



Appendix 6: Review of tools and guidance

Adaptation Strategies for European Cities: Final Report

This is part of the Final Report of the project "Adaptation Strategies for European Cities" which has been compiled by Ricardo-AEA for the European Commission Directorate General Climate Action



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Adaptation Strategies for European Cities: Final Report



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1 Concept

The review of adaptation tools and guidance forms one element of a targeted review of current practice on adaptation in European cities as outlined on page 48 of our proposal. This Sub-task (1.2.3) incorporates the three desk based reviews of:

1.2.3.1 – Adaptation strategies (see pages 48-51 in the Proposal)

1.2.3.2 – Good practice adaptation options (see pages 52-54)

1.2.3.3 – Adaptation tools and guidance (see pages 54-57)

These tasks respond to requirements outlined under Task I in the Specifications, particularly addressing the following points:

- “Identifying adaptation options, the best practices (... collected and incorporated into the Adaptation Clearinghouse...) in view of using these in training / capacity building”
- “Identify cities with relevant experience in designing and implementation adaptation strategies, plans and measures ... concrete best practice examples”
- “Taking stock of and reviewing existing guidance tools for adaptation...”

Analysis of the information collected in the three reviews contributes to the emerging picture of the state of play in adaptation in cities (complementing evidence from the survey and the literature review of impacts and vulnerabilities), as well as providing core content for the development of training materials (Task 3).

1.1 Aim of the adaptation tools and guidance review

The Good Practice review (sub-task 1.2.3) has four key purposes. First, within the context of the project, the review aims to inform the development of training materials. Second, also within the context of the project, the review will provide content for the web platform (eucities-adapt.eu) which will ultimately transfer into the Climate-Adapt platform. Third, again within the context of the project, the review will inform awareness-raising through interactions with cities. Fourth, within the wider context of European activity on adaptation, the review will help to inform the development of the European adaptation strategy (due 2013) (via State of Play report).

The specific aim of the review of adaptation tools and guidance (sub-task 1.2.3.3) is to take stock of the range and nature of existing tools and guidance for adaptation. For most policy and decision-makers working at city level, adaptation planning is a new and complex topic. Those charged with adaptation planning often have numerous additional responsibilities and consequently do not often assign a high priority to dealing explicitly with adaptation challenges. There are now a range of online tools and guidance documents available which can make the task of adaptation planning more manageable. These guides, tools and reports offer different perspectives and are focussed on a range of sectors and stages in the adaptation process, however, it can be difficult for users to navigate a way through these resources and find the most appropriate tool or guide for their needs.

The review of adaptation tools and guidance review process can help to:

- Identify which tools and guidance are most appropriate for specific challenges or types of cities.
- Avoid duplication of efforts by understanding the purpose and application of existing tools.
- Optimise the effectiveness of the products developed in this project by drawing upon existing good practice.
- Summarise a selection of tools and guidance enabling users to assess which resources may be of most use to them in an efficient manner.

The review does not assess 'take up' or the practical application of the tools as this data is not available. Furthermore, the degree to which a tool or guidance is deemed useful will depend on individual preference, knowledge and experience; the situation to which the tool may be applied; and the sectorial and geographic coverage of the resource in question. However, in reviewing the tools a subjective assessment is made of the usefulness for cities based on its likely relevance in an urban context, the resolution at which any data is available and the 'user-friendliness' of the resource. This assessment builds upon the experience of the consultants in working with cities and local authorities but is no substitute for users exploring each tool to find which suits them best.

2 Approach taken

Drawing upon expertise and experience from within the project team, a 'long list' of 50 tools and guidance documents was compiled. The aim was to capture a range of tools and guidance relevant to European cities undertaking adaptation planning, recognising that this could include sector specific resources or information from outside the EU where appropriate. The resources were classified in order to better understand:

- The context of the tool / guidance (e.g. funding country, organisation and language);
- Applicability of the tool / guidance to a wide range of EU cities, climate change hazards and sectors;
- Focus of each tool (e.g. does it have a specific urban focus? What stage of the adaptation planning cycle does it correspond to?)

The 'long list' of 50 resources can be found in Table 1 in this report and the characteristics of each tool have been recorded on a spreadsheet. It is important to note that long-list contains some highly relevant resources which will be used to inform the development of the training element of the project and have also been used in selecting content for the Knowledge Bank on the project website. However, in order to provide a more detailed analysis of key tools and guidance likely to be of most use at city-level, six resources were selected in line with the proposal.

A short-listing exercise was undertaken in order to reduce the number of tools and guidance. In doing so, the following criteria were considered:

- Applicability to a wide range of EU cities (ensuring relevance to a broad range of cities likely to engage in the project)
- Applicability to a range of climate hazards and sectors (recognising that sector or hazard specific resources identified in the long-list will remain useful resources throughout the project and will be entered into the Knowledge Bank)
- European coverage (ensuring that the shortlist draws on experiences and expertise from a range of Member States and, where relevant, beyond Europe)
- Design, layout and format (ensuring that tools were selected that were accessible to users with different levels of adaptation knowledge and recognising that users will prefer different formats including web-based tools, written step-based guidance, practical examples and case studies)

Further consideration was then given to the tools and guidance to ensure that there was an appropriate mix of resources and that all stages of the adaptation process are addressed within the final portfolio to be analysed in more detail. To this end we identified the following short-list of six tools and guidance which are widely applicable to European cities:

1. **BalticClimate: Baltic Sea Region toolkit to support climate change mitigation and adaptation at the local level** [<http://www.toolkit.balticclimate.org/>]
2. **Climate Change Adaptation by Design: A guide for sustainable communities (Town and Country Planning Association (TCPA), UK)** [http://www.tcpa.org.uk/data/files/bd_cca.pdf]
3. **Future Cities Adaptation Compass (incorporating the UKCIP Adaptation Wizard)** [<http://www.future-cities.eu/project/adaptation-compass.html>]
4. **Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project: Case Studies and Assessment Tool** [<http://www.grabs-eu.org/casestudies.php> and <http://www.grabs-eu.org/assessment.php>]
5. **Framework for City Risk Assessment (Mehrotra et al. 2009)** [http://www.pik-potsdam.de/research/climate-impacts-and-vulnerabilities/research/research-field-2-NSP/nsp/teaching/literature_sose2009/cities-develop/rosenzweig.pdf]
6. **ICLEI Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation (ICLEI Canada)** [http://www.iclei.org/fileadmin/user_upload/documents/Canada/Changing_Climate/ICLE076_-_NRCan_Guide.pdf]

The shortlisting process and final selection of tools and guidance was undertaken between March and April 2012 and therefore reflects the tools that were available at this time.

