

The park has its

A park influences its surroundings. Temperature inside and around the park varies in a special way. Air quality also varies. And the park creates its own wind system.

Why do we have parks in urban areas? Are they of any benefit to the town, and if so, in what way? Historically, parks have had many functions, from being "only" an aesthetic urban element to making the town more resistant to fires. In recent years, attention has mostly focused on how parks influence the environment in the town and how parks can be used in planning for a sustainable urban development. One of the points of interest has been the way parks influence climate in the town.

At the Department of Physical Geography, Göteborg University, research concerning urban climate has gone on since the 70s, with the support of the *Swedish Council for Building Research*. In recent years some of the research has focused on parks. Examples of important issues have been the way temperature varies inside and around parks during both the day and night, the way air quality varies inside and around parks, and whether parks create their own wind systems. Some of the ongoing projects were described in the autumn of 1999 in the form of the author's thesis "*Influence of Parks on Local Climate*" (Upmanis 1999).

Large parks are colder

The results of the thesis show that parks really create their own climates and that they also influence their surroundings in several ways.

Large parks, such as Slottsskogen



◆ A park such as Slottsskogen in Göteborg may be as much as 5.9°C colder during the night than its surroundings.

in Göteborg (ca 156 ha), may be as much as 5.9°C colder than their surroundings, especially during the night, while smaller parks of only a hectare or two may be up to 2°C colder than the surrounding built up area. It may be mentioned by way of comparison that the temperature difference in Göteborg between town (the urban heat island) and countryside is on average 5°C (Eliasson 1995). The park Slottsskogen also has a cooling effect on the surrounding buildings which may extend more than 1100 m from the park boundary.

In contrast, the influence of small parks on their surroundings is more

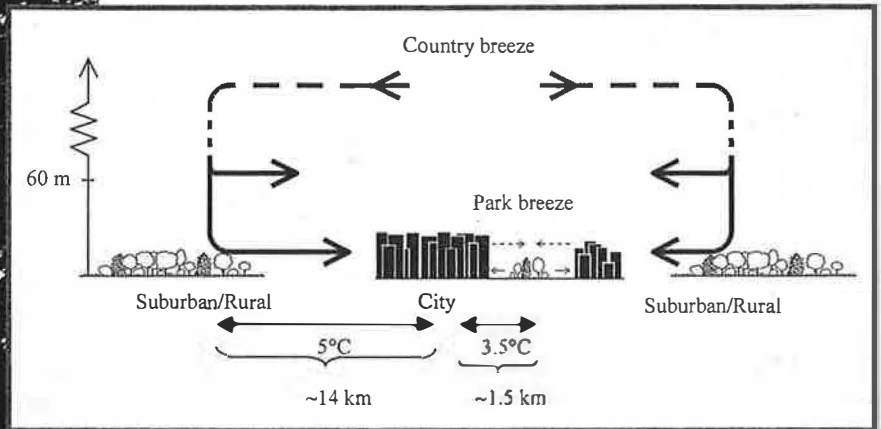
limited. The greatest differences in temperature occur on clear nights when wind speeds are low. As much as 40% of the temporal variation depends on wind speed and cloud cover, but wind direction also affects the temperature differences. During the day temperature differences are smaller than overnight, and temperature variations are largely dependent on the density of the town and the park, but even when this effect is disregarded, a park such as Slottsskogen is still about 1°C colder during the day than its surroundings.

Park breeze blows out of the park

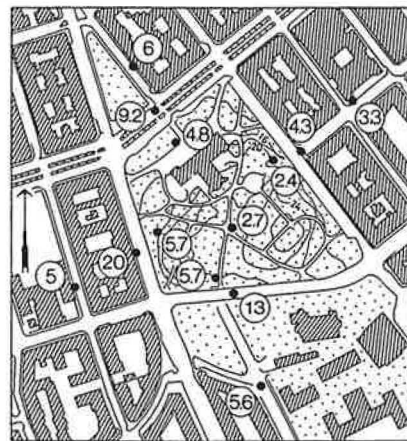
The question is whether this cooling

own climate

By Hillevi Upmanis



◆ Schematic illustration of the way the wind system of the park, the park breeze, interacts with the urban wind system, the country breeze. The temperatures are median values of the maximum differences between town and surrounding countryside and between town and park.



