Build4People Project

Work Package #5: Urban Climate

Research Approach

INSPIRED BY

11 SUSTAINABLE CITIES AND COMMUNITIES

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Federal Ministry of Education and Research

RATIONALE & BACKGROUND

For city development of Cambodia the urban climate especially the urban heat island has to be considered. Dealing with the thermal and air pollution aspects it is crucial not only to deal with the presentation of large-scale mean climatic conditions, but also to assess differing observations of individual inner city local climates including their reciprocal interactions.

The main urban climate tools are urban climatic maps in different scales, which provide relevant information for planning and make qualitative as well as quantitative statements on thermal and air quality issues.

The maps demonstrate the thermal efficiency complex which refers to the effects of the total meteorological relevant aspects of the urban canopy layer (radiant heat, sensible and latent heat, anthropogenically generated heat, thermal circulation, wind).

THEORETICAL FRAMEWORK

Climatic systems describe areas with the same urban climatological characteristics. They are generated and influenced by morphological and city fabric factors. They include thermal load, ventilation and can also evaluate air pollution aspects. The climatope information on the territorial level is then used to specify recommendations depending on existing wind regimes and can also be used to make recommendations for specific planning purposes.

The underlying methodology for the map is to combine layers, which were deduced from land use maps or other maps, translated to thermal and dynamic aspects with weighting factors. These weighting factors range from building volume to heat storage, greenery to heat budget, openness to ventilation, roughness to wind speed and topographical information.

RESEARCH QUESTIONS

The task of planning-related urban climatology is to improve air quality and thermal conditions for a liveable city asking the relevant questions:

- How to reduce urban heat islands (heat island as an indication of thermal comfort / discomfort)?
- How to optimize urban ventilation (air exchange, ventilation lanes), urban planning and urban development for air quality and thermal comfort?
- What is the aim of open space planning?
- Are there possibilities to preserve or to promote fresh air or cold air influx areas to foster air exchange?

OBJECTIVES

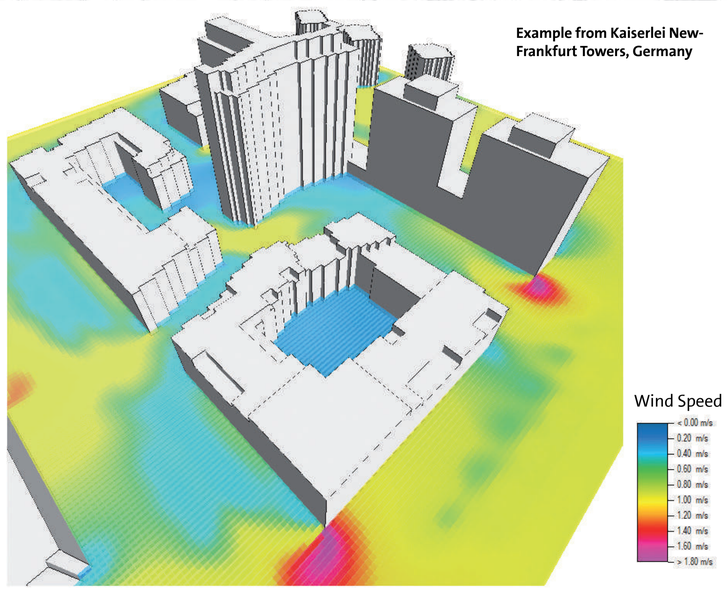
Within the Build4People project urban climate recommendation lead to more sustainable development and sustainable buildings. Consequently, formal planning needs to be addressed with climate information's. Additional informal planning analyses are needed to be part of the formal procedure.

The approach to urban climate issues should incorporate a planning approach to urban climate investigation methods and in their presentation of results.

Further objectives are:

- To increase quality of urban planning and building design with meso and microscale climatic analysis.
- To improve thermal and air pollution outdoor comfort by using urban climatic recommendation maps and analysis.

SIMULATION OF MICRO-CLIMATE

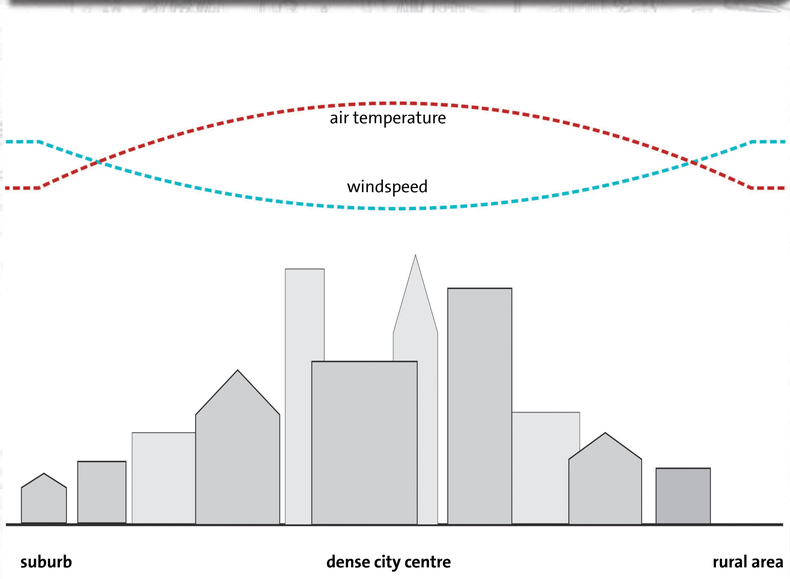


SOURCE: INKEK GMBH INSTITUT FÜR KLIMA- UND ENERGIEKONZEPTE (MODELLING BY SEBASTIAN KUPSKI)

MILESTONES OF THE DEFINITION PHASE

- First conceptualisation of an urban climate map
- Baseline Report: Measuring urban quality of life from an urban climate perspective.
- Input to eco-city model pilot project
- Input to touring exhibition „Green Buildings and Sustainable Neighbourhoods"
- Consulting services and feasibility studies in the context of the Green School Demonstration project
- Exploration of urban-rural linkages in terms of urban climate and material flows
- Preparation of a solid theory-based proposal in regard to the RD-phase

URBAN HEAT ISLAND



SOURCE: OWN DESIGN.

OUTLOOK

Based on the previous analyses of urban climate conditions following perspectives and plans can be derived:

- Climate recommendations for urban master plans to characterize areas for city for development perspectives.
- Recommendations for zoning plans or neighborhood plans or blocks with detailed specifications.
- Recommendation for building design, building sites and building density
- Future perspectives will take the climate change into account, especially for open spaces and input of vegetation types.

URBAN CLIMATE MEASUREMENT EQUIPMENT

SOURCE: LUTZ KATZSCHNER.

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QR-code:
List of references cited within this poster / Further reading

WP#5 LEADER

INKEK institute for climate and energy strategies

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