3 Findings from the analysis

The key findings from the analysis of tools and guidance are consolidated into two outputs; the 'long list' of 50 resources listed in Table 1 and a more detailed review and summary of six key resources. These components form the basis of this chapter.

Table 1: The 'long list' of adaptation tools and guidance

Tool/Guidance	Funder	Type of resource
BalticClimate: Baltic Sea Region toolkit to support climate change mitigation and adaptation at the local level	Baltic Sea Region Programme 2007-2013 (EU)	Tool
TCPA's Climate Change Adaptation by Design: a guide for sustainable communities	TCPA	Guidance
Future Cities Adaptation Compass	EU - Interreg IVB-project	Tool
Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project: Case Studies	EU - Interreg IVB-project	Tool
Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project: Assessment Tool	EU - Interreg IVB-project	Case Study
Framework for City Risk Assessment (Mehrotra et al., 2009)	Unknown	Research Project
The PACT assessment tool	Alexander Ballard Ltd	Tool
The Adaptation Support Tool	EU - DG CLIMA	Tool
Adaptation Wizard, UKCIP	Defra	Tool
University College London (2007 - 2010) LUCID: The Development of a Local Urban Climate Model and its Application of the Intelligent Design of Cities "	UK Engineering and Physical Sciences Research Council	Research Project
Australian Government 2007 Climate Change Adaptation Actions for Local Government.	Department for Climate Change and Energy Efficiency	Guidance
SNACC: Suburban neighbourhood adaptation for a changing climate.	EPSRC, under the Living with Environmental Change Programme (LWEC). Part of the Adaptation and Resilience to a Changing Climate (ARCC) Coordination Network	Research Project

The CIBSE “Design Compass”	The Chartered Institution of Building Services Engineers	Tool
BACLIAT: Business Areas Climate Assessment Tool	Defra	Tool
Canadian Communities’ Guidebook for Adaptation to Climate Change (Bizikova et al. 2008)	Adaptation and Impacts Research Division (AIRD), Environment Canada	Guidance
Climate Change Local Area Support Programme (CLASP) Adaptation Risk Assessment Resource Pack	CLASP	Guidance
Costing the impacts of climate change in the UK, UKCIP/Defra	UKCIP/Defra	Guidance
A blueprint for the integrated assessment of climate change in cities (Dawson et al. 2009)	Tyndall Centre	Guidance
Climate adaptation: Risk, uncertainty and decision-making UKCIP Technical Report (May 2003)	UKCIP/Defra	Guidance
Energy Saving Trust 2008: The Nottingham Declaration Action Pack.	Energy Saving Trust	Guidance
Regional Climate Change Adaptation Strategies (RCCAS) (online guidance) and 'Design of guidelines for the elaboration of Regional Climate Change Adaptations Strategies' (Ribeiro et al. 2009). Ecologic.	EU - DG Environment	Guidance
ICLEI 2007 Preparing for Climate Change Guidebook for Local, Regional and State Governments.	ICLEI (Center for Science in the Earth System (The Climate Impacts Group)	Guidance
ICLEI 2008 Local Governments Adaptation Toolkit Australia.	Australian Government Department of Climate Change.	Tool
ICLEI Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation (ICLEI Canada).	Natural Resources Canada: Climate Change Impacts and Adaptation Division	Guidance
Integration of Adaptation and Mitigation in Local Climate Policies (Kress 2007)	AMICA: Grand Lyon; Climate Alliance; City of Venice; etc	Guidance
PREPARED: Enabling Change	European Commission / FP7	Guidance
Preparing for change: Climate-proof your tourism business.	UKCIP	Tool
TSB 'Design for Future Climate'.	Technology Strategy Board	Research Project
City of Chicago 2008 Quick Guide to Climate Change Preparation.	City of Chicago	Guidance
Local Climate Impacts Profile (LCLIP)	UKCIP/Defra	Tool
Identifying adaptation options (AdOpt), UKCIP	Defra	

Checklist of climate variables (UKCIP Adaptation Wizard)	UKCIP/Defra	Checklist
Checklist of risk categories (UKCIP Adaptation Wizard)	UKCIP/Defra	Checklist
Climate change projections (UKCIP Adaptation Wizard)	Defra	Projections
New Zealand Government 2008 Preparing for Climate Change - Local Government Guide.	New Zealand Government	Guidance
Socio-economic scenarios, UKCIP	UKCIP	Tool
University of Manchester (2007 - 2010) SCORCHIO: Sustainable Cities: Options for Responding to Climate Change Impacts and Outcomes	UK Engineering and Physical Sciences Research Council	Research Project
University of Oxford (2009 - 2012) ARCADIA: Adaptation and resilience in Cities: Analysis and Decision Making Using Integrated Assessment	Tyndall Centre for Climate Change	Research Project
Your Home in a Changing Climate	Three Regions Climate Change Group	Research Project
ICLEI Adaptation Database and Planning Tool (ICLEI USA).	ICLEI	Tool
Interreg Flood Resilient City programme (Dijle, Woluwe river basins, Belgium)	Interreg	
New Zealand Government 2009 Climate Change: Effects-Impacts-Assessment - a Community Manual.	New Zealand Government	Guidance/Manual
University of Gothenburg (2011 - 2012) Adapting cities to climate induced risks - a coordinated approach	Formas; Swedish Energy Agency; Swedish Environmental Protection Agency; Swedish National Heritage Board; Swedish Transport Administration	Guidance
Inter-University Research Centre for Technology, Work and Culture (2007 - 2009) Climate Change in Murau: Regional Portfolios for Adaptation and Mitigation. Building regional capacities for portfolio-development and adaptive experimentation	Austrian Academy of Sciences; Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management"	Research Project
University of Natural Resources and Life Sciences, Vienna, Institute of Landscape Development, Recreation and Conservation Planning (2011 - 2013) STOPHOT: Cool towns for the elderly – protecting the health of elderly residents against urban heat "	Austrian Climate Research Programme (ACRP)	Research Project
SCORCHIO: Sustainable Cities: Options for Responding to Climate Change Impacts and Outcomes	EPSRC. Part of the Adaptation and Resilience to a Changing Climate (ARCC) Coordination Network	Research Project

