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From the IAUC President

Colleagues, hello. This is my first occasion to write as President of the IAUC. I hope that I am as successful as previous Presidents in pursuing the objectives of the IAUC.

It goes without saying that the IAUC owes a considerable debt of gratitude to Matthias Roth, the ex-President. One of the most important activities of the association is the ICUC events, which are held each three years. ICUC-7 in Yokohama was very successful despite the very difficult economic circumstances that prevailed during its organisation. The success of the event can be attributed to the considerable efforts of the local organising committee led by Manabu Kanda and the leadership provided by Matthias. There are two other achievements that I think deserve special mention.

One of these has been the involvement of the IAUC at the 3rd World Climate Conference (WCC3), entitled '**Better climate information for a better future**.' Matthias organised a session on 'Climate and more sustainable cities' at which two White papers were presented on urban climate capabilities & needs. These formed the basis for a submission that was included in the Conference Statement (available at http://www.wmo.int/wcc3/documents/WCC-3_Statement_07-09-09_mods.pdf). Although such a statement does not, by itself, change practice, its inclusion in the over-arching documents means that the interests of urban climatologists are no longer marginal to broader concerns for climate information, which thus far have regarded urban meteorological data as fatally contaminated. Hopefully, the call for careful observations in urban areas (where most of the planet now live) complemented by metadata that describe the circumstances under which they are made, will not fall on deaf ears.

Our growing relevance as a scientific organisation of merit is apparent in our invitation to the first Global Meeting of International Forum of Meteorological Societies (IFMS), which Rohinton Emmanuel writes about in this edition. The presentation to the IFMS is available at www.ifms.org. The structure of the IAUC, which relies on the goodwill of members and operates without a budget, was commented upon favourably at this meeting. This is a tribute to the smooth running of the IAUC organisation, which to-date has been remarkably free of any acrimony. This is in large part attributable to Matthias' calm demeanour and the efficiency of Jennifer Salmond as Secretary. Two areas of the IAUC were singled out for particular mention as innovative projects that are the envy of much larger and better resourced organisations: *Urban Climate News* that has, under the editorship of David Pearlmutter, evolved into a highly professional publication and; the *Bibliography* project, overseen by Julia Hidalgo, is seen as a valuable resource other organisation would do well to imitate.

We also owe a debt of gratitude to other Board members that are stepping down at this juncture. This includes Benedicte Dousset who has been a great advocate for the IAUC for many years and Kevin Gallo who has studiously managed and maintained our most important resource, the membership information.

However, as the IAUC grows in size and scope it will have to address some challenges, some of which have already arisen and others of which can be anticipated. At the IFMS meeting, I identified the following as key:

- Adoption of a formal constitution,
- Sustaining momentum through new initiatives and volunteers,
- Needing funds to support initiatives,
- Overcoming a reliance of relatively few high profile individuals,
- Ensuring that it becomes a genuinely international organization, and
- Providing leadership in developing areas of research.

I hope that over the next three years I can address some of these issues and continue to rely on the volunteer work of IAUC members.

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Inside the Spring issue...

Benefits and opportunities of the adaptation of geoinformatical software in outdoor human comfort studies

1. Introduction

Because of the rapidly growing global population, more and more people have to live or work in urban areas – and the importance of thermal comfort investigations of urban public areas with recreational purposes continues to grow. There are many more factors that influence thermal comfort conditions in the open-air than indoors, as several studies have pointed out (Höppe, 2002; Nikolopoulou and Steemers, 2003; Thorsson et al. 2004; Knez and Thorsson, 2006). If the study concentrates on whether an urban public area is appropriate for recreation, more specified and more detailed information is needed about the investigated area on the one hand and about the visitors on the other hand.

The aim of the present paper is to recommend a methodology for the thermal comfort investigations of open public green areas (squares and parks) in urban environments. There is an emphasis on the advantages of using the geoinformatical software *ArcView* GIS 3.3, which could be a valuable tool to collect, process and visualize the data. The opportunities coming from adapting this software will be demonstrated through a study in which the data were collected using human monitoring and environmental monitoring.

