



CHECK VULNERABILITY

The development of a city or region is subject to many uncertainties, e.g. changes in the demographic situation. The climate projections add more uncertainties. Therefore, the Future Cities vulnerability check starts by determining the current vulnerability.

With the Adaptation Compass, the local physical features and socio-economic conditions – called receptors – can be checked for their vulnerability related to weather events. The list of receptors is based on the experiences of the Future Cities organisations and provides a comprehensive check list for the urban environment. For customised use, the user can select the receptors of individual interest and describe the spatial relevance of the receptors for the area in question. For this, practical indicators are proposed.

Furthermore, the user can submit individual information regarding former events, e.g. heavy precipitation or heat waves, what impacts they imposed on the different receptors and which actions were taken, e.g. in the infrastructure system or in organisational procedures.

As the overall result for the different receptors, the current vulnerability is summarised as – low, medium, high – as a basis for the module “Appraise Risks and Opportunities”.

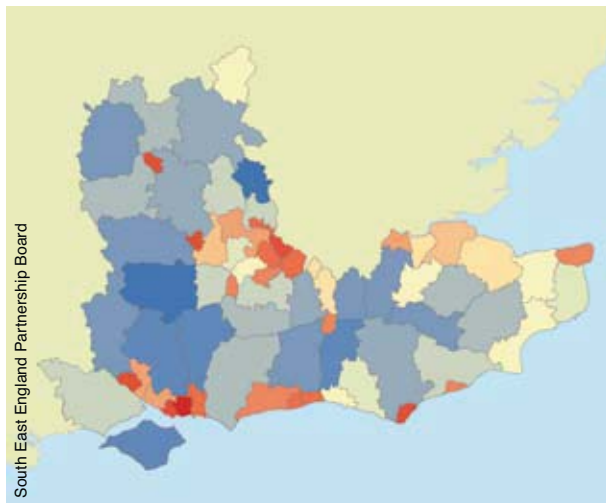
List of topics and urban receptors

- Population e.g. public health, vulnerable groups
- Built environment e.g. existing building stock, construction material, urban (green) spaces
- Infrastructure e.g. transport, water and sanitation services, electricity and heating services, communication services, waste water management
- Economy e.g. industry, retail, tourism
- Natural resources e.g. water resources and water quality, air quality, agriculture, forestry, biodiversity
- Administration e.g. preparedness, public budget

Spotlight: The Regional Vulnerability Assessment in South East England

In the South East of England, the Partnership Board, a partnership between the South East's local authorities and the regional economic development agency, undertook a regional vulnerability assessment. Different sectors were explored, e.g. population and health, water resources and the economic development. The Board decided to first look at the current vulnerability: What consequences are currently experienced as a result of flooding and erosion?

The regional vulnerability assessment has focussed on identifying areas at greatest risk or "vulnerability hot spots". These were identified by overlaying maps with the geographical information available at the regional planning association. Starting from the current vulnerability, the experiences made with the receptors were integrated into the Future Cities Adaptation Compass.



Analysis map of density of households in the South East of England (Red zones: high density; Blue zones: lower density)

Spotlight: The Local Vulnerability Check in Hastings

The Future Cities partner, Hastings Borough Council, explored its local vulnerability by conducting a Local Climate Impacts Profile. This is a procedure introduced in the UK by the UK Climate Impacts Programme to explore the consequences of extreme weather events.

In Hastings, a town on the South East England coast, weather events reported in the news during the past 10 years were connected to the impacts they caused on the municipal services and communities. For the past 10 years, 20 events of flooding, 14 events of drought and each 7 events of heat waves and high winds were noted.

Heat waves had positive and negative consequences. More tourists came to visit Hastings because the sea and wind lowers the temperatures. Negative was the increase of complaints due to more noise in the streets during warmer nights. The process also raised awareness among the various departments of the administration as they were requested to gather the necessary information.



Heat waves also create opportunities: Hastings beach tourists

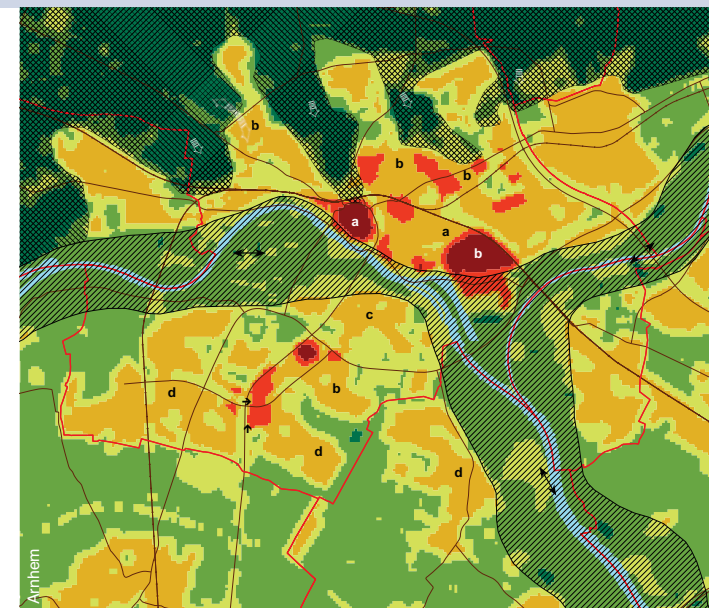


The Future Cities Adaptation Compass provides a similar approach to explore the current vulnerability by checking former events. Following the vulnerability check Hastings Borough Council will be developing a town-wide climate change adaptation 'plus' plan, drawing on regional and local climate impacts data of the UK Climate Projections 2009 with actions spread across a range of partners.

Spotlight: Assessing the urban climate of the city of Arnhem

The Dutch city of Arnhem focuses on the urban vulnerability due to heat and the urban heat island effect: The average temperature in a city is higher than in the surrounding area.

Different types of instruments are used. The Urban Climate Analysis Map, also called Heat Map, shows areas at most risk for heat storage and possibilities to ventilate and cool the city based on five factors: topography, land use, urban morphology, material use and colour, and wind paths. Additionally, in August 2009 after a series of hot days the temperature on the ground was measured with special bicycles. Late in the evening a maximum temperature difference of 7 °C was measured between stony and green areas in the city. These results validate the theoretical results of the Heat Map. In the same period, an aeroplane at 4000 metre altitude took pictures with a heat sensitive camera for a so-called heat scan. Analysing the Heat Map and the heat scan leads to interesting conclusions: E.g. the heat scan shows that the football stadium "Gelredome", a stony area, radiates in the evening a lot of heat which was absorbed during the day. The Heat Map concludes that the open area around the stadium prevents the area as a whole from heating up because it is well ventilated.



The Arnhem Heat Map: Existing geographical and meteorological data were combined with knowledge and experience from Germany (University of Kassel) and China (Chinese University of Hong Kong). Green zones: fresh and cool air producing areas; Red zones: sensitive areas for heat accumulation of a part of the Arnhem Nijmegen City Region.



Analysing the city climate with special bicycles and the heat scan in parts of the City Region Arnhem Nijmegen.