Adaptation Navigator	Climate Change Adaptation Programme (Global Cities Research Institute) at RMIT University	Tool
Canadian Government 2006 First Nations Guidebook on Adaptation Planning.	Canadian Government	Guidebook
CLASP NW Resource Centre		Online resources and links
Kind, Christian, Till Mohns, Christian Sartorius 2011: Supporting the management of climate risks and opportunities (Unterstützung des Managements von Klimarisiken und Chancen). Climate Change Series 05/2011 Dessau: Umweltbundesamt		Tool

The remainder of this Chapter comprises the detailed review of the six short-listed resources.

3.1 Future Cities Adaptation Compass

3.1.1 The Future Cities Project

The Future Cities Adaptation Compass has been developed as part of the broader Future Cities project, funded by the European Regional Development Fund (ERDF). The project brings together partners from five European countries (Belgium, France, Germany, Netherlands and UK) with the aim of making city regions in North-West Europe better able to cope with the predicted climate change impacts. The partners have developed *The Future Cities Strategy* built upon three strategic components - green structure, water systems and energy efficiency – to facilitate the proactive transformation of urban structures. From 2008 to 2012, two water boards, six municipalities, two regional planning associations and two development agencies are cooperating to implement this strategy.

Key features

- ✓ Step-based toolkit
- ✓ Available online
- ✓ Strong urban focus
- ✓ Based on five member states but likely to be of wider relevance
- ✓ To be launched in Autumn 2012

<http://www.future-cities.eu/project/adaptation-compass.html>

3.1.2 Purpose of the tool and target audience

The Adaptation Compass acknowledges the cross-sectoral nature of climate change. The fact that within a city almost all departments are facing climate impacts is also considered, thus measures taken by one department or organisation may have synergies with those of another. Equally, there may be conflicts between these adaptation activities. The Compass seeks to bring together stakeholders in order to improve cross-sectoral working. According to the Future Cities website, the final version of the Compass will exhibit the following characteristics:

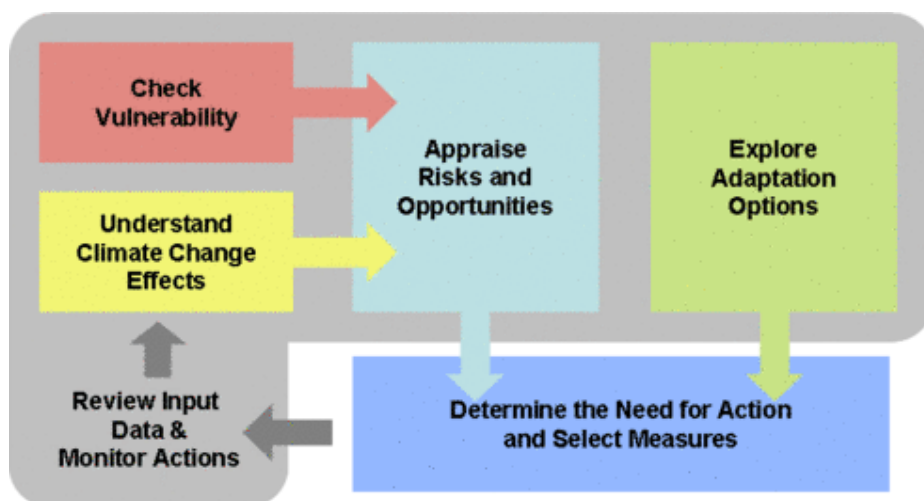
- It will provide general information and automated answers. It will also give the user the opportunity to submit local information.
- It will be a guide to connect different stakeholders and to check the vulnerability and adaptation options across sectors.
- It will help planners and experts in cities and water boards to structure work steps, provide good-practice examples and highlight issues and possible barriers.
- It will enable the user to plan the stages required to create climate proof cities through the application of a pre-structured assessment process.
- It can be applied to a region, a city or a project area.

The Compass is deliberately cross-sectoral and is targeted at experts and planners at city or regional level. The tool frames adaptation as a cyclical process, reflected in Figure 1. A prototype of the Adaptation Compass is being tested by the partnership and will be launched in Autumn 2012.

3.1.3 Tool structure and format

The Compass is structured around the adaptation process as outlined in Figure 1 which appears constant with similar risk-frameworks and adaptation support tools which also present adaptation as a continuous process (e.g. UKCIP's Adaptation Wizard; BalticClimate Toolkit; and DG CLIMA's Adaptation Support Tool).

Figure 1: Future Cities Adaptation Compass structural diagram (from <http://www.future-cities.eu/project/adaptation-compass.html>)



The Compass uses the structure above as the basis for a series of ‘working steps’ which are complemented by best practice examples and experiences of the Future Cities project partners. The idea is that the Compass can be applied to a region, city, project area or single department, but with a focus on bringing together stakeholders.

The Compass incorporates the following steps:

Check vulnerability: The compass will enable users to assess the current vulnerability of a city region or part of a city. Using a checklist, physical and socioeconomic receptors can be checked in terms of their vulnerability to weather events and hazards. The list of receptors is based on the experience of the Future Cities organisations and aims to provide a comprehensive checklist for the urban environment. This approach can be tailored by the user and information on past weather events can be input. The result is a low, medium or high vulnerability rating for each receptor.

Understand climate change effects: The Compass directs users to relevant information on the future effects of climate change, providing advice on dealing with the uncertainties inherent in climate projections. A basic catalogue of direct and indirect climate change impacts for different sectors of relevance urban areas has been developed. For the regions participating as Future Cities partners a greater level of detail will be available including trend data for key climate variables (e.g. increase of heat days and increase in temperature during summer months).

