

Climate change and challenges in urban planning

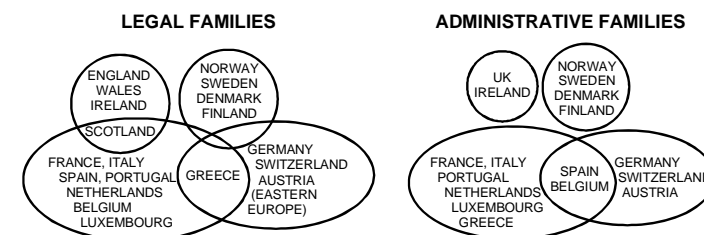
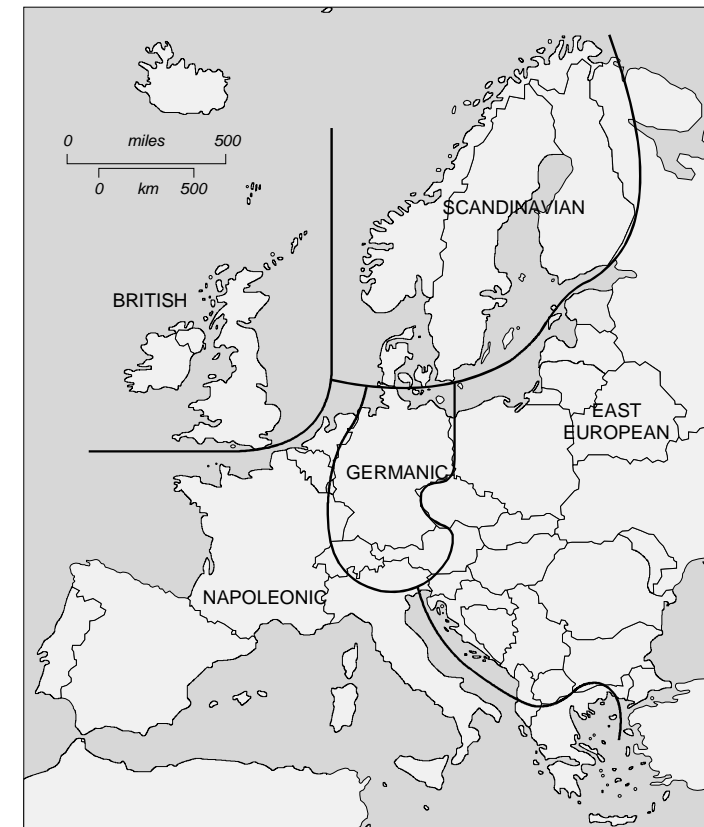
Stefan Greiving

Agenda

1. Relevance of urban planning
2. Challenge I – climate change
3. Challenge II – other connected changes
4. Challenge III – dominance of built-up areas
5. Applied adaptation: Experimental Housing and Urban Development (ExWoSt)
6. Conclusions – strength and weaknesses of urban planning

1. Relevance of urban planning

- Urban planning bases on a set of legal frameworks and rules which differ among Europe.
- The European Union does not have any legal competence for urban planning.
- But: urban planning and adaptation are addressed by the Territorial Agenda 2020
- Land-use determines to a certain extent the sensitivity to climate change.
- Urban planning is relevant for adaptation.
- Evidence basis is needed.



