3 hours appeared at noon, while at 3PM in cases of surface air temperature. In general, larger difference (around 1 deg C) between the two stages appeared at dawn. In Bangkok, presence of sea breeze probably brings a little decrease of skin temperature at the city center during the two stages. Extension of urban area to the leeward may enhance the wind speed of sea breeze passing through the city center and this enhances heat exchange between ground surface and atmosphere. The largest warming of skin temperature also appeared in the leeward of the city center and it exceeded 13 deg C at noon.

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