Appraisal of Risks and Opportunities: Drawing upon the vulnerability assessment and review of future impacts, this module will utilise an evaluation matrix that can be used to classify risks and identify opportunities.

Explore adaptation options: This element of the Compass will assist users in examining various adaptation options. It will incorporate a catalogue (or database) of adaptation options organised in the three categories of green structure, water systems and energy efficiency, as well as awareness raising and educational measures.

Need for action and select measures: This module considers the links between the catalogue of adaptation options, the problems they address and the need for action. The previous information and assessment steps are will be taken account resulting in a list of core problems and problem areas (hotspots) which are matched with suitable adaptation measures.

Review data and monitor: The Compass will allow users to save the results, review data at a later date and update as required. Examples of how to monitor the measures are also provided.

Because the Adaptation Compass is still at test stage the exact format of the final tool will not be publically available until Autumn 2012. All indications are that this will be web-based.

3.1.4 What makes the tool useful for cities?

The Adaptation Compass has a strong urban focus and the Compass Brochure¹ already provides useful examples from the participating cities and organisations. The framework which underpins this tool covers the breadth of the adaptation process, although it will be interesting to understand the level of detail available in the final version. The emphasis on three-components (green structure, water systems and energy efficiency) suggests the toolkit will also tackle overlaps between mitigation and adaptation.

The Compass is being tested by the Future Cities project partners in Belgium, Germany, France, the Netherlands and the UK, consequently, it is impossible to assess the ease of using this toolkit until the final version is available. It is also difficult to determine the extent to which the 'Understand climate change effects' module will provide data which applicable beyond the participating countries. However, the strong focus on cities and urban areas suggests that this will be a highly relevant tool.

¹ http://www.future-cities.eu/uploads/media/Future_Cities-Adaptation_Compass_en.pdf

3.2 GRaBS Assessment Tool and Case Studies

3.2.1 Context

The Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project² is a network of leading pan-European organisations involved in integrating climate change adaptation into regional planning and development. The project has 14 partners from eight Member States, addressing a range of climate change challenges. These partners are from a range of local authorities with varying degrees of strategic policy and experience.

Key features

- ✓ GIS-based climate impacts and vulnerability data available across Europe
- ✓ More detailed data available for partner cities
- ✓ Practical case studies of green and blue infrastructure responses
- ✓ Strong urban focus

<http://www.ppgis.manchester.ac.uk/grabs/>

<http://www.grabs-eu.org/casestudies.php>

3.2.2 Purpose of the tool and target audience

During the course of the GRaBS project, partners have worked with the University of Manchester to develop a risk and vulnerability assessment tool, to aid the strategic planning of climate change adaptation responses. The aim of the GRaBS Assessment Tool was to assess the current vulnerability of urban areas to climate change impacts, with an additional assessment of relative spatial patterns of risk where suitable data was available. The tool was devised to help users to visualise vulnerability, exposure and climate hazards within a particular location up to 2080, thus raising awareness, aiding decision-making and facilitating community and stakeholder participation in formulating appropriate adaptation responses. As such, it is particularly useful in the preparation of Adaptation Action Plans and in understanding flooding and heat stress. It is designed to be accessible to a broad range of stakeholders involved in climate change adaptation, including the general public.

3.2.3 Tool structure and format

The GRaBS project frames climate change as a problem that impacts on urban areas in different ways, according to the specific exposure of these locations to climate and weather hazards and the consequences of these hazards which are mediated by a range of urban characteristics (e.g. population structures, development patterns etc). The Assessment Tool aims to improve understanding of these factors in an urban context, thus supporting adaptation planning.

Adaptation strategies act to reduce vulnerability by lowering exposure and increasing the resilience of the elements at risk from climate hazards. The main aim of the GRaBS Assessment Tool is to assess current vulnerability of urban areas to climate change impacts using spatial data for a range of receptors that are potentially vulnerable to climate hazards. The Tool is based on a Geographical Information System (GIS) and was built on the Google Maps interface using a range of spatial data for the whole of Europe. This data, combined with specific spatial data from project partners, provides over 325 different map layers.

The Adaptation Tool interface comprises a Google map of Europe and a menu of themes (variables) divided into 'European' and 'Partner' tabs. The European tab includes a range of

² The GRaBS project has been made possible by the Interregional Cooperation Programme INTERREG IVC, financed by the European Union's Regional Development Fund.

themes which can be selected and illustrated automatically onto the map. These themes include:

Climate: ‘Baseline climate’ (1961-1990) data; projections for 2080s under the A2 (medium-high) and B2 (medium-low) emissions scenarios. Both baseline and projection data is available for temperature and precipitation.