The legal and administrative 'families' of Europe. Source: Newman & Thorn

p.29

2. Challenge I – climate change

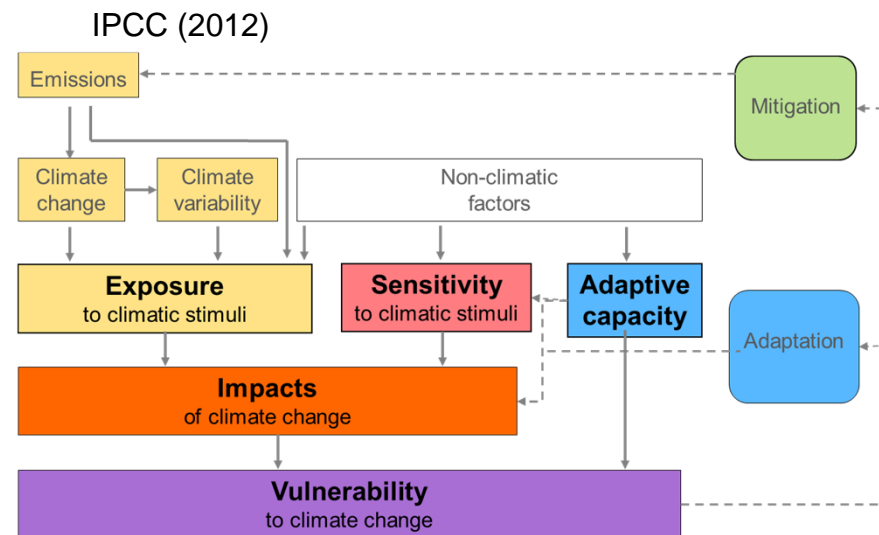
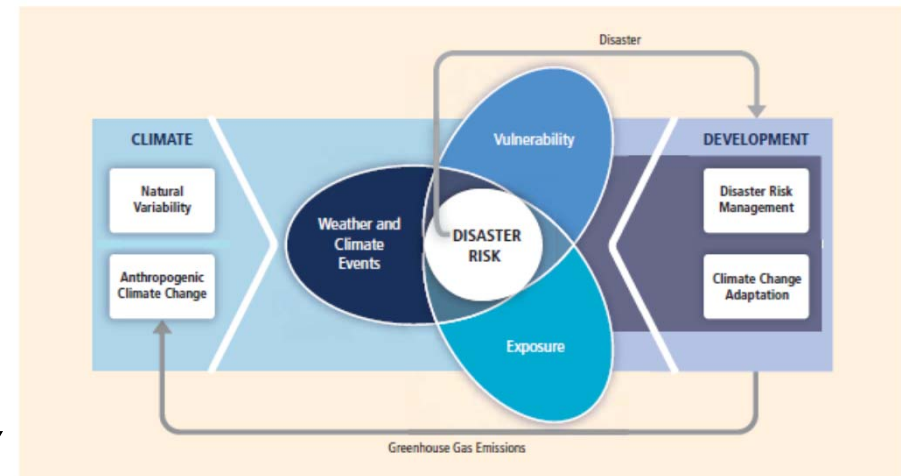
IPCC SREX Report 2012:

- Models project substantial warming in temperature extremes (“urban heat island effect”).
- It is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in the 21st century over many areas of the globe.
- Projected precipitation and temperature changes imply possible changes in floods, although there is low confidence in projections of changes in fluvial floods.
- What is about the local pattern?



Vulnerability concepts

- Outcome oriented understanding according to IPCC: “Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes.
- Contextualised understanding according to UN ISDR: “The conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of *hazards*.”



Füssel&Klein (2006)

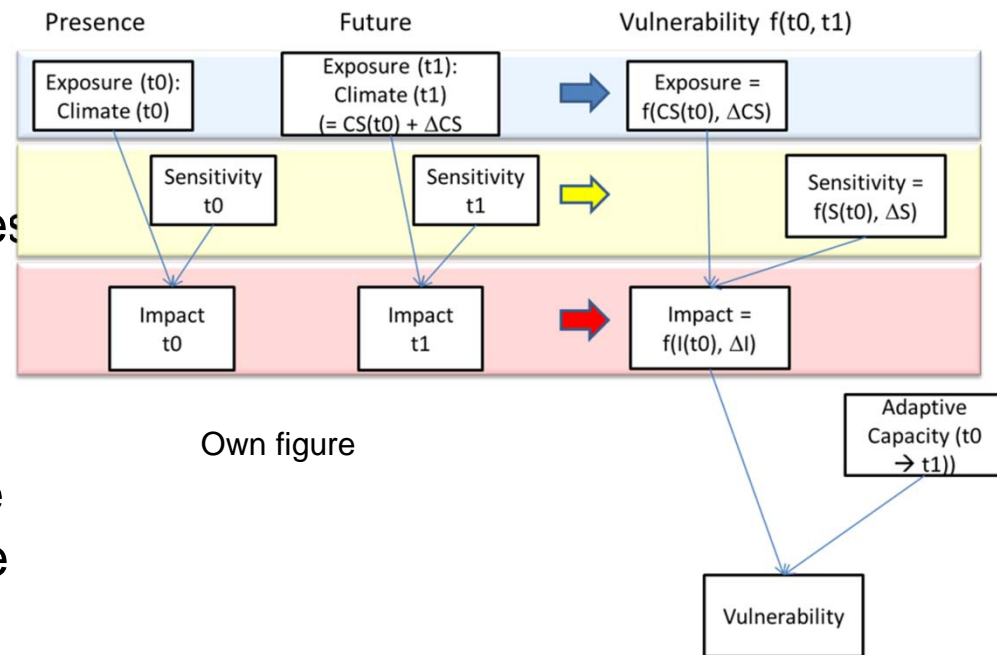
Need for a consistent evidence basis

- Climate change signals expressly refer to future climate changes, but the time frame for sensitivity is not defined.
- The current status of the system is generally taken as the benchmark for measuring sensitivity.
- The sensitivity of the system in its current and potential future status is a more decisive factor in terms of its vulnerability than climate change itself.
- Future changes are disregarded (building of housing estates, demographic change, changes in land use).
- Adaptive capacity as component of assessments is : ambivalent: assumed future potential to adapt (i.e. of urban planning) lowers vulnerability and may therefore deteriorate the political willingness to adapt?



