Climate Change in Bielefeld: An Adaptation Process

Structures, Measures and Programmes

BfN/ENCA-Workshop
„Urban Biodiversity and Health in the Face of Climate Change“
Isle of Vilm/Germany, Oct. 6th 2016

Björn Brodner, Environment Agency
Agenda

① Bielefeld – Basic Facts, Geography & Climate

① Past and Present of Climate Change Issues in Bielefeld

② The Impact of Structures

③ Perspectives & Conclusion
Bielefeld – Basic Facts, Geography & Climate
Basic Facts

- Independent city in North-Rhine Westphalia
- Administrative district of Detmold

- Approx. 338,000 pop.

- Solitary agglomeration & regional centre of East Westphalia-Lippe

- Max. north-south-expansion: approx. 22 km
- Max. east-west-expansion: approx. 20 km
- Total area: approx. 260 km²
- Approx. 1,300 pop./km²

- 114 m above sea level (71-330 m)
Geography & Climate

- Rolling landscape of the *Ravensberger Mulde*: northern part of the city incl. the city centre

- *Münsterländer Tieflandsbucht*: plains in the southern part of the city

- Sandy areas of the *Senne*: southern periphery

- Mountain range of the *Teutoburg Forest*: west-east-axis
  
  → impact on local/city climate in the northern & southern parts especially during cloudy & rainy weather
Geography & Climate

• Landscape crossed by several creeks, ditches and humid lowlands (= Sieke) → Ventilation & near-ground streams

• *Finkenbach* and *Weser-Lutter*
  → Floods by heavy rain induced high tides
  → Damages on nearby buildings/residential areas

• More than 20 large and small parks mostly interconnected by a wide spread system of urban green spaces

• Mostly Atlantic climate
• Mostly mild winters and warm temperate summers
• Precipitation spread evenly throughout the year
Climate Data - From the Archives

Emergency appeal after severe hailstorm (Agency of Dornberg, July 1895)

Public document for snow melt flood warning (District president of Minden, January 1891)
Climate Data

Longtime means of the climatologic reference period 1960-1990 for temperature, precipitation & sunshine duration

<table>
<thead>
<tr>
<th>Messgröße</th>
<th>Region</th>
<th>Deutschland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperatur</td>
<td>+9,0°C</td>
<td>+8,2°C</td>
</tr>
<tr>
<td>Niederschlag</td>
<td>757 Liter/m²</td>
<td>789 Liter/m²</td>
</tr>
<tr>
<td>Sonnenscheindauer</td>
<td>1521 Stunden</td>
<td>1528 Stunden</td>
</tr>
</tbody>
</table>

Annual means of temperature, precipitation & sunshine duration of the year 2013, region & Germany as a whole

<table>
<thead>
<tr>
<th>Messgröße</th>
<th>Region Bielefeld 2013</th>
<th>Abweichung vom langjährigen Mittel</th>
<th>Wert 2013</th>
<th>Abweichung vom langjährigen Mittel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperatur</td>
<td>+9,4°C</td>
<td>+0,4°C</td>
<td>+8,7°C</td>
<td>+0,5°C</td>
</tr>
<tr>
<td>Niederschlag</td>
<td>633 Liter/m²</td>
<td>-124 Liter/m²</td>
<td>781 Liter/m²</td>
<td>-8 Liter/m²</td>
</tr>
<tr>
<td>Sonnenschein</td>
<td>1417 Stunden</td>
<td>-104 Stunden</td>
<td>1480 Stunden</td>
<td>-48 Stunden</td>
</tr>
</tbody>
</table>

(Böttner et al. 2015)
Climate Data

Annual mean temperature, 2000-2013, Region of Bielefeld
(Longtime mean 1961-1990 = + 9.0 °C)

(Böttner et al. 2015)
Climate Data

Frequencies of climatologically characteristic days
Measured data (2004-2010) & modelling (2091-2100)

<table>
<thead>
<tr>
<th>Messdaten</th>
<th>2004-2010</th>
<th>Bielefeld</th>
<th>Gütersloh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>17,9</td>
<td>64,0</td>
</tr>
<tr>
<td>Klimatologische Kenntage</td>
<td>Eistage</td>
<td>Frosttage</td>
<td>Sommertage</td>
</tr>
<tr>
<td>Szenarien</td>
<td>Gütersloh</td>
<td>3,3</td>
<td>24,6</td>
</tr>
<tr>
<td>2091-2100</td>
<td>Bielefeld</td>
<td>5,8</td>
<td>26,9</td>
</tr>
</tbody>
</table>

(Fischer 2013)
2 Past and Present of Climate Change Issues in Bielefeld
Landmarks of Climate Change Issues