◆ Map of Vasaparken in Göteborg. The figures show the concentrations of benzene during the hours of maximum traffic on an autumn morning. The further inside the park, the lower the level of benzene.

effect is favourable or unfavourable for a town at our latitudes. On hot summer days the cool of the park is naturally positive, but the cooling effect of the park in winter can be a disbenefit since this may increase the energy needed for heating dwellings in the vicinity of the park.

In addition, during the night the difference in temperature between the park and buildings also gives rise to a wind system, with a weak wind out of the park towards the surrounding buildings (Häger and Svensson 1996, Upmanis 1999). This wind is called *park breeze*. This breeze arises during certain very calm and clear nights when the temperature diffe-

rence between park and town is greatest. Calm and clear nights are also the occasions when an inversion occurs which often creates very poor air quality in the town, and this breeze may therefore be important since it carries fresh air from the park into the town. It is however not quite clear how this wind system functions, and more investigations into this system are needed before the effects of the breeze can be determined with certainty.

Even a small park has pure air

Most studies of air quality in built up areas concentrate on spot measurements and temporal variations.

Very few studies have, on the other hand, been made into the spatial variation in smaller areas, and part of the thesis therefore concentrated on a study of air quality in and around parks, with the focus on the *hydrocarbons* benzene and toluene.

The results showed that at the times when wind speeds are relatively low there are large variations in benzene and toluene concentrations in space and time. There are large differences in concentration over only a few metres, for instance between the two sides of a street.

It was further found that the air in a small park is on the whole purer than in its surroundings, in spite of

the fact that it is surrounded by heavy traffic. However, air quality in a park may at times be worse than in surrounding streets, depending on the layout of the town around the park and the wind direction.

Studies of a larger park showed that concentrations of hydrocarbons rapidly decrease to a low level the further inside the park measurements are made, i.e. to between 1/3 to 1/9 of the concentration at the source which in this case was a street carrying heavy traffic at a distance less than 40 m.

Studies of wind systems

It is easy to see from the above examples that a park is of great importance for the climate in its surroundings. On the other hand, it is not always easy to judge whether the total effect of a park is positive or negative. If parks are to be used in the broader planning of a town, it is therefore very important to know what effects are to be achieved and to take into consideration all the properties of the park. It is also important to continue studies into urban climate and the way a park influences its surroundings. At the Department of Physical Geography, research is now carried further by two PhD students, Sofia Thorsson and Marie Svensson, who are taking a closer look at the small wind systems that are created inside the town, and the way climatic knowledge can be used in planning with the help of the Geographical Information System (GIS). It is to be hoped that the knowledge which this will produce will be used in planning the towns of the future.

Hillevi Upmanis has a PhD in physical geography at Göteborg University.
E-mail: hillevi@gvc.gu.se

Literature:

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SEK 62m

for research into the environment and sustainability

By Gunvor Forssell

25 projects concerning the environment and sustainability share SEK 62 m. The Swedish Council for Building Research has allocated SEK 30 m, and other co-funding authorities, organisations and firms contribute SEK 32 m.

The projects deal with sustainable development in the multistorey housing estates of the postwar years, environmental assessment methods, and a review to determine which environmental impacts are most significant in the construction sector.

The overarching goal of the Swedish Council for Building Research key action (i.e. concentrated research activity during a limited period) "Environment and sustainability in construction and management" is to develop a holistic approach and collaboration between different areas of expertise, to demonstrate how efficiency in the use of resources in construction and management can be increased by a factor of 10, and to show how environmentally hazardous substances can be phased out.

Four principal areas were designated for the key action: Environmental impacts in construction and management, User demands and user benefits, Techniques and methods for environmental adaptation, and Assessment methods. The importance of experiments and demonstration projects was also emphasised.

Projects which focus on existing buildings, the management phase and energy issues were pointed out as important.

86 applications which were of general interest and of good quality were received. Many satisfied several of the designated goals and criteria. Some examples of approved projects are given below.

Green targets in relation to land, buildings and people

One very interesting project is "Sustainable development in the housing estates of the 50s, 60s and 70s – green targets meet land, buildings and people". The project will be carried out at the Royal Institute of Technology KTH, School of Architecture, with *Sonja Vidén* as project manager.

The aim is to systematically compile, analyse and disseminate experi-