2. Steps of the human comfort study carried out in Szeged

The study in Szeged (Hungary) aimed to reveal the recreational aspects of the area usage according to the thermal conditions. It was conducted in 2008 between 10 April and 15 May on every Tuesday, Wednesday and Thursday from 12 to 3 p.m.

A green area adjacent to the automatic meteorological station by the University of Szeged (on the Ady Square) was selected as the study area (Fig. 1). The main part is a great grassy area surrounded by a morphological step. Several old trees can be found on the northwestern side and there are 10 benches on the site, 8 along the pavement and 2 on the grass. The area is regularly visited by a high number of students throughout the academic year, which makes it suitable for this kind of comfort studies using meteorological measurements and human monitoring. The topography of the study area was mapped as a preliminary step prior to the field measurements. This

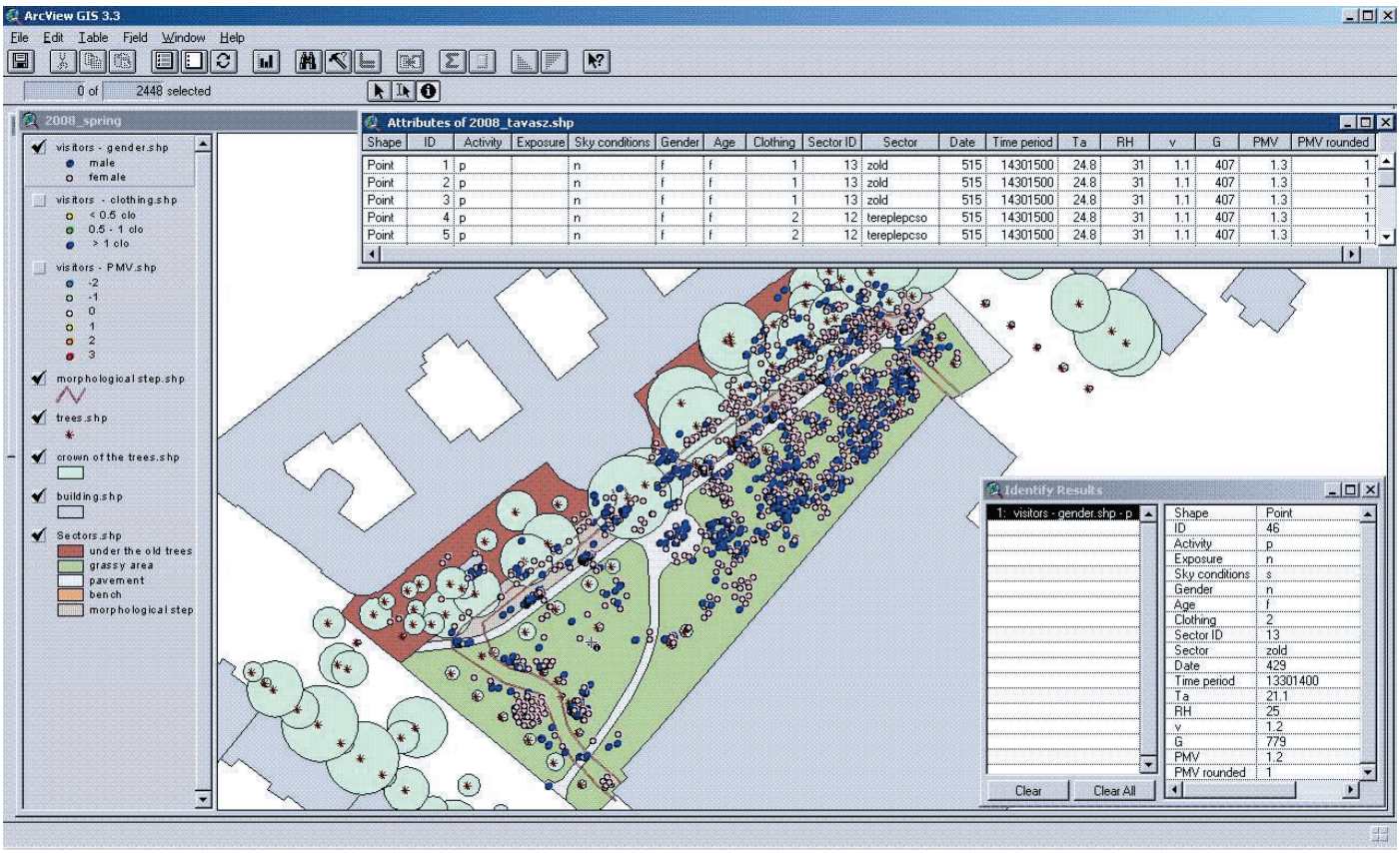

Figure 1. The investigated area in *ArcView*: green points mark the visitors' locations; the connected attribute table contains all of the observed and measured information (according to the whole dataset).

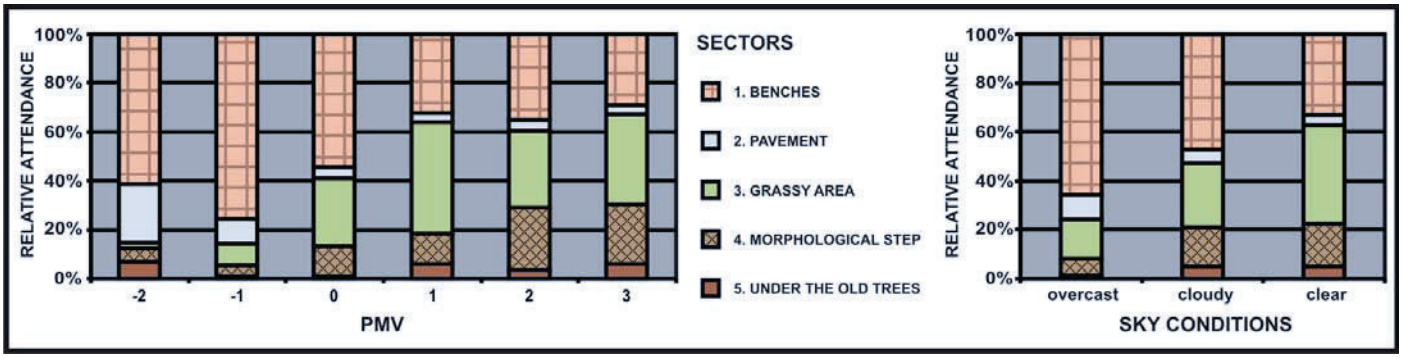

Figure 2. Relative attendance of the sub-areas according to the thermal and sky conditions.

consisted of recording the exact coordinates (x, y, z) of artificial and natural objects and different surface covers, as well as the measurement of the heights of trees and buildings. Besides full and trunk heights, trunk circumference and the crown radius of the trees were also registered. The georeferenced map of the study area was created with the *ArcView* GIS 3.3 software based on these data.

Human monitoring consisted of unobtrusive observations of people lingering on the site. The presence was measured cumulatively in half-hour periods. The locations of the visitors staying there in a given half-hour period were marked with ID numbers on a map of the area. (People only passing through the area were not included.) Each half hour between 12 and 3 p.m. on each measurement day had its own map which included the individuals' exact locations. Each of these had a connected table containing the marked visitors' gender (male / female), age (child, young / middle aged / old), position (sun / penumbra / shade), clothing (<0.5 clo, 0.5-1 clo, 1 clo<) and type of activity (active / passive). The ID counters started from 1 in every half hour period so the absolute cumulative attendance could be easily derived at the end of the given period. The observations produced 2448 datasets on the whole.

To describe the thermal conditions 10-minute averages of air temperature T_a (°C), air humidity *RH* (%), wind velocity *v* (m/s) and global radiation *G* (W/m^2) were obtained from a QLC50 type station by the site. As a first step of data processing, Fanger's Predicted Mean Vote (*PMV*) was calculated using the radiation and bioclimate model RayMan.

The tables of the collected personal characteristics were digitized in Microsoft Excel, then the half-hour averages of measured and calculated objective parameters were attached to these subjective data according to the time of the measurement. The investigation maps were digitized within *ArcView*. As a result, cumulative attendances were represented on a layer, which showed peoples' locations (Fig. 1). The attribute tables of this layer contained the marked visitors' ID numbers, the time intervals of the observations, and additionally the subjective and objective parameters which had been summarized earlier.

Due to the integrated data processing with *ArcView*, we are able to select anyone from the visitors of the area. We can query the selected visitors' personal data (gender, age, clothing, position, activity) and location, the time period (day, half hour) when they stayed in the area, and the thermal characteristics of the given time period (T_a, *RH*, *v*, *G*, *PMV*). The software makes it possible to select, aggregate or divide visitors into different groups according to any (combinations) of the above mentioned information (Fig. 1). The selection and aggregation can be made also on the basis of the registered visitors' locations. To study the spatio-temporal patterns of the area's

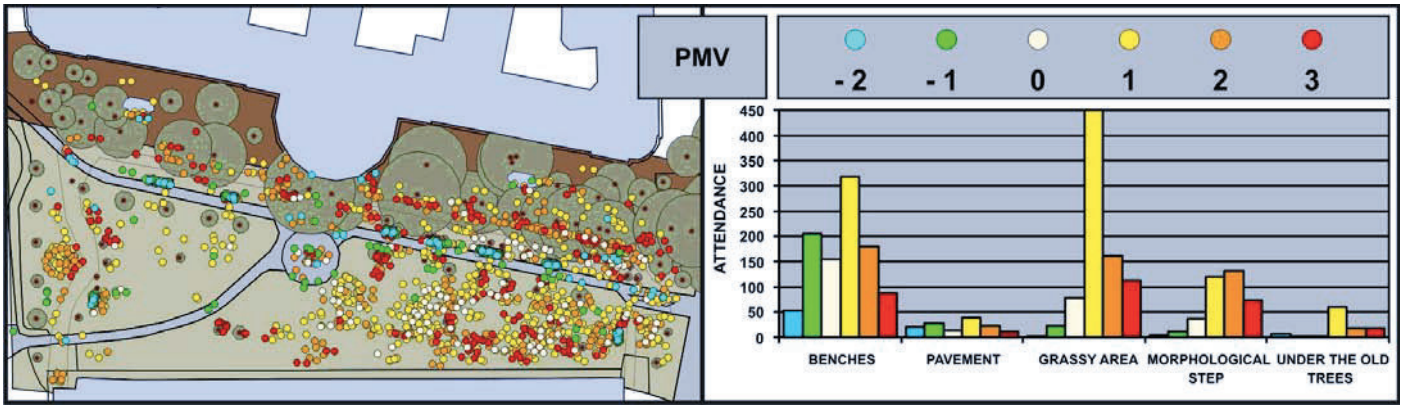

Figure 3. Spatial usage of the area (absolute attendance of the sectors) according to the thermal conditions.

Table 1: Summary of statistical measures describing relationships between the attendances of the sectors and the recorded characteristics during the study period .

		PMV	clothing	activity	age	gender	position
Sample size	***n***	2448	2448	2448	2448	2448	2133
Significance level	***α***	0.000	0.000	0.000	0.000	0.038	0.000
Cramer's-V	***V***	0.212	0.196	0.299	0.113	0.064	0.415
Contingency coefficient	***C***	0.391	0.267	0.286	0.191	0.064	0.506

usage, sectors (sub-areas) should be created according to various categories, for example shading, surface cover, function etc. After that, it is easy to get information in what circumstances (in what time, by what thermal conditions) what kind of visitors (according to given personal parameters) took a seat in the given sub-areas (for example on the benches). These evaluations are of great importance in the field of urban human comfort investigations.

3. Spatial usage of the area

In order to study the spatial patterns of the area usage, five sectors were defined. 1st: the 10 benches, 2nd: the pavement, 3rd: the great grassy area stretches on the southeastern side, 4th: the northwestern side of the morphological step, 5th: the sub-area under the tall, old trees. All sectors had the highest number of visitors (absolute attendance) by clear sky and slightly warm thermal conditions (PMV = 1), but the relative attendance of the selected sub-areas showed remarkable tendencies according to the PMV and the amount of sunshine (Fig. 2).

The relative usage of the benches was dominated by overcast-cloudy sky and by lower PMV values. However, with warmer (PMV > 0) and more sunny situations the greater proportion of visitors stayed on the grass. At the same time, the relative attendance of the morphological step and the shady sector under the old trees become higher. Physical adaptation of people in the cases of sunny warm-hot circumstances is indicated by the increasing percentage of subjects on the shady-penumbra sectors 4 and 5 (Fig. 2).

To illustrate these graphical results also in a spatial manner, a map was created with *ArcView* which shows the area usage according to the thermal conditions (Fig. 3). The seating capacity of the benches is obviously limited, so in case of warmer conditions (which can be characterized by greater number of visitors) more and more subjects had to take seats in the other sectors. On the other hand, higher *PMV* values were associated with sunny conditions and many people came into the area to sunbathe. Furthermore the nature and extent of the grassy sector permitted attendance to take place even in greater bunches (Fig. 3). The relationship between the PMV values and the attendance of the particular sectors can be described statistically with Cramer's V (*V*) and with the Contingency coefficient (*C*). According to these two statistical measures, the relationship is significant (α = 0.00) and moderately weak (*V* = 0.212 and *C* = 0.391).

The markers showing the visitors' locations (2448 on the whole) on the area map can be colored according to any of the recorded subjective characteristics (e.g. clothing, activity, age, gender or position) with the *ArcView*. This method is very suitable to illustrate the results of the statistical tests using *C* and *V* values (Table 1). The relationship between the visitors' clothing and the attendance of the mentioned sectors is significant, but not strong. The passive and active subjects' area usage shows remarkable differences supported by the moderately weak *C* and *V* values, due to the more active subjects preferring the pavement for walking and the large grassy area for playing. Nearly all of the elderly (old and middle aged) subjects sat on the benches or stayed on the pavement and nearby. There was only a slight difference in the spatial usage of the study area according to the gender of the visitors, as the values of the *C* and *V* are very low (Table 1). The shading conditions provided by the selected sectors showed the best correlation with the spatial usage of the area (*V* = 0.415 and *C* = 0.506) due to the given sub-areas having different vegetation and exposure to the sun.

4. Significance of the investigation design and the *ArcView* program

The presented study consisted of a preliminary survey of the sample area, meteorological measurements near the site (environmental monitoring) and simultaneous observations of the visitors (human monitoring). This investigation design is very useful for the thermal comfort examination of a small urban square, since in a relatively short time a lot of information can be obtained by us-

ing tables of personal characteristics in each half hour. By recording the visitors' exact spatial locations besides their personal characteristics, we had wide-ranging possibilities for the data processing and the representation of the results. It is important to note that the presented observation method can cope only with "resting place conditions" and mainly sedentary visitors, as marking the spatial position of too many active subjects can not be accomplished.

Data were integrated with *ArcView* as digitization of the subjects' exact locations required this geoinformatical application. All data derived from the environmental and human monitoring were joined to the markers signing the individuals according to their ID numbers as well as the certain half-hour periods. The resulting format facilitated the data analysis. The presence can be showed on the whole or can be separated and presented according to any of the objective or subjective parameters. Consequently, the spatio-temporal presence of certain groups, additionally the attendance of particular subareas in accordance with the meteorological conditions became easily to analyze. The software facilitates selection of visitors for further descriptive and inferential statistical treatment, on the basis of the individuals' characteristics, or on the basis of their locations.

Fig. 3 clearly illustrates the benefits of a map constructed with geoinformatical software in terms of the interpretation of statistical results. Graphs combined with these area usage maps are more expressive than the pure statistical measures (commonly used by theoretical sciences) without graphical illustrations. It is especially important in the course of discussion with urban planners and civic designers aiming to construct more comfortable urban areas. The importance of the topic is obvious, as the efficiency, well-being and health of citizens are positively (or negatively) influenced by the thermal comfort conditions, so by obtaining and maintaining comfortable conditions urban life quality will be enhanced (Mayer, 2008). The adopted methods can be extended with interviews, questionnaires, as well as with mobile meteorological measurements. Processing such data with *ArcView* has additional inherent opportunities, and could be adapted by experts working in the field of applied urban climatology.

5. Conclusion

This article described the methodology and some representative results from an outdoor thermal comfort study carried out in the center of Szeged. The study design proved to be appropriate to record a lot of subjective information about the visitors. Measurement of the climate parameters on the site with simultaneous human monitoring makes it possible to look into the connections between the area–climate–human attitude complex. These results are important to reveal beneficial coherences which can be used in the process of urban planning – civic designing.

Acknowledgements

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