- 2008: Handlungsprogramm Klimaschutz 2020
- 2009: Arbeitskreis Umwelt: Thema Klimaanpassung
- 2011: Bevölkerungsstichprobe zum Bielefelder Stadtklima
- 2011: Beschließvorlage der Abteilung für Umwelt und Klimaschutz
- 2012: Veranstaltung: Dunkle ein bisschen wärmer sein
- 2012: Erarbeitung eines Planungs- und Implementierungs-
  Klimaanpassungs-Strategie
- 2014: Kommunal-Klima-Modellkommune
- 2016: Zukunftskonzept Klimaschutz
Climate Campaign – Practical Examples

- Solar Atlas
- Climate Quarter Sennestadt
- Healthy & Climate-Friendly School Kitchen
- Apple Day
Solar Atlas
Solar Atlas
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Solar Atlas

Höchst Willkommen! Mit diesem Assistanten können Sie Ihre eigene Photovoltaik- und Solarthermieanlage auf Ihrem Dach kalkulieren. Durch die Beantwortung der Fragen erhalten Sie eine passende Anlagenempfehlung für Ihren Haushalt.

1. Wie wird Ihr Gebäude genutzt?
   - Privat
   - Geschäftlich

2. Wie hoch ist Ihr jährlicher Energieverbrauch?
   - 4 Personen
   - 4400 kWh/Jahr

3. Welches Lastprofil entspricht Ihrem typischen Verbrauch?
   - Lastprofil: Privathaushalt (ganztägiger Verbrauch)

weiter
Climate Quarter Sennestadt

- Promoting energy-saving measures within the existing building stock
- Preserving the historic townscape
- Developing the residential environment
- Investing in climate protection measures

Projects of the Climate Quarter Sennestadt

- Urban restructuring
- Climate protection estate on the area of a stripped down industrial site
- Concept for an energy-related urban redevelopment
- KWK Civic Network
- Extension of the city railway
Healthy & Climate-Friendly School Kitchen

Rating is assigned by the environment agency and the consumer advice centre of Bielefeld to school cafeterias in Bielefeld, which manage to save CO$_2$ by optimizing their menu.

Criteria of the flexible rating system:

- Purchase of fresh, regional and seasonal groceries
- Reduction of animal products
- Energy-saving forms of food preparation and warm-keeping
- Notably little pre-processing and conservation
- Waste avoidance during transport and food distribution
Apple Day 2016
„Our Region in One World – together, ecological, crisis safe”

Approx. 50 stations dealing with nature conservation & climate protection in the region

- Opening: „cutting party“
- Mobile juice extractor
- Experts help to classify apple varieties
- Information about biodiversity & sustainability
- Information about the historic buildings
- Discovering the garden of Ramsbrockhof
- Shepherd demonstration
- Regional cooking

Free transportation by bus & guided bike tours
Biodiversity & Urban Green
Integrated Strategies & Measures to Protect and Promote Urban Biodiversity

**Overall Project Aims:**
- Development of generally applicable guidances for cities
- Field-testing of tangible measures for the implementation of the National Biodiversity Strategy on the level of urban landscapes

**Partners of the Overall Project:**
Leibniz Institute for Ecological Spatial Development, Dresden (IÖR)
Institute for Habitation and Environment, Darmstadt (IWU)
German Environmental Aid, Radolfzell (DUH)
City of Heidelberg
City of Bielefeld

**Sub-Project Bielefeld “Schloshofbach greenway”**
- Defining, testing and evaluating practical measures for enhancing the biological diversity
- Mapping of flora & fauna, civic participation/communication, Online user-survey
- Local stakeholders: environment agency and environmental services, Bielefeld 2000plus/AK Umwelt, associations for ecological conservation, Biological Station Bielefeld/Gütersloh and on-site actors

**Funded by:**
Biodiversity & Urban Green
Climate Change Adaption Today

• The issue of climate change adaption has been considered within the scope of spatial planning for the past years

• Evaluation of a demand for action (planning-related individual cases) on the basis of analyses as well as separate assessments of the urban climate
  → For a spatial distribution of „heat islands“ and over-heated areas
  → Reconciliation with other subject-specific interests of the department for environmental planning (esp. green planning, landscape and soil) and the department of planning and building inspection

• Particular textual arrangements in development plans have already been made with the department of planning and building inspection
  → e.g. regarding building designs (colouring (RAL) / increase of albedo, greening of buildings, parking areas with water-permeable surfaces)
Climate protection zones

- Open space (highly climate sensitive)
- Teutoburg forest (highly climate sensitive)
- Interconnected green space (highly climate sensitive)
- Green space (highly climate sensitive)
- Moderately climate sensitive areas
- Cold air corridor (high drain)
- Cold air corridor (moderate drain)
- Air channel

(c) Agency for geo information & land registry, 2016
Cold & warm development areas