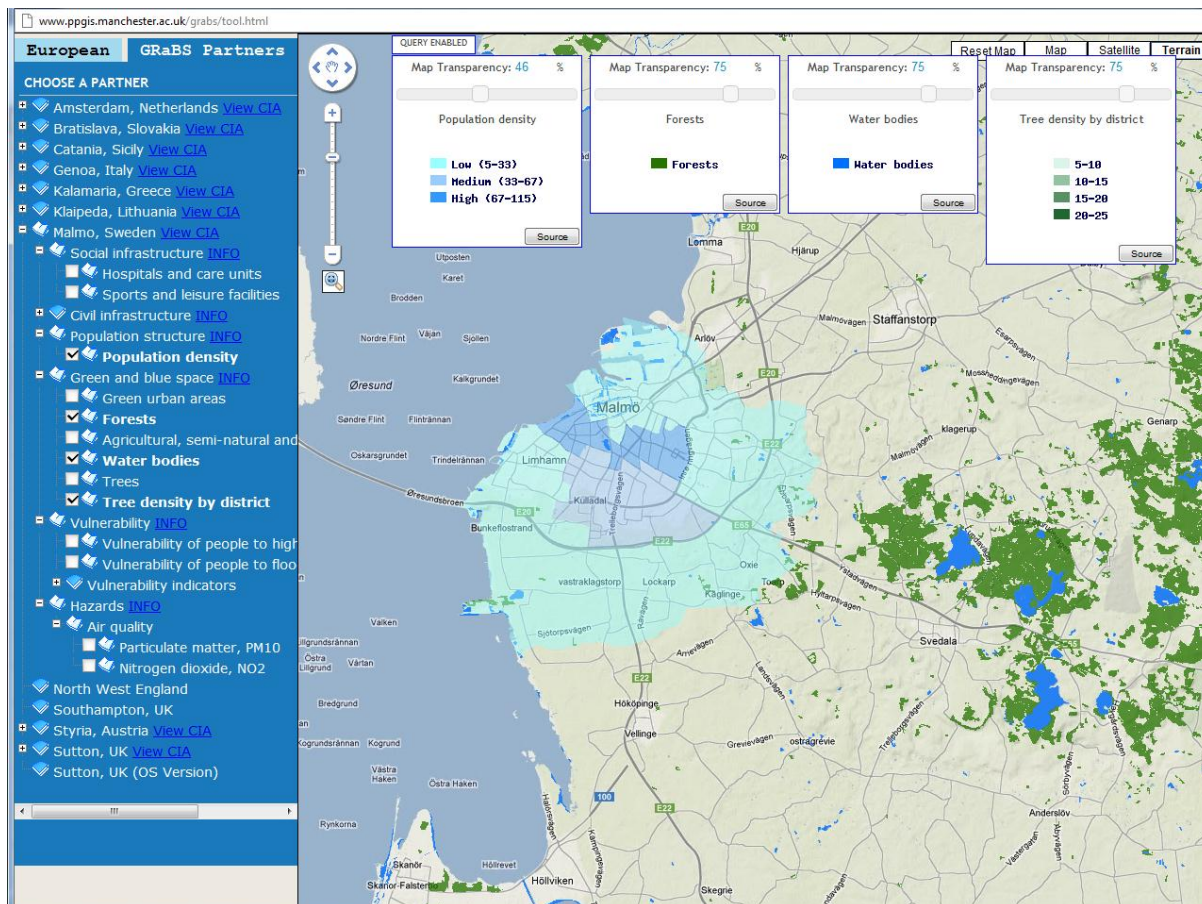
Climate Hazards: Data is provided for six climate hazards, namely ‘river flooding’, ‘forest fire’, ‘storm surge’, ‘extreme temperature’, ‘drought’ and ‘storm hazard’.

Characteristics and features: including the location of civil infrastructure (key roads, airports, railways); population structure (density, growth rate, key age bands), urban development (degree of urbanisation, location of urban centres); location of green and blue space.

The ‘**Partner**’ tab provides users with access for details data for the GRaBS project partner cities including Amsterdam (Netherlands), Bratislava (Slovakia), Catania (Sicily), Genoa (Italy), Kalamaria (Greece), Klaipeda (Lithuania), Malmö (Sweden), North West England (UK), Southampton (UK), Styria (Austria) and Sutton (UK). The data themes for these locations include:

- Social infrastructure
- Civil infrastructure
- Population structure
- Green and blue space
- Hazards
- Vulnerability

Figure 2: Example map from GRaBS Assessment Tool



3.2.4 Case Studies

By focussing on current and future climate impacts and vulnerability, the Adaptation Tool is largely concerned with the early stages of the adaptation process³; it does not provide information on responses, options or adaptation costs. However, the project has developed 15 in-depth case studies from across the world, providing insight into adaptation options and responses. Each case study details the aims of the intervention, the climate themes and impacts it is responding to, how stakeholders have been engaged and its likely impact. These projects are focussed on adaptation responses which incorporate green and blue infrastructure.

3.2.5 What makes the tool useful for cities?

The Adaptation Tool is useful for cities as it provides an interactive and visual means by which cities can explore current and future vulnerability to climate hazards. The ability to overlay data sets is also a useful feature. The spatial resolution of the different data sets means that some data layers may be more useful and relevant at city-level than others. For example, the degree to which the data on the European level map will be useful for urban-level planning is questionable; however, the data for partner cities is far more detailed. The Adaptation Tool is easy to use, although it relies upon the user being able to interpret and gauge the relevance of the data in order to develop an accurate picture of location-specific vulnerability (i.e. overlaying two datasets does not necessarily imply a causal relationship). The richer data available at GRaBS partner level includes more detail on infrastructure, vulnerable groups and the provision of green and blue space. The GRaBS case studies offer a valuable contrast to the vulnerability-focussed Adaptation Tool, providing practical examples of green and blue infrastructure initiatives. Neither the Tool nor the case studies provide information on assessing the costs and benefits of adaptation or on how to implement effective monitoring and evaluation.

³ As defined by the EC DG CLIMA Adaptation Support Tool and the UKCIP Adaptation Wizard

3.3 Changing Climate, Changing Communities: Guide and Workbook for Municipal Climate Adaptation (ICLEI Canada)

3.3.1 Purpose of the tool and target audience

The Guide and accompanying Workbook provide a framework which is specifically targeted at local government practitioners and aims to guide them through the adaptation process. The Guide frames adaptation planning in terms of a five-milestone process comprising initiation, research, planning, implementation and monitor/review. As such, there are strong similarities with other step-based approaches, particularly the UKCIP Adaptation Wizard. The guide is designed so that each milestone builds upon the findings of the previous milestone and the Guide has been formulated

to encourage users to reevaluate and review findings and decisions. This approach means that the Guide provides support through the whole adaptation process. The Guide is supported by a Workbook which provides users with practical tools and exercises to support the process, along with policy and scientific resources that can be used to complement adaptation activities. Neither the Guide nor the Workbook is specifically targeted at cities, instead considering the adaptation challenge in terms of impacts, consequences and responses *for communities*. However, a number of the case studies are focussed on towns and cities and the resources seem highly relevant for those working in an urban environment.

Key features

- ✓ Practical milestone-based approach
- ✓ Very useful set of exercises and activities to help operationalize theory
- ✓ Tackles adaptation holistically (as an iterative process)

Full Guide and Workbook can be found online [here](#)

3.3.2 Tool structure and format

The main Guide is divided into the five milestones mentioned above. These milestones form the framework for both the Guide and the Workbook.