Proposed conceptual frame:

- For each time slice (present, future) a potential impact is calculated.
- Adaptation capacity only relates to the future while existing measures are part of the sensitivity.
- For the overall assessment we take into account t_0 , t_1 and the delta ($t_1 - t_0$).
- In this way, the significance of already existing sensitivities becomes clear.



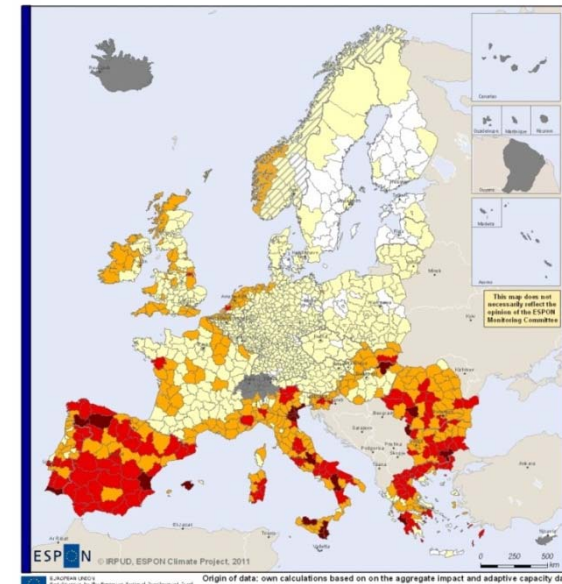
3. Challenge II – other connected changes

- Global Change as a whole
- Mitigation of greenhouse gas emissions
- Demographic change
- Economic globalisation and involvement of cities
- Migration
- Financial situation of public budgets
- Growing complexity and urban hazards
- ...

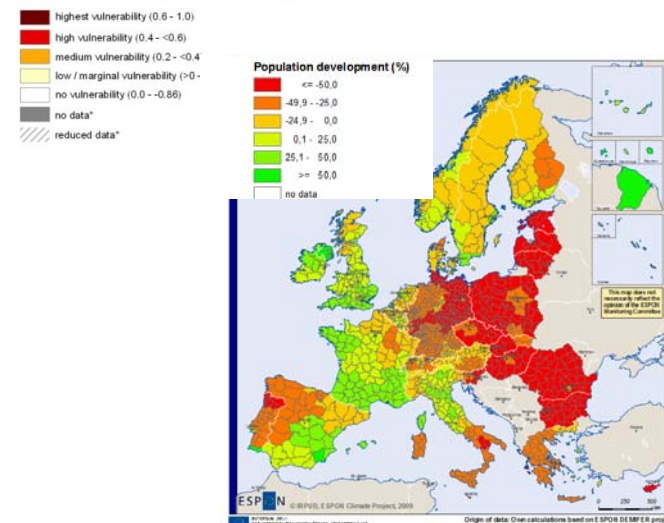


Vulnerability of European regions to climate change

- South-north gradient due to high impact in South and South-Eastern Europe, but also adaptive capacity of Scandinavia and Western European countries.
- Particularly countries which may expect a high increase in impact seem to be less able to adapt than others.
- This scenario for the future runs counter to territorial cohesion. Climate change may deepen the existing socio-economic imbalances between the core of Europe and its periphery.
- Particularly the East of Europe is affected by demographic changes, which may lead to an additional increase in sensitivity but also decrease in adaptive capacity.



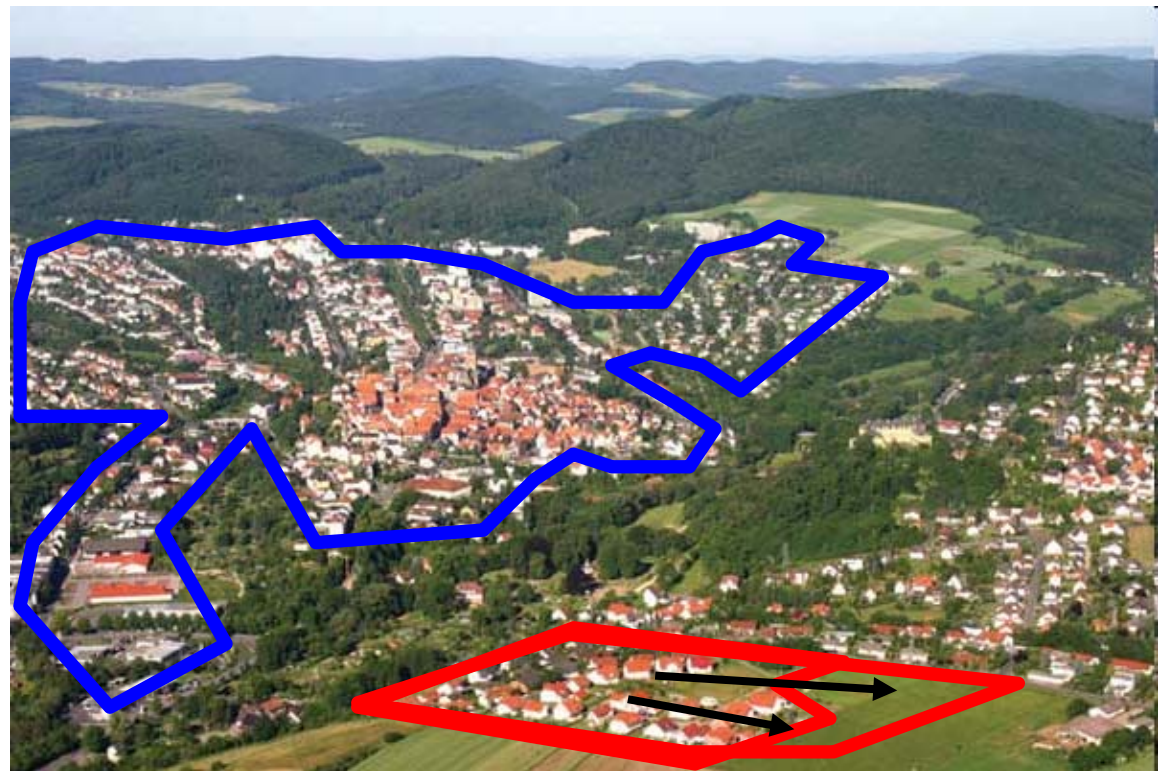
Potential vulnerability to climate change



Greiving et al (2011)

4. Challenge III – dominance of built-up areas

- Cultural landscapes of Europe are result of long-lasting development
- Built-up areas with high persistency
- Planning instruments designed for new developments
- Formal instruments with limitations
- Discourse-based strategies are needed



Risk governance

“The risk governance framework offers a systematic way to help situate ...judgments about disaster management, risk reduction, and risk transfer within [a] broader context” (IPCC, 2012, p.56).

- Growing uncertainty
 - Legal implications (e.g. private property rights)
 - Tolerability and Acceptability (quote from Walker et al., 2010)
- Complexity of changes
 - social, political, economic, demographic, cultural, climatic factors
 - Vertical and horizontal dimensions (Van Asselt and Renn, 2011; Young, 2002)
- Region specific
 - Varies depending on “socio-political contexts, value choices and decision structures in each case” (Assmuth et al. 2009, p.1)
 - ‘spatial relevance’ of hazards (Greiving et al, 2006; Schmidt-Thomé and Greiving, 2006)

Communication and participation techniques

Method	Napoleonic	British	Scandinavian	Germanic	East European
	+ = highly recommended		0 = recommended		- = partly recommended (to be decided case by case)
	Development function dominates; legally non-binding programmatic and/or strategic statements	Characterised by national level planning; only strategic planning at the regional level	Local self-government is seen as one of the cornerstones; the role of the local land use planning level is the most influential	New development legally allowed when it is conforming to the land use as laid down in legally binding plans	Management policies are characterised by a deep distrust in any long-term strategic planning approach
Preparation	Strategic planning approach needs evaluative elements	Strategic planning approach needs evaluative elements	Need to tailor communication strategy towards local implementation level	Need to tailor communication strategy towards local implementation level	Need to tailor communication strategy in order to increase trust in decision-making
Stakeholder analysis tool	+	+	+	+	+
Social milieu approach	+	+	+	+	+
Risk governance assessment tool	+	+	0	0	+
Information	Information important but has to be supported by elements of consultation in order to design and agree on strategic approaches	Information important but has to be supported by elements of consultation in order to design and agree on strategic approaches	Provision of information necessary in order to keep people informed about different implementation steps within the planning process	Provision of information necessary in order to keep people informed about different implementation steps within the planning process	Provision of information necessary in order to keep people informed about different implementation steps within the planning process, educational information as important basis

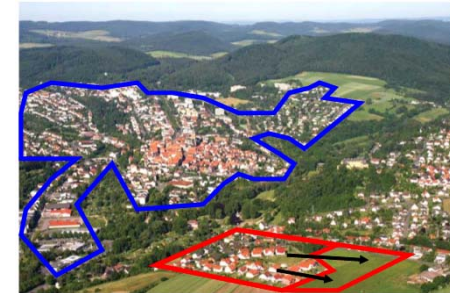
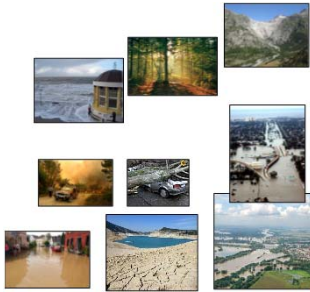


Planning and implementing communication and public participation processes in flood risk management

Procedural guidelines and toolbox of methods



Source: Greiving et al (2012): IMRA Handbook "Planning and implementing communication and public participation processes in flood risk management"



Challenge I - Impacts

Challenge II - Changes

Challenge III - Cities

Mitigate climate change

Adapt to changes

Cope with uncertainty!



Urban Resilience

Principles of resilient cities

(according to Godschalk, 2003; Henstra et al., 2004)

- **Redundancy:** Systems designed with multiple nodes to ensure that failure of one component does not cause the entire system to fail.
- **Diversity:** Multiple components or nodes versus a central node, to protect against a site-specific threat.
- **Efficiency:** Positive ratio of energy supplied to energy delivered by a dynamic system.
- **Autonomy:** Capability to operate independent of outside control.
- **Strength:** Power to resist a hazard force or attack.
- **Interdependence:** Integrated system components to support each other.
- **Adaptability:** Capacity to learn from experience and the flexibility to change.
- **Collaboration:** Multiple opportunities and incentives for broad stakeholder participation.

5. Applied adaptation: Experimental Housing and Urban Development (ExWoSt)

Räumliche Strategien zur Anpassung an den Klimawandel
- die KlimaExWoSt und KlimaMoRo Modellvorhaben des BBSR/BMVBS



KlimaExWoSt
"Urbane Strategien zum Klimawandel - Modellvorhaben Kommunale Strategien und Potenziale" (Laufzeit 2010-2012)

- 1 StädteRegion Aachen
- 2 Stadt Bad Liebenwerda
- 3 Stadt Essen
- 4 Stadt Jena
- 5 Nachbarnschaftsverband Karlsruhe
- 6 Stadt Nürnberg
- 7 Stadt Regensburg
- 8 Landeshauptstadt Saarbrücken
- 9 Stadt Syke

KlimaMoRo
"Raumentwicklungsstrategien zum Klimawandel" (Laufzeit 2009-2011)

- 1 Regionale Planungsgemeinschaft Havelland-Fläming
- 2 Planungsregionen Mittelhessen und Südhessen
- 3 Planungsregionen Mittlerer Oberrhein u. Nordschwarzwald
- 4 Landkreis Neumarkt in der Oberpfalz
- 5 Regionaler Planungsverband Oberes Elbtal/Osterrgebirge
- 6 Verband Region Stuttgart
- 7 Regionaler Planungsverband Vorpommern
- 8 Regionaler Planungsverband Westsachsen

Datenbasis: Laufende Raumbeobachtung des BBSR
Geometrische Grundlage: BKG, Gemeinden, 31.12.2008



KlimaMORO

8 regions
2011-2013

Phase I: 2009-2011

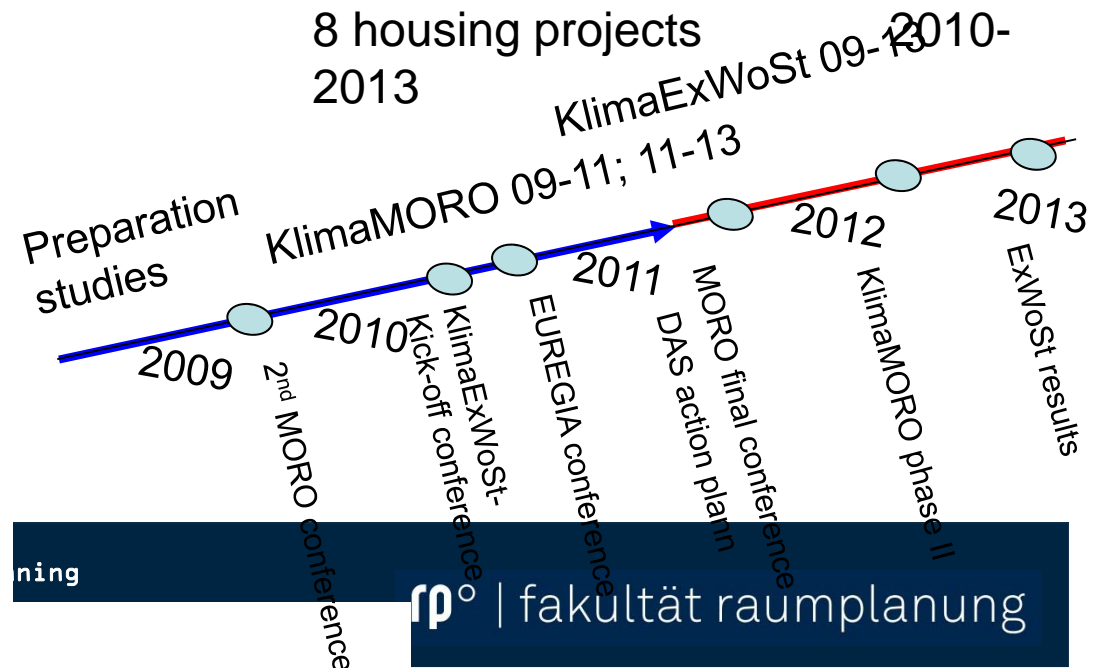
Phase II:



KlimaExWoSt:

9 cities/city regions
2009-2012

8 housing projects
2013



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rp

| fakultät raumplanung

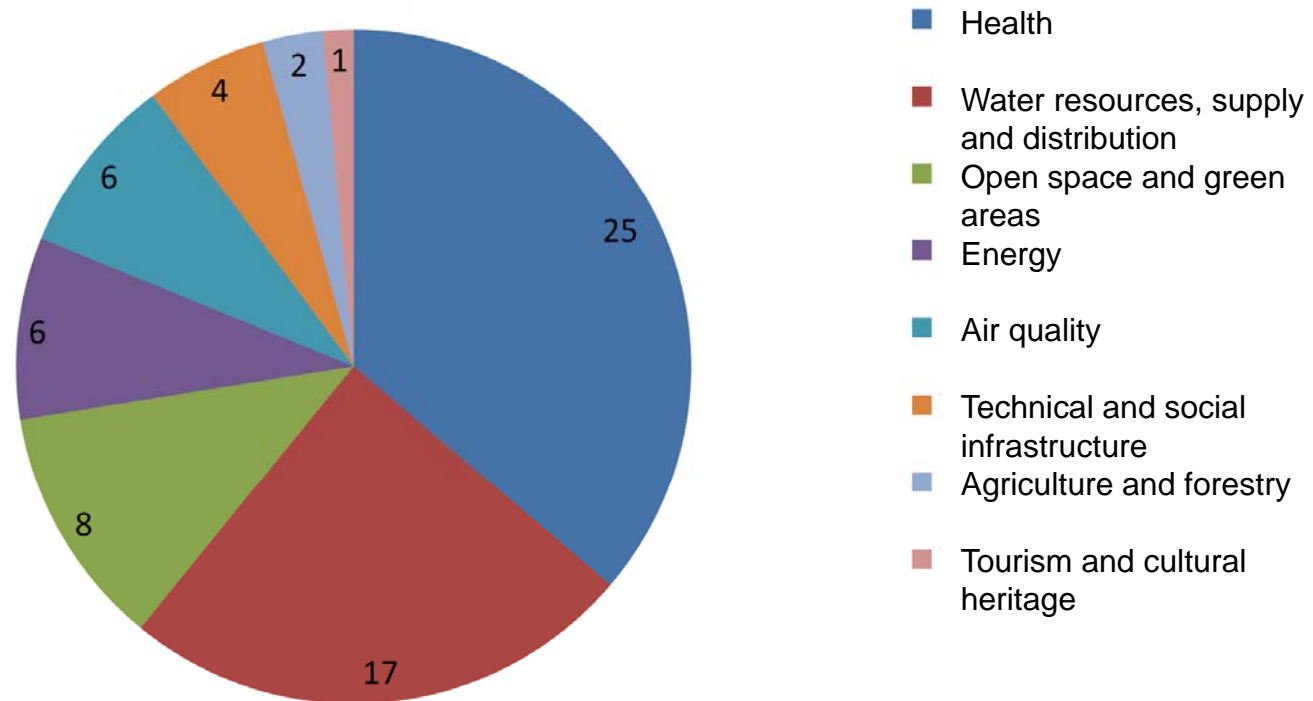
General observations

- Focus on extreme weather events
- All 9 projects/case studies consider approaches to dealing with the increase of extreme weather events (river floods, extreme precipitation, flash floods, heat waves)
- Different approaches in the demonstration projects:
 - planning related/structural approaches: measures in the area of urban planning and housing
 - informative/organisational approaches: information of the public, governance, co-ordination with other stakeholders, improvement of information and communication
 - analytical/technical approaches: measures for improving the analysis/assessment of future extreme weather events, technical analysis tools

Dealing with the challenge of extreme events in urban demonstration projects

Share of planned measures according to issues of urban development

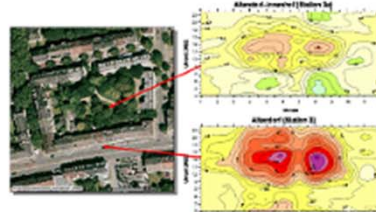
Number of
measures



Elements of the Cool City Concept in Essen

Making use of demographic change and structural change for a climate change oriented urban development

- Use potentials of greening roofs, facades, courtyards and streets
- Development and opening of lanes for flows of cool air
- Integration of climate change adaptation into existing measures



Greening of courtyards



Demonstration quarter with climate change oriented urban land-use plan



Green in the city: University quarter



Urban reconstruction new Niederfeld lake



Former railway track used as cycling path and lane for cool air flow



Climate change adaptation in old peoples' homes



New green and blue spaces

ExWoSt demonstration project „Tackling climate change – Integrated strategies for the City of Essen“

- Scenario „Cool City“ at the „Innovation City“ site in Essen, North Rhine-Westphalia
- Examples of optional measures

Example from the City of Essen: Adaptation to the urban heat island



Development of a heat warning system

- Forwarding heat warnings of the German Weather Service (DWD) to the public
- Specific information provided to sensitive facilities (old peoples/retirement homes, hospitals, nursery day cares/kindergartens, schools)
- Information accessible to everybody on an internet website

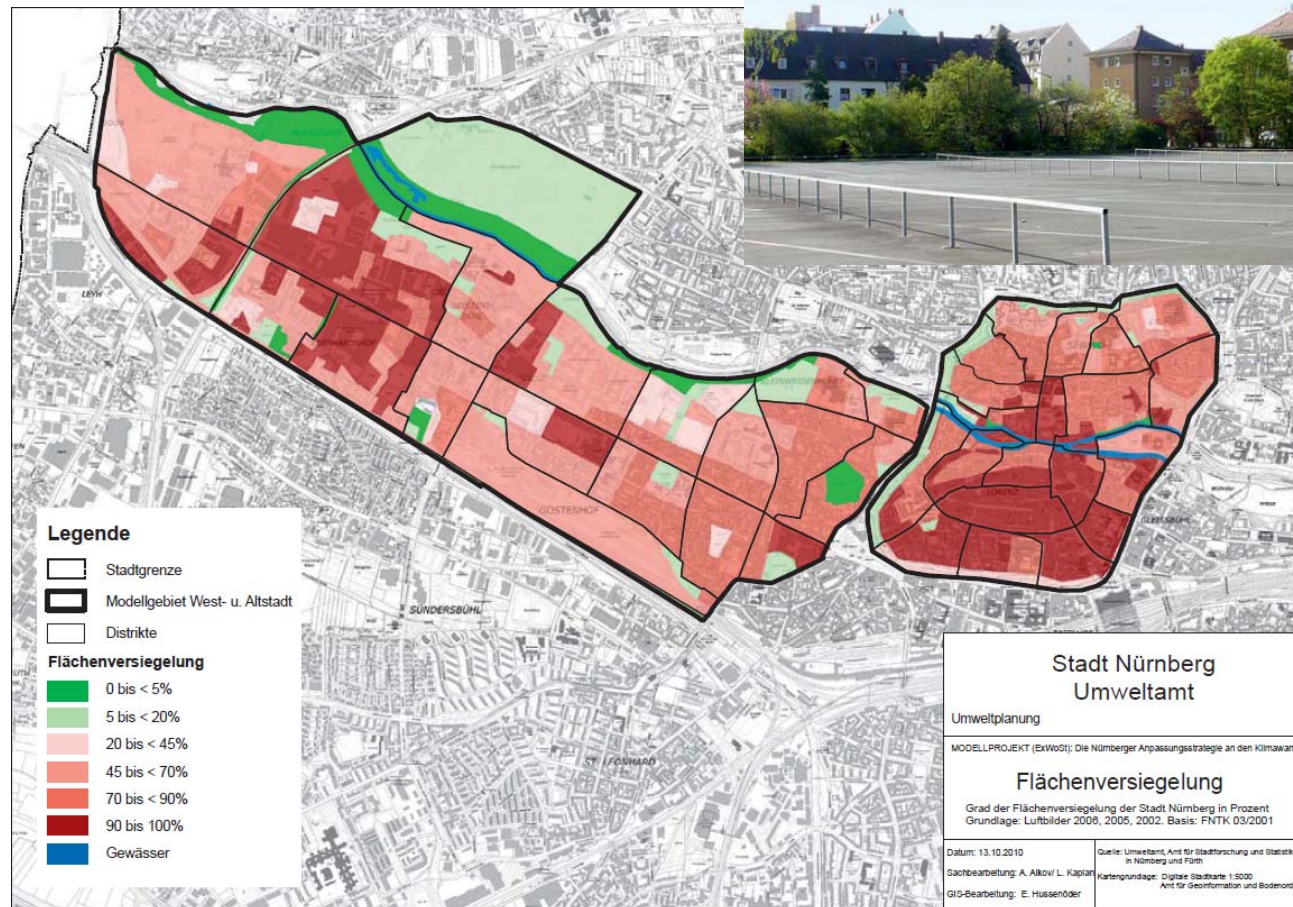
Distribution of information for behaviour during heat waves

- Information on what to do for the population and social facilities

Planning and housing related recommendations

- Construction of old peoples homes: selected sites ideally not in the centre of the urban heat island but close to heat compensating green spaces
- Buildings for social facilities with sensitive persons: sun protection, use of materials that reduce heating effects

Example from Nuremberg: Redevelopment



ExWoSt demonstration project „Climate change adaptation strategy for Nuremberg – the example of inner city quarters“

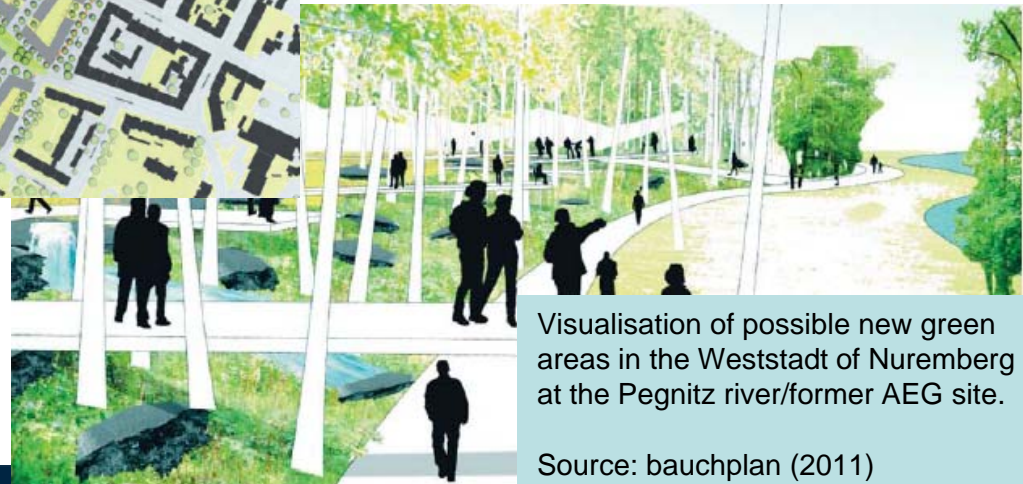
- Redevelopment of brownfield areas in the „Weststadt“ of Nuremberg, Bavaria
- Reduction of sealed surface area

Example from Nuremberg: Redevelopment of brownfield areas (former Quelle and AEG sites)



Urban design competition for the former Quelle site:
Draft of the 1st award with new green areas on
former parking lots

Source: AG Messmer + Franke, Rössner +
Waldmann, Tautorat (2011)



Visualisation of possible new green
areas in the Weststadt of Nuremberg
at the Pegnitz river/former AEG site.

Source: bauchplan (2011)

6. Conclusions – strength and weaknesses of urban planning

Task	Milestones	Potential of spatial planning	Description
Assessment of long-term consequences	Assessment and appraisal of climate change impacts on the human-environmental-system	fair	Possible based on regional impact studies, planning has to have at hand. A strength of comprehensive planning is the traditionally integrated view on different change processes (demography, economy, environment, climate)
	Assessment of frequency and magnitude of extreme events	poor	That is clearly a task for specialised authorities like water management where spatial planning does not have any competence at hand - connection to SUDPLAN tool
Change proofing	Identification of interaction between land-uses and the changing climate	good	Such assessments can easily be integrated in the strategic environmental assessment which is obligatory for any spatial plan or program
	New guiding principles (such as “resilience”) suitable for the ongoing global change	good	The concept of resilience is almost in line with existing planning principles like decentralised concentration and could therefore easily adopted in planning practice

Task	Milestones	Potential of spatial planning	Description
Adaptation	Avoidance of non-adapted developments	good	This is in focus of planning which is very much about future developments. The effectiveness of actions depends partly from the existing regulatory framework (zoning instruments)
	Adaptation of existing spatial structures (settlements, infrastructure)	poor	Any adaptation of existing structures is hardly possible through regulatory planning due to the given private property rights. What is needed are incentives and good practices aiming at convincing private householders
	Keeping disaster prone areas free of further development	good	At least conforming planning systems have regulatory zoning instruments at hand. Keeping free of areas prone to extreme events is thereby possible
	Differentiated decisions on land-use according to the given sensitivity	fair	Almost possible, but not effective with regard to existing settlement structures
	Relocation/retreat from threatened areas	poor	In conflict with property rights. Full recompensation is needed which fails mostly due to the lack of financial resources. Possible in areas with shrinking population where the existing building stock will be (partly) deconstructed based on planning strategies (see Eastern Germany)

Thank you for your attention

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