- Origin of cold air
- No cooling effect
- Low cooling effect (≤ 0.2 ° C)
- Medium cooling effect (≤ 0.9 ° C)
- High cooling effect (≤ 1.6 ° C)
- Very high cooling effect (≤ 2.7 ° C)

(c) Agency for geo information & land registry, 2016
Development plan

- Plans accessible online
- Plans in process
- Plans accessible at building authorities
- Link with further information
The Impact of Structures
Public Administration

Department „Environment & Climate Protection“

- Regulatory Agency
- Environment Agency
- Agency for Public Health, Veterinary & Food Inspection
- Fire Department
- Environmental Services
Workgroup Environment

- Foundation of the Initiative Bielefeld 2000plus in the year 1997
- 6 workgroups (inter-culturality, culture projects, sustainable economic management, urban development, environment)
- Scientists of the university, citizens, participants of different scientific, environmental, cultural, environmental, urban development and educational institutions

- **Goal:** find practical on-site solutions for greater global challenges such as climate change, mobility or an aging society

- Distinguished as „Ort des Fortschritts.NRW“ by the North Rhine-Westphalian Ministry of Science in 2014 (for facilities, which have succeeded in considering economic, ecologic, social and cultural aspects in the context of their projects in an outstanding way and contributed an approach to solving social challenges)

- **Current projects on the subject of climate change:**
  - Population survey „Climate Change in Bielefeld“ & event „Darf’s ein bisschen wärmer sein?“ („May it be a little warmer?”)
  - Population survey „Biodiversity at the Greenway Schlosshofbach“
 Perspectives & Conclusion
Concept for Climate Change Adaptation

→ Focus on burden caused by heat and heavy rain

**Two stage approach:**
1. View on the total city area
2. Detailed view on selected subspaces (already existing climate problems or areas where climate relevant changes could be possible; e.g. development in cold air corridors, conversion areas)

- Determination and evaluation of local climate situations and local climate change impacts
- Identifying vulnerabilities
- Developing a local overall strategy
- Stakeholder involvement & public relations
- Catalogue of measures
- Continuation strategy
- Concept for controlling
- Communication strategy
Future Forum Climate Protection

Updating old & developing new climate protection goals beyond 2020

• Civic participation started on September 29th, 2015
• Kick-off to develop sustainable ideas and visions
• Discussing and progressing kick-off ideas and visions in 10 on-topic workshops in November 2015 & December 2016
  - Sustainable consumption & nutrition
  - Mobility fit for the future
  - Renewable energy | energy supply | energy saving
  - Building | housing | energy saving development
  - Support by and for the local economy
Future Forum Climate Protection

• Results of civic participation are the basis for the update of the Action Programme Climate Protection → Workshop protocols and results are available online

• Subsequent to the workshops the results were summed up in 12 fields of action → Interdisciplinary discussion within the administration

• Fields of action (examples):
  o Sustainable mobility
  o Health and climate change
  o Climate change adaptation
KlimaNetze.
Transformations in Climate & Resource Protection by Designing Governance Processes 2016-2019

Aims:
• Identification of local governance processes in climate protection and resource conserving
• Examination of the relations, structures of meaning and operational rationales of the various stakeholders
• Quantitative und qualitative network research to examine typical conflicts
• Development and validation of problem-solving strategies within field tests

Project partners:
ILS – Research institute for state und city development
RWTH Aachen (Faculty for sociology of technology and organisation (IfS), Faculty for planning theory and development (PT))
City of Darmstadt
City of Bielefeld

Funded by:
Conclusion

Exchange of Information:
- Interdisciplinary exchange within the municipal administration will become more important
- Consistent exchange of practitioners and scientists on current research

Breaking the Mould:
- Concept for a transdisciplinary work (administration, science, population, policy)
- Studies for/on integrated concepts

Leaving the Ivory Tower:
- Process/provide results transparent/understandable (science & practice)
For further information please visit:

www.bielefeld-wills-wissen.de
www.uni-bielefeld.de/bi2000plus

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THANK YOU FOR YOUR ATTENTION!

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References & Web-Links


Slide 23: [http://www.bielefeld.de/de/un/kli/eff/apple/](http://www.bielefeld.de/de/un/kli/eff/apple/)
Slide 24-25: [http://urban-nbs.de/](http://urban-nbs.de/)
Slide 31: [https://www.bielefeld.de/ftp/dokumente/DEZVert2016_10_01.pdf](https://www.bielefeld.de/ftp/dokumente/DEZVert2016_10_01.pdf)
Slide 32: [http://www.uni-bielefeld.de/bi2000plus/arbeitskreise/ak_umwelt.html](http://www.uni-bielefeld.de/bi2000plus/arbeitskreise/ak_umwelt.html)

(Last access to all web-links: 10/12/2016)