Milestone One: Initiate

This milestone aims to commence the process of planning for adaptation by helping communities to identify possible internal and external stakeholders that should be part of a climate change adaptation team; assess their existing knowledge; and consider the anticipated climate change impacts which will affect the community in question.

Milestone Two: Research

The second milestone aims to enhance the community's understanding of climate change impacts and the service areas which might be affected. This includes assessing vulnerability and risk.

Milestone Three: Plan

Based on the impacts previously identified, this milestone provides guidance on how to establish a vision, develop adaptation goals and objectives and identify adaptation options. It also helps users to examine possible constraints to, and drivers of, action. Advice is provided on drafting an Adaptation Action Plan.

UKCIP Adaptation Wizard

The UKCIP Adaptation Wizard takes users through a 5-step process to help to assess an organisation's vulnerability to current climate and future climate change; identify options to address an organisation's key climate risks; and help to develop and implement a climate change adaptation strategy. This well-respected resource was one of the first comprehensive adaptation tools to be developed, influencing many subsequent resources. It may be a useful tool to use alongside the *Changing Climate, Changing Communities Guide*.

The UKCIP Adaptation Wizard can be found online [here](#)

Milestone Four: Implement

The fourth milestone concerns the implementation of the Action Plan, including engaging and gaining support from stakeholders and ensuring that the implementing team have the appropriate tools.

Milestone Five: Monitor/review

The fifth and final milestone considers the process of assessing whether the goals and objectives set previously have been achieved, identify any problems that have been encountered and develop solutions. Communication of progress to the general public is also addressed.

Workbook

The workbook comprises 17 worksheets or exercises which help users to plan, organise their ideas and develop an appropriate Action

Plan. These worksheets are referenced throughout the main Guide such that the each activity or exercise is linked to a particular milestone.

3.3.3 What makes the tool useful for cities?

Changing Climate, Changing Communities provides a very practical, user-friendly tool focussed on users from the local government community. The adaptation context is focussed on impacts in Canada and, consequently, is of little relevance to European users; this may also be true for the case studies which are predominantly North American. The strong Canadian focus is also borne out in the choice of referenced material, including references made to policy. However, the milestone-based framework could be easily applied in a European situation and the Workbook exercises are largely generic and would be a useful resource in most developed country settings. The similarity with the UKCIP Adaptation Wizard means that users might benefit from using a selection of resources and ideas from both tools.

3.4 Framework for City Climate Risk Assessment (Mehrotra et al 2009)

This risk assessment framework is informed by interdisciplinary research which reviews recent literature and practices, and identifies knowledge gaps in order to develop a consistent approach to assess climate risk in cities. The framework sits within a broader report (Mehrotra et al 2009) which sets out the findings of the research and provides case studies illustrating the application of the framework for the cities of Buenos Aires, Delhi, Lagos, and New York.

The risk assessment framework is targeted specifically at cities and seeks to bring together existing local information on vulnerability, observed and projected climate data and information on awareness and action taken by local institutions. This understanding of risk at city level can then enable the development of “adaptation planning pathways, which are effective, efficient, and necessary responses to climate change at the city level” (Mehrotra 2009, p.3). The overall purpose of the Urban Climate Risk Framework is to assist policy makers in assessing and responding to the risks associated with climate change in cities. The authors list the following three objectives:

- Characterize the hazards associated with climate change at the city-level;
- Identify the most vulnerable segments (people, locations, sectors) of the city; and
- Assess the city’s ability to adapt to anticipated changes in climate.

The focus of the framework is on cities in developing and emerging economies, however it was tested in New York and the principles would appear relevant to a wider range of cities.

3.4.1 Tool structure and format

The framework aims to deconstruct the following three elements which shape climate risks in cities:

- Hazards: “The climate-induced stresses on the city and are identified through observed trends and projections derived from global climate models (GCMs) and regional downscaling.”
- Vulnerability: “The physical attributes of the city and its socio-economic composition that determine the degree of its susceptibility”.
- Adaptive Capacity: “Institutional attributes of the city and its actors that determine the degree of its capability to respond to potential climate change impacts”.

These three elements comprise a combination of physical science, geographical, and socioeconomic elements, which if unpacked, can help municipal governments to understand risk and develop climate change action plans. In testing the framework in four cities, emphasis is placed upon understanding and articulating the differential impacts on poor and non-poor urban residents as well as disaggregating implications for infrastructure and social wellbeing, including health. The framework outlines suggested approaches to measuring and assessing hazards, vulnerability and adaptive capacity.

Key features

- ✓ Useful framework for assessing risk based upon three pillars:
 - Hazards
 - Vulnerability
 - Adaptive Capacity
- ✓ Four examples of the framework’s application from across the world

Full study available [here](#)

Measuring Hazards through Climate Change Scenarios

For Hazard analysis the framework highlights the inclusion of observed and projected data for key climate parameters (e.g. temperature, precipitation, sea-level rise) and changes in the frequency, as well as intensity, of extreme events. The need to consider a range of model outputs and scenarios in the analysis is also stressed.

Measuring Vulnerability

When considering vulnerability assessment, the framework decouples vulnerability determined by the physical and underlying social conditions of the city from adaptive capacity. Vulnerability is framed as a function of a range of city characteristics, including physical (e.g. location, topography) and social factors (e.g. size and composition, density, size of city, quality of infrastructure). When determining the vulnerability of the poor as opposed to the non-poor, the percentage of the population living in slums is identified as a key determinate.

Measuring Adaptive Capacity

What makes the tool useful for cities? Adaptive capacity refers to the ability and willingness of the city's key stakeholders to cope with the adverse impacts of climate change. The measurement of adaptive capacity within the framework is focussed on measures of awareness, capacity, and willingness to the change.

In addition to outlining the conceptual framework for assessment, the study identifies some practical lessons from successful policies and programmes at the city level that aim to reduce systemic climate risks, especially for the most vulnerable population. In-depth case studies from Buenos Aires, Delhi, Lagos, and New York are then presented.

