Case Study Report

Climate Adaption and Urban Planning - The Case of Basel, Switzerland

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Abstract

The climate change has already changed the Basel policies: after the climate emergency resolution of the city parliament in 2019, the delegates demanded a climate smart policy in all fields of the Basel administration. A comprehensive strategy how to deal shot-termed with climate adaption was demanded, besides the boost of all ongoing activities for climate mitigation and decarbonisation. As a result, the climate change was placed as one of the top three priorities of Basel legislation.

In 2021 the Urban Planning Devision of Basel administration completed the Urban Climate Adaption Concept; the concept was adopted by the city council as a compulsory document. The Urban Climate Adaption Concept gives the Basel urban planning devision a road map to face the climate challenges on a strategic and already on an implemention level.

A high number of vulnerable inhabitants to climate change impacts are identified in Basel. A historical middle european city with an extremly dense urban structure and short of parks and green spaces faces the rising temperatures over drastically. In order to meet the requirements of climate adaption short-termed immediate measures will be realised in next summer. With mobile and temporary water fountains, water pools, tree pots, greened pergolas, and shade elements inhabitants and visitors should find cool and shaded public space protected from extreme heat. Even if these immediate measures could not have a crucial impact on the climate change, they are worthwhile to protect the living quality in urban neighbourhoods.

The responsible Basel administration of urban planning is still in the beginning to face effectivly climate change adaption. On the basis of a clear political commitment of the city council and demanding politics, the projects develop very fast, know-how transfer is required, and lessons learned by other cities are of major interest.

Keywords

Climate adaption, urban planning concept, case study, Basel / Switzerland

1. Introduction

Adapting to climate change is one of the mayor challenges facing urban planning. In Basel the meteorological phenomena of urban heat islands has become glaringly obvious over the last two decades: the town has suffered from an increasing number of particularly hot summer periods, which caused above average casualties, health problems, and the deterioration of local biodiversity and green spaces.

Climate change has already altered Basel's policies: following the climate emergency resolution of the City Parliament in 2019, the delegates demanded a climate smart policy for all sectors of Basel's administration. They requested a comprehensive strategy on how to deal with climate adaption in the short-term, as well as boosting all ongoing activities for climate mitigation and decarbonisation. As a result, climate change has been recognised as one of the top three priorities of Basel's legislation.

2. Urban Climate Adaption Concept

Many inhabitants of Basel are vulnerable to the impacts of climate change. As a historic central European city with an extremely dense urban structure lacking parks and green spaces, rising temperatures will have a disproportionate impact. The city's climate simulation analysis presents a challenging future: vast areas of Basel city will increasingly suffer from summer heat by the year 2030, see figure 1.

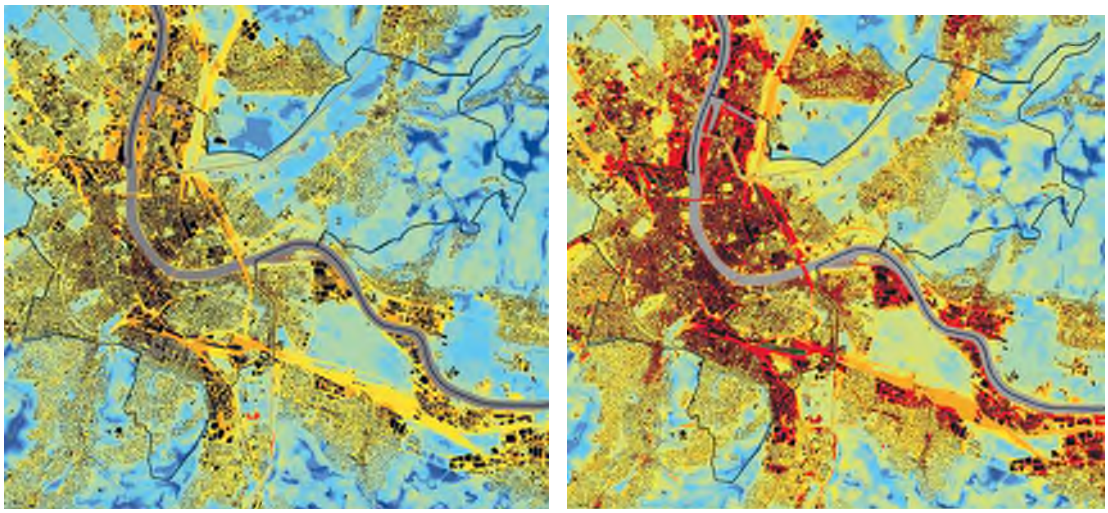

Figure 1: Night temperature (4 am) today and 2030 in the Basel region. Source: GEO-NET Umwelt consulting GmbH, Germany

These developments are problematic for the quality of life in the city of Basel. The heat keeps you from sleeping, reduces your ability to concentrate and puts a particular strain on the most vulnerable members of our society: small children, the elderly and the sick. In addition to these health risks, the heat also has a negative impact on public urban space. Relief from the heat can only be found in the shaded open and green spaces.

The current Urban Climate Adaption Concept aims to establish climate-adapted settlement development, which counteracts the increasing heat stress and creates a healthy quality of public life even on very hot days, particularly for those who are unable to shelter in private gardens.

In 2021, Basel's Department of Public Works and Transport completed the Urban Climate Adaption Concept. The concept was subsequently adopted by the City Council as a compulsory document. The Urban Climate Adaption Concept gives the Department of Public Works and Transport a road map to face climate challenges on a strategic as well as on an implementation level. Since Basel is located directly on the border to France and Germany, projects by the authorities always have to be considered from a cross-border perspective.

Figure 2: Urban Climate Adaption Concept of Basel, adopted in 2021.

3. Summer Heat Focus Areas

Many inhabitants of Basel are vulnerable to the impacts of climate change. Due to the dense urban structure, rising temperatures will have a disproportionate impact on urban populations.

The need for action in Basel is therefore high. Many areas are severely affected by heat and future increases in temperature will exasperate the problem. In particular, the densely built-up neighbourhoods with little green space, e.g. the city centre, and the historical districts on both sides of the river Rhine, are areas with a high need for action, so-called focus areas. Focus areas will see the implementation of measures shortly (see chapter 5).

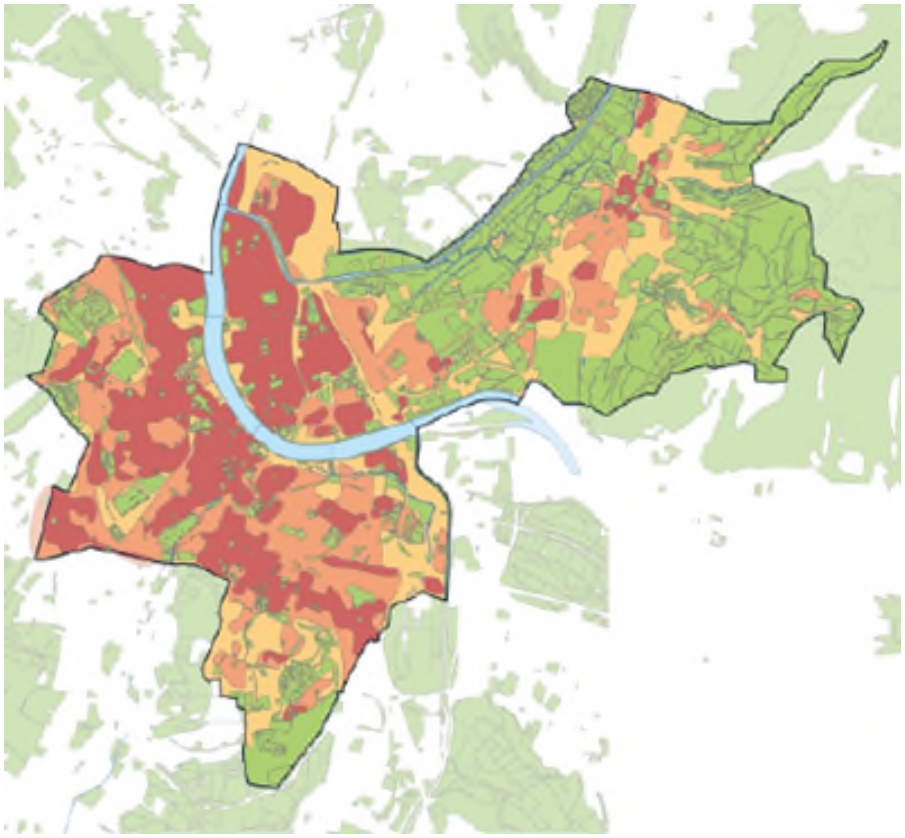

Figure 2: The dark red focus areas will be particularly severely affected by the heat island effect in the future (2030). Source: Stadtklimakonzept zur klimaangepassten Siedlungsentwicklung im Kanton Basel-Stadt, Basel, 2021.

4. Urban Climate Adaption Strategy

The Urban Climate Adaption Concept is both a strategic base for the present climate policies of the city of Basel as well as a guideline for its urban development projects. Six strategic chapters and nine fields of action articulate precise assignments for Basel's administration to face the climate adaption challenges until 2030. The city council passed the following six strategic goals:

- Keeping heat distress low

The summer heat stress in the living and working areas is moderate during the day. Nocturnal cooling allows residents to recover. The heat will affect sensitive population groups less.

- Increased quality of public space through green spaces and shade

Climate-adapted public spaces create a green system as continuous as possible with shaded pedestrian and bicycle lanes. They are easily accessible from both residential and workplace areas. Private gardens further contribute to a better supply of green areas.

- Night-time cooling through ventilation

The specific wind conditions of the Basel region are taken into account in all urban developments. New building structures and site typology will be designed for optimal air exchange and enable air emission

transport. Cold air from the surrounding areas and from large green spaces will circulate in the urban area at night.

- Water availability during hot summer periods

Water is accessible and tangible in many urban places. Rainwater will be retained in urban areas to cool the heat and irrigate parks and gardens.

- New surface materials combat the heat

The surface design of buildings and materials in public spaces takes climate change into account. They store little heat and absorb precipitation.

- Site developments as an opportunity to face climate change

Large urban site developments will be used as an opportunity to adapt to climate change in Basel. While the public administration of Basel takes the lead, private investors and real estate owners also contribute to climate adaption.

5. Action Plan

The Basel Urban Climate Adaption Concept displays a wide range of measures that counteract the increasing heat stress and achieve a good quality of life on very hot days. Generally, all measures can be structured as follows:

<table>
<tr><td>Green Measures</td><td>Diverse alignment of green spaces and climate-adapted design for all parks and public green areas</td><td rowspan="4">  </td></tr>
<tr><td></td><td>Create new green spaces; increase green spaces in all roads</td></tr>
<tr><td></td><td>Create shade in squares, roads, pedestrian and bike lanes</td></tr>
<tr><td></td><td>Adapt urban vegetation to future climate conditions</td></tr>
<tr><td>Blue Measures</td><td>Create accessibility to water and water experiences</td><td rowspan="4">  </td></tr>
<tr><td></td><td>Unseal asphalt surfaces</td></tr>
<tr><td></td><td>Enable rain water circulation system (sponge city)</td></tr>
<tr><td></td><td>Establish natural irrigation of parks and green spaces</td></tr>
<tr><td>Urban Site Measures</td><td>Establish intensive roof top vegetation with integrated water storage</td><td rowspan="2"></td></tr>
<tr><td></td><td>Support façade greening</td></tr>
</table>

		
	Adapt new building structures to wind circulation, irradiation, and shade	
Technical Measures	Introduce new materials with low heat storage	
	Create shade through technical constructions	

Table 1: Action Plan. Source: All photos are taken in Basel by Kanton Basel-Stadt, Robert Adam, Amt für Umwelt und Energie Basel-Stadt, Roman Weyeneth.

These measures have been proven by science, and by their implementation in other cities with longer experiences in climate adaption. Basel's Urban Planning Devision will follow these experiences and adapt them to local conditions.

Nine fields of action represent the core of the Urban Climate Adaption Concept. The technical, organizational, and legal measures on one hand are summarized and, in accordance with the structure of the canton's administration, organized according to specific instructions for action up to 2030. Sites of action and responsibilities are described in order to ensure a rapid implementation in the city of Basel. Without a highly committed city council and close cross-section coordination, it will be impossible to implement measures to face the climate challenge effectively.

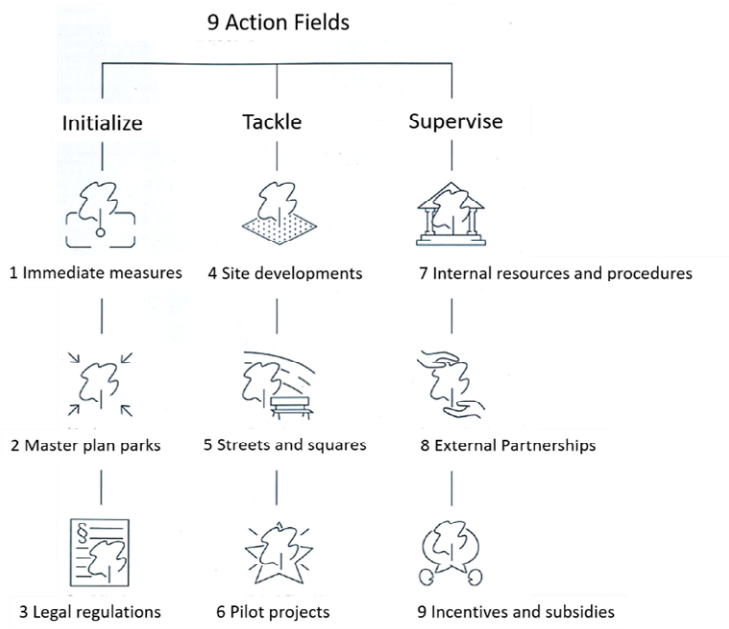

Figure 3: The cross-section implementation of the Basel Urban Climate Adaption Concept is organised into nine action fields. Source: Stadtklimakonzept, Basel, 2021.

In order to meet the requirements of climate adaption immediate short-term measures will be carried out next and the following summer (Action field 1). Mobile and temporary water fountains, water pools, tree pots, greened pergolas, and shade elements will allow inhabitants and visitors to find cool and shaded public spaces offering protection from extreme heat. Even though these immediate measures will not have a crucial impact on climate change, they are worthwhile to protect the quality of life in urban neighbourhoods.

As soon as appropriate short-term measures are identified in the focus areas, the community will be involved, especially the most vulnerable persons in the neighbourhood. There are already considerations and grass root activities in climate adaptation measures taking place in various districts, which will be included in the Urban Climate Adaption Concept in order to facilitate its implementation, increase acceptance by the inhabitants and use the knowledge of the neighbourhood. The participation of the inhabitants of the city should be given a special status – human health, physical and natural assets are essential elements of life. In addition, joint actions by the inhabitants should be considered to ensure the participation of the neighbourhood residents, design the implementation of greenings and water elements and, if necessary, to help with maintenance. Local community agencies are already involved.

Additionally Basel will aim to mitigate the impact of climate change through a number of urban design measures:

- (Action field 4) New instruments to evaluate the climate impact of site developments will be implemented and assessed to set new standards in urban planning.
  New demands for climate-adapted urban development are negotiated between the landowner and the canton at the beginning of a site development. Climate assessment criteria are now part of contracts. The already existing sustainability tool of the city of Basel will be implemented on all site developments. Additionally, microclimate simulation models help to evaluate future climate impacts of new and ongoing developments. All urban competitions will have to review their climate impact as a high priority criterion of their competition programme. Once the impacts are

evaluated according to magnitude and likelihood, adaption measures can be identified to reduce risks to acceptable levels. These measures must then be incorporated into the projects, and their implementation has to be monitored to assess whether any further action is needed.

- (Action field 5) Important landowners are stakeholders on climate adaption due to their real estate shares, and the policies to develop them. Partnerships with private or semi-private landowners will be established to encourage them to upgrade their sites in climate stressed areas. Basel's Urban Planning Devision will intensify communication and consulting in order to enhance the awareness of climate-adapted urban development. The preservation of historic qualities and the chance for upgrading any buildings are to be given specific attention. The addressees of action field 5 are the public, landowners, experts, scientific associations and organizations. Basel's urban administration will develop effective incentives and funding programs to support the implementation of climate-adapted urban development; synergies with private organizations will be used.

- (Action field 5) The number of planted trees in the streets and on public squares will be increased as much as possible to reduce episodes of massive heat. The cooling impact of a single tree through evaporation and shade is extremely efficient. The city of Basel has a remarkable stock of trees. There are over 500 species and varieties in tree-lined avenues and green areas. The current climate change and the increase of new vermin and diseases compels the city administration to plant resilient tree species today, which could be proved worthwhile in the coming decades. In order to minimise the risk of failure, as many different species as possible and new species from warmer and drier climate zones are constantly being tested.

- (Action field 6) Streets and public spaces will be designed to allow heavy rainfalls to filtrate through to the groundwater, as is requisite for a «sponge-city». Surfaces and subsurfaces are critical criterion to the urban water management: they cool our city as well as feed vegetation and water supply. We have to manage the subsurface conditions carefully, and integrate it wisely into our urban planning efforts on the surface. For more sustainable public space, it is necessary to open asphalt surfaces. As a pilot, in some slow neighbourhood streets rainwater sewage will be omitted; rainwater will infiltrate into roadside greenery. Tramway lanes, as long as they are separated from the general circulation, are constructed on lawns in Basel.

6. Reflection and Questions

The Department of Public Works and Transport is still in the first phase of effectively combating climate change. Basel's City Council has shown clear political commitment and has high political ambitions, forcing projects to develop rapidly and making knowledge transfer and learning from other cities increasingly crucial.

In particular, the local issues that should be highlighted and discussed in this paper and in the congress track are:

- Due to Basel's lack of public and green spaces and its particularly narrow streets there is unfortunately little room to plant new trees and design green areas. This will cause huge conflicts of interest.

- In order to plant new trees, one parking lot usually has to be eliminated. Today, the declining number of parking lots is already being criticized publicly. We are afraid there will be disputes over every tree and every parking space in the future.
- Does the use of drinking water still make sense or is reasonable when installing evaporators, fountains and water basins all over the city?
- In the negotiations of the important urban site developments, the question arises whether investors will give up construction plots and their benefits in favour of parks and public climate-adapted spaces.
- Will private land or house owners only partake in climate change adaption when given incentives and subsidies, or can voluntary support be generated as well? What has the experience been in other cities?

7. References

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8. Tables