

7 Designing with microclimate: interviews with urban designers and planners

In the second part of this thesis effects of climate adaptation measures on thermal comfort were studied. With a better understanding of the effectiveness the 'best' solution in relation to thermal comfort can be selected. Nevertheless, this might not be the most appropriate solution considering the site specific conditions. What considerations determine a particular design choice? This question frames the research by design studies in the third part of this thesis.

It is particularly interesting for this research to know why a designer decides to apply, or not to apply, climate adaptation measures when is asked to develop an integrated design with the utmost account of thermal comfort at street level. With more insight in the approach of designers to the theme a design method can be developed that fits to the actual role of urban microclimate in the design and planning process. And gives an indication of what output from this research can be of importance to strengthen the role of the theme. In this chapter a group of designers and planners is asked to give insight in their way of thinking through a questionnaire and an in-depth-interview. The results enables answering the sub-question: What is the role of the urban microclimate in the design process according to urban designers and planners?

§ 7.1 Introduction

Microclimate design is often not a central theme in design projects. Even in education the subject does not yet receive full attention, except for some individual student projects where they can choose their own conceptual framework and priorities. The educational project *Green-blue infrastructure for a resilient and healthy city* did place the theme centrally, and therefore, offered a great chance to work on climate adaptation design with a diverse group of Msc students in landscape design and urban planning. The design atelier was organised in the spring semester of 2014 at Wageningen University, The Netherlands. With a questionnaire and individual interviews the attitude towards climate adaptation and the role it plays in the design process are analysed. This chapter aims to discuss the place of climate adaptation in

the design process and does not address the content of the designs. In chapter 8 some of the student projects are presented substantively.

In the setup of the design atelier 28 students were assigned to 4 tutors with a different background; two landscape architects, a cultural geographer and a spatial planner. All groups had the same assignment formulated by two delegates of the city of Utrecht: an advisor from the province of Utrecht and a project manager from the municipal department responsible for green. The assignment was as follows: improvement of the green-blue infrastructure in and around the city of Utrecht and its contribution to the recreational network, the ecological network, hydrology and microclimatic functioning of the city. In the first eight weeks each of the four groups focussed on a different part of the city to analyse the green-blue infrastructure and the ecosystem services connected to it. The multidisciplinary approach of this design atelier also requires a view on other urban systems and values such as mobility and history. A common vision and objectives were developed as a start-up to the individual phase in the last four weeks. In the individual phase three of the four tutors continued, thus one student group was divided over the other three.

To resume, all four groups worked on the same assignment, all students shared the same client (the province and municipality of Utrecht), but there was variation between the groups and the individual student projects due to the influence of the tutors that have a different background and personal prioritization.

The **main question** addressed in this survey is:

What is the role of the urban microclimate in the design process according to urban designers and planners?

The main research question is answered through a questionnaire and personal interviews in the following two sections.

1 Questionnaire

To gain insight in the role of the urban microclimate in the design process according to urban designers and planners, the following sub-questions were addressed in the questionnaire form (see Appendix D for the complete form) and filled-in by all participating students:

- 1 What was the importance of the four ecosystem services of green-blue infrastructure in the design process?
Where do most designers see chances for combinations with microclimate?
Where do most designers see conflicts with microclimate?
What role do designers dedicate to the theme microclimate if they can choose between

central theme, repeating problem or precondition?
 Was there an influence of the tutor on the importance of the role of the microclimate?
 The first question positions the urban microclimate in relation to the three other ecosystem services (social, ecology and hydrology) that had to be addressed according to the assignment. Question two and three are very much related to the main research question 'How to integrate microclimate in a planning or design process?' In the integration process links with other design issues need to be made to come to a holistic design. When the aim is to find promising combinations of microclimate measures with other urban design aspects, the students will encounter conflicts as well. Question four is directed at finding out the position that thermal comfort and the microclimate occupy in the design process. Do they think this theme is suitable to act as a concept or framework, or is it one of the elements that is applied when it provides a positive result in combination with other elements. For example the framework during the design process can be 'the life course-proof neighbourhood' in which climate adaptation has an important role because the elderly and infants should be able to reside. Finally, question five is to test whether the earlier implied relation between personal motivation or focus of a tutor influences the role of the urban microclimate in the students their design process.

§ 7.1.1 Questionnaire results

1. What was the importance of the four ecosystem services of green-blue infrastructure in the design process?

In the questionnaire the students were asked to what extend the four different ecosystem services play a role in their design process. One of these services concerns the microclimate, which scored as the most important role. The scores in Table 7.1 show that social services of green and blue are regarded as the most important and hydrology the least important.

THEME	AVERAGE ROLE: 7 (LARGE) - 1 (SMALL)	TOTAL SCORE OF 196	POSITION OF IMPORTANCE
social	5,7	160	1
microclimate	5,3	147	2
ecology	4,4	122	3
hydrology	3,7	104	4

TABLE 7.1 Rating of the four ecosystem services addressed in this design atelier scored by the individual students.

Microclimate has a high priority in this group of designers. All four ecosystem services are stated as equal in the design brief. However, as introducing microclimate to students is a main didactic aim of this course, students received more information and lectures about microclimate compared to the other three. Another consequence of this didactic aim, is that students deliberately chose the course, knowing to learn about designing with the urban microclimate. This has probably influenced the prioritization of the students, showing that despite of the extra attention microclimate design received, social services of green are still seen as more important.

In fact, without the clear didactic focus on the microclimate the priority of the theme would probably have been lower. In a study by (Pijpers- van Esch, 2015) the microclimate theme was assigned with the second lowest importance amongst 11 themes in total. This result is based on interviews with mainly urban designers, also architects and a landscape architect, who did not have special interest in or focus on microclimate design.

2. Where do most designers see chances for combinations with microclimate?

In an open question in the questionnaire the students were asked which urban functions or design elements can be combined with microclimate design. Even though this is an open question, many answers coincide. In Table 7.2 the answers are presented. The combination of ecology and microclimate is mentioned most of all, followed by a combination with recreation and social cohesion or social functions. Other frequently mentioned combinations with microclimate are hydrology, aesthetics of public space and green or trees in general.

COMBINES WITH MICROCLIMATE	SCORE
ecology	10
recreation (routes)	9
social cohesion/functions	9
hydrology	7
aesthetics public space/street scape (green)	5
green/trees	5
buildings	2
experience of outdoorspaces	2
thermal comfort	2
green and blue	2
attracting more environmental friendly companies	1
economy	1
large scale and small scale	1
new developments	1

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COMBINES WITH MICROCLIMATE	SCORE
ecosystem services	1
climate change mitigation	1
climate change adaptation	1

TABLE 7.2 Design elements that can be combined with microclimate design according to the students.

3. Where do most designers see conflicts with microclimate?

In line with sub-research question B, this was an open question as well. Where many students could easily give two examples of good combinations with microclimate, naming conflicting aspects turns out to be more difficult. In Table 7.3 the conflicting aspects named by the students are presented. The preference of people or their awareness is named most often as conflicting aspect with microclimate design. Followed by existing buildings or districts and insufficient space that prevent solutions to improve the microclimate.

CONFLICTS WITH MICROCLIMATE	SCORE
people's preference/awareness	6
existing buildings/districts	5
insufficient space	5
infrastructure/traffic	4
economy	2
finance	2
planning	1
lack of data	1
ownership	1
south-west facing facades	1
policy/governmental plans	1

TABLE 7.3 Design elements that can be in conflict with microclimate design according to the students.

A general difference between the answers of sub-question B and C is the practical opportunities that were mentioned that have to do with integrating climate adaptation measures in the urban structure. While conflicts are more often related to planning and governance aspects. Clearly the physical aspects of existing buildings and infrastructure and competition in the occupation of space are definitely considered in conflict with climate adaptation measures.

4. What role do designers dedicate to the theme microclimate if they can choose between central theme, repeating problem or precondition?

This question aims to find out what position thermal comfort and microclimate occupied in the design process during the atelier. Did the students place it very central as a concept or guiding theme, more to the background as one of the preconditions their design has to meet or is it a struggle to design with? Within the five generic elements in the design process distinguished by Dooren et al. (2014) all three have a different place. When the urban microclimate is seen as guiding theme (2), it provides inspiration and helps creating a coherent and consistent result. In case the microclimate is a precondition in the design process, in all domains (3) the designer has to make choices considering also the microclimate. In case the microclimate is perceived as a repeating problem there are two elements in the design process that are insufficient to be able to work with the theme: either the frame of reference (4) does not provide enough solutions (rules of thumb/guidelines), or the laboratory (5) of sketching and modelling does not enable reflection or evaluation of the solutions.

FIVE GENERIC ELEMENTS IN THE DESIGN PROCESS ARE (DOOREN ET AL., 2014):

- 1) experimenting or exploring and deciding,
 - 2) guiding theme or qualities,
 - 3) domains,
 - 4) frame of reference or library,
 - 5) laboratory or (visual) language.
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Table 7.4 presents the position of thermal comfort and the microclimate in the design process according to the students. The outcome of this question suggests that climate adaptation can function well as both, a central point and precondition. Nevertheless, more than 20 percent of the students struggled with the subject where it became a repeating problem. The questionnaire only allowed a forced choice between three options. The role of the urban microclimate might have more nuances. Many of the respondents indicated that the theme will have a different role depending on the location, assignment and client.

	SCORE	
central theme	10	36%
repeating problem	6	21%
precondition	10	36%
blanco	2	7%

TABLE 7.4 Position of microclimate in the design process in this atelier according to the perception of individual students.

1 **Was there an influence of the tutor on the importance of the role of the microclimate?**

For sub-research question A the questionnaire asked students: 'To what extent did microclimate play a role in your design process?' on a scale of 1 (small) to 7 (large). The relation between this question and the tutor of the student gives insight in the influence the tutor has on the position of the subject 'microclimate' in the design process. When we look at the correlation between the role of the microclimate and the tutor of the group phase there is almost no correlation: -0.11). While the correlation with the individual tutor turns out to be high: -0.73 . In Figure 7.1 the correlation is presented in a graph. From Tutor 1, to Tutor 2, to Tutor 3 the attention/priority for the microclimate decreases.

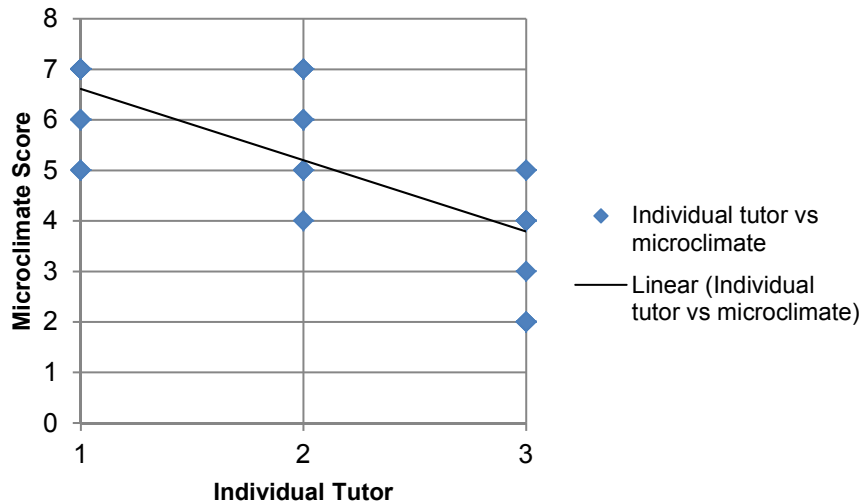


FIGURE 7.1 The correlation between the individual tutor and the role microclimate plays in the perception of the student.

From the high negative correlation between tutors and the microclimate importance we can expect that Tutor 1 finds microclimate more important than Tutor 2 and 3 and Tutor 3 finds it less important than Tutor 1 and 2. Figure 7.1 does not show the amount of times a microclimate score occurs. To make clear how the average score of

the role of the microclimate in the students their design process varies per tutor, the total score is divided by the amount of students of each tutor, see Table 7.5.

	AVERAGE SCORE OF THE ROLE OF THE MICROCLIMATE ACCORDING TO STUDENTS	IMPORTANCE OF THE MICROCLIMATE IN FUTURE DESIGN AND DESIGN EDUCATION ACCORDING TO TUTOR	ROLE OF MICROCLIMATE IN THE TUTORING OF THIS ATELIER
Tutor 1	6.3	6	7
Tutor 2	5.9	5	5
Tutor 3	3.4	4	6

TABLE 7.5 The average score of the role of the microclimate by students and the importance of the microclimate in future design and design education and in the tutoring of this atelier per tutor.

Looking at what the tutors find more important in future design the score of the students is clearly related. However, when you ask them what role the microclimate has played in their tutoring during this atelier the outcome is slightly different. The answer of this question can be relevant to what role the microclimate normally has, or will have, in their design education. Tutor 2 is very much acquainted with the subject and already incorporates it in education, while for Tutor 3 the subject was quite new and introduced it for the first time to students. Compared to former education the role of the microclimate was relatively large for Tutor 3, but in amount of time spend or emphasis on the subject, this tutor probably did less than the other two.

§ 7.2 Personal interviews

Next to the questionnaires, students were asked for an in-depth interview if they had the opportunity to meet after the end of the course. This resulted in 12 evaluation interviews about the individual design process. These interviews offered the opportunity to ask more about personal motivation and ambition and elaborate on what difficulties planners and designers encounter when designing the urban microclimate.

The questions that were asked randomly during the conversation are given below and the answers to these questions are discussed in the next section and shortly summarized in Appendix E.

- 1 Inherent to design is to make choices. Within this atelier there was a lot of freedom in choosing a location and program in which the green-blue network with its four ecosystem services had to be optimally embedded. What was your personal ambition or motivation beforehand?
- 2 What part of your design is a success?
- 3 Is there an element you had to drop during the design? Did you choose a variant that is not the best option in relation to the microclimate or thermal comfort? If yes, why?
- 4 Does the theme 'urban microclimate' promote your inspiration?
- 5 Did you have enough information available? What could have helped you further in designing with microclimate?
- 6 What position will the theme microclimate have in your future designs?

§ 7.2.1 Discussion

Based on the personal ambition and motivation of the designer at the start of the course (question A) a student is seen as an proponent of the importance of the urban microclimate when the intention was to learn more about or learn how to design with the micro climate. Among the 13 students, six can be seen as advocates of the urban microclimate. We can conclude that when the student is an advocate, the theme 'urban microclimate' provides them with inspiration (question D) and was for almost all of these students part of the successful elements in their design (question B). This starting point, however, did not always lead to choices in favour of the microclimate. In many cases the character or ambience of an area was found more important than choosing the best option in relation to thermal comfort (question C).

Independent from the starting point of the students, the guidelines provided were often found too general or the desire to know more about a specific aspect or being able to simulate results left students unsatisfied about the real contribution of their design proposals to the micro climate (question E). This relates to interview question 4 where some students indicated to see the theme as a repeating problem that might be due to a lack of frame of reference (rules of thumb/guidelines) or insufficient skills in sketching and modelling disabling reflection or evaluation of the solutions. Only 4 of the 13 students did not miss information or knowledge about the microclimate. Many indicated that more 'clear' and straight forward solutions and guidelines would be helpful. On the other hand, the provided book, guidelines and/or expert supervision was used and appreciated by more than 2/3rd of the students, advocates or not.

After following the course, a large majority of 70 percent of the students expect the urban micro climate to be a pre-condition in their future designs (question F). Notable is that none of the interviewees see it as a repeating problem. Instead, a few stated only to apply a microclimate measures when it provides an additional

benefit in combination with other elements. The approach to the microclimate theme depends for a lot of designers on the project, location or on the client. This implies that factsheets, guidelines and a design method to improve the urban microclimate are useful for a large group of designers and planners regardless their approach to the theme.

§ 7.3 Conclusion

This section evaluates the integration of climate adaptation in the design process by a survey amongst MSc students within a design atelier.

The sub-research question that was addressed by this survey - **‘What is the role of the urban microclimate in the design process according to urban designers and planners?’** - leads to the following main conclusion:

The approach to the urban microclimate varies, and depends on the designer, client and context. These three determine whether the urban microclimate plays the role as central theme, repeating problem or precondition.

Although the group of respondents to the questionnaire and in-depth interview was relatively small, more insight is gained in the way urban designers and planners approach the urban microclimate during the design process.

An interesting finding from the survey is that most of the designers and planners indicated that the urban microclimate will play an important role in their future designs. A large majority sees it as a pre-condition. This insight emphasises that a group of urban designers and planners is and can be convinced of the need to integrate climate adaptation into the design process.

Another finding is the need of additional knowledge and ‘clear’ information on climate adaptation measures. This thesis supplements this need through various means: Factsheets about climate adaptation measures as outcome of the first literature part explain measures and indicate chances and risks. Guidelines from the second simulation and measurement part add to or strengthen findings from literature. A set of measures per neighbourhood typology function as guiding models and a method to integrate adaptation measures as possible design process is presented in this third part of the thesis. This output aims to strengthen the role of the urban microclimate in the design and planning process.

The group planners and designers participating in this study choose the course to learn more about the urban microclimate which means they have an interest in the subject. Planners and designers without this interest might judge the role of the microclimate in design differently. This would be interesting to study further.

Another interesting question that relates to the study presented here is: is there a difference in the design process of plans that have an improved microclimate and plans that do not result in such improvements?

The following chapter builds on the conclusions in this chapter by providing additional knowledge and clear information in the form of a set of measures per neighbourhood typology and a method to integrate adaptation measures.

§ 7.4 Acknowledgements

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§ 7.5 References

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