3.4.2 What makes the tool useful for cities?

The framework is useful in terms of conceptualising three main elements which can provide improved understanding of city-level climate risk. These three elements – hazards vulnerability and adaptive capacity – are relevant to cities across the world, so while the study has a developing country emphasis, the relevance to European cities is evident. The report is academic in its presentation and, as such, is not particularly accessible for those wishing to gain an overview or quick insight into the issues. However, the flip-side of this is that the material covers the concepts in depth. The case studies also illuminate the theoretical framework and highlight its relevance to a range of city types.

Reference

Mehrotra, S. et al. (2009) Framework for City Climate Risk Assessment. World Bank.

3.5 Climate Change Adaptation by Design: A guide for sustainable communities (Town and Country Planning Association, UK)

3.5.1 Purpose of the tool and target audience

The aim of the Climate Change Adaptation by Design guidance is to “communicate the importance of adapting to some degree of inevitable climate change, and to show how adaptation can be integrated into the planning, design and development of new and existing communities”. The guide has a clear focus on the built environment and urban centres and presents a positive view of how adaptation in urban areas offers enormous potential for creating high value, quality places where people and businesses will want to spend time. Particular emphasis is placed on how adaptation options are influenced by geographical location and the scale of development, thus a range of climate risks are considered at three spatial scales (conurbation, neighbourhood and building).

The emphasis of the guide is on the UK, consequently the policy mechanisms referred to may only be of relevance to UK cities. Furthermore, the Guide was published in 2007 and the policy context has changed considerably in the UK. However Chapters 3 to 4 (which present consider a framework for delivering adaptation action; the implementation of adaptation through design and development; and key adaptation technologies) are of great relevance beyond the UK and draw extensively on European examples. This guide is targeted at a broad audience comprising those who are involved in the development of sustainable communities, including politicians, policy makers, developers, architects and urban designers. Consequently, it is highly relevant to city-level adaptation.

Key features

- ✓ Strong focus of adaptation options
- ✓ Excellent range of international examples
- ✓ Addresses adaptation options for a range of spatial scales and impacts
- ✓ Positive and inspiring tone

http://www.tcpa.org.uk/data/files/bd_cca.pdf

3.5.2 Tool structure and format

The Climate Change Adaptation by Design guide takes the form of a written report and is organised into five chapters (excluding references). The first two chapters provide an introduction and set out the policy context. Chapter 3 describes a series of guiding principles which local authorities and cities can apply in the delivery climate change adaptation and which would be relevant across Europe. There is no detailed consideration of costs within this study, though the benefits of different options are described, but not quantified. Chapters 4 and 5 present the most valuable source of information for European cities therefore the guidance is of most relevance in a broader European context when adaptation options are being considered. Chapters 4 and 5 are structured as follows:

Chapter 4: How to implement adaptation through design and development

This part of the guide provides a menu of adaptation options organised according to the main climate risks faced by communities in the UK, namely a) managing high temperatures b) managing flood risks c) managing water resources and water quality d) managing ground conditions. While the risks are based on the UK context, the adaptation options are relevant to many other European cities and most of the case study examples are from Europe and beyond. For each risk, the menu of associated options is summarised in a useful city-level

diagram. As well as being grouped by risk, the adaptation options are also considered in terms of three spatial scales:

Conurbation or catchment scale - which considers options that may serve a whole city and is likely to include a variety of land uses. At this scale opportunities for creating cost-effective and integrated solutions as part of an overarching climate change strategy are explored.

Neighbourhood scale - focussing on developments of discrete groups of dwellings, including a mix of uses, which may vary in size from an individual block to a large estate. Consideration is given to adapting the public realm and spaces between buildings and developments.

Building scale - Smaller developments including individual dwellings, apartment blocks or commercial buildings providing opportunities for integrating climate change adaptation into or around buildings. At this level there is a focus on building design, use and management in order to maximise current and future climate adaptation potential. Design or building codes are identified as useful tools.

Chapter 5: Techniques and technologies

This chapter provides further details on some of the key technologies available to help manage climatic risks, focussing especially on:

- Sustainable drainage systems (SUDS)
- Green roofs
- Structures and products to improve flood resilience
- Cool roofs, building and pavement materials
- Rainwater harvesting and storage systems
- Greywater recycling

3.5.3 What makes the tool useful for cities?

This Guide has a strong focus on adaptation options for the built environment and a range of examples of good practice. The categorisation of these examples by impact type and spatial scale is also useful, providing examples for those working at a strategic city-wide level as well as practical solutions at site or development level. The emphasis on making better places and spaces for communities, business and individuals may be attractive to policy makers and is a refreshing counterpoint to a disaster reduction narrative. Adaptation by Design tends to focus on the adaptation options element of the adaptation process so may complement more holistic step-based approaches such as UKCIP's Adaptation Wizard, the BalticClimate Toolkit and the Adaptation Support Tool on the Climate-Adapt website. While the guide is UK focussed, which may mean the policy elements are of less value elsewhere, it draws upon a wide range of international good practice and the principles and options presented are of relevance to many European cities. This guide has been well regarded and well used in the UK, including in training spatial planners and town planners.

3.6 The BalticClimate toolkit

3.6.1 Purpose of the tool and target audience

The BalticClimate online toolkit is a knowledge transfer instrument targeted at actors working at local and regional level who may not be experts on climate change but who will be making decisions which relate to the implementation of climate change measures. The toolkit stems from a broader project to help municipalities and local and regional stakeholders to deal with the issue of climate change in a cooperative, integrated and sustainable way in the Baltic Sea Region.

BalticClimate deals with issues of climate adaptation and mitigation together and in doing so, provides a range of tools and exercises and is targeted at actors working in small and medium sized cities and rural areas in all Baltic Sea Region countries. It seeks to address the needs of three main groups of actors: **Policy makers, spatial planners and business people**. A step-based approach to developing both adaptation and mitigation responses is presented through these three lenses.

3.6.2 Tool structure and format

The three actor groups form the main entry point for using the toolkit and also form the framework within which information and resources are organised.

Policy Makers

Guidance and support for policy makers is divided into four steps:

Prepare the ground/recognise the problem - by gathering information on impacts and vulnerabilities and mapping stakeholders

Assess vulnerability – though a general introduction to vulnerability in four key sectors (agriculture, housing, energy and transport).

Set strategic direction – this section acknowledges the need for a long term strategy and the importance of integrating climate change into existing policies

Plan and implement – this section is where the most information is contained, including useful examples of policies and plans from across the Baltic States, organised in terms of *Regional, General* and *Detailed Planning* categories.

Spatial Planners

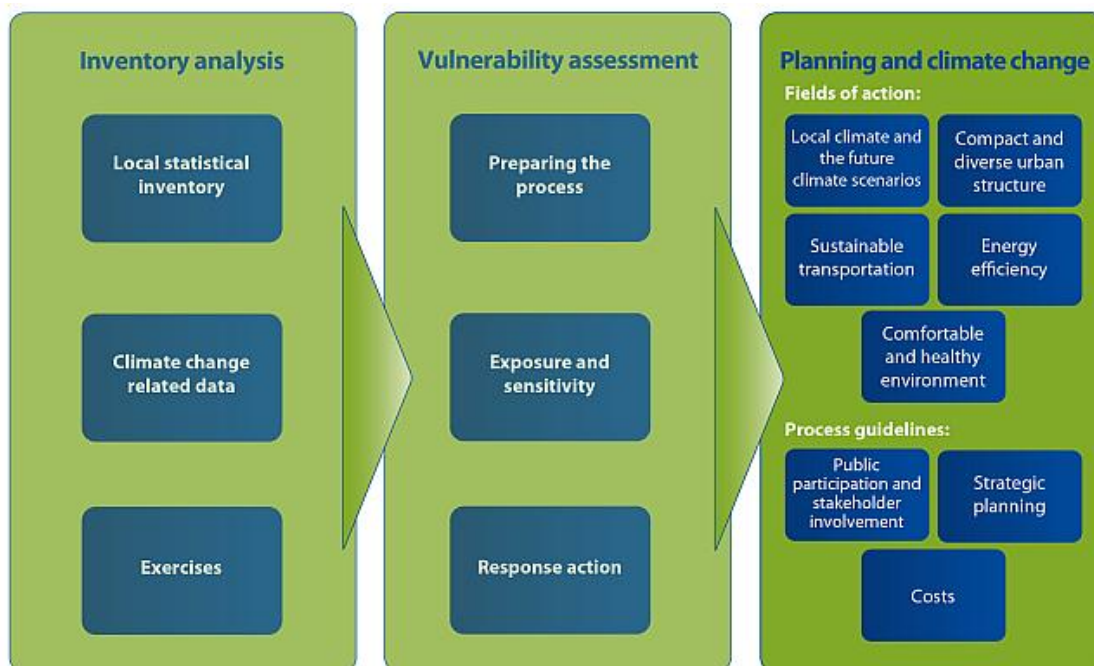
The entry point for Spatial Planners focusses on three levels of analysis and information; *inventory-analysis*, mainly dealing with contextual information and climate change data; the process of *vulnerability assessment*, which includes a number of exercises to assist the assessment process (e.g. mapping socio-economic and climatic stressors); and *planning and climate change*, which is divided into fields of *action* and *process* guidelines. This approach is illustrated in the diagram below:

Key features

- ✓ Covers mitigation and adaptation
- ✓ Three key user groups targeted - Policy makers, Spatial Planners and Business People
- ✓ Strong regional (Baltic State) focus
- ✓ Provides information and example policies and plans
- ✓ Includes practical exercises for users

<http://www.toolkit.balticclimate.org/en/home>

Figure 3: Spatial Planning toolkit (from the BalticClimate website <http://www.toolkit.balticclimate.org/en/home>)



Business people

Resources for business people focus on information and exercises which examine the challenges and opportunities faced by businesses. This approach also utilises scenarios of future climate for the Baltic Sea Region produced by the Swedish Meteorological and Hydrological Institute (SMHI) in cooperation with the Centre for Climate Science and Policy Research (CSPR). The toolkit also features a SWOT analysis tool tailored for use by businesses.

In addition to the three entry points outlined above, The BalticClimate toolkit provides more general information on climate change; climate change scenarios; climate regional impacts; and case studies, all of which can be accessed via a tool bar.

3.6.3 What makes the tool useful for cities?

The BalticClimate toolkit is a practical, step-based tool kit with a clear regional focus. The application of three distinct user groups or entry points recognises that professionals from different backgrounds will approach adaptation differently and therefore require different tools. The toolkit provides regionally specific data and information as well as an extensive range of examples of policies and plans from across the Baltic States. Throughout the toolkit exercises have been developed which enable users to apply the theory to their own circumstances and well as videos providing practical examples of mitigation and adaptation projects.

4 Conclusions

There are now a range of tools and guidance documents available which can make the task of adaptation planning more manageable for adaptation practitioners. This review has identified 50 resources which offer different perspectives and are focussed on a range of sectors and stages in the adaptation process. They also vary in the way in which they seek to engage users and communicate information, varying from web-based tools, written reports and guides. It is difficult to identify which of these tools will be most relevant to cities as this often depends on the local context, local needs, individual learning preferences and professional background. For example, what may seem pertinent to a local authority planner may not appear useful to an inner city community leader. Despite this complexity, the review highlights a rich array of support and guidance available to cities at various stages on their adaptation journey.

There is generally a lack of information on how the tools have been tested with user groups and little or no monitoring information of how these tools are perceived and used by practitioners. In some cases (e.g. the Adaptation Wizard) tools have been revised in response to user feedback but further information on this process would be useful. Such information could have been used to assess the robustness and practical application of these tools.

The review exercise provides a useful baseline of the resources available to European cities which can help inform future adaptation planning and could be used to guide practitioners to the tools which might best suit them. It also informs the training phase of this project, ensuring that both coaches and cities will be aware of some of the latest resources and how this might be used in the context of urban adaptation planning. In the longer term, this review could be adapted for inclusion the Climate Adapt website where it could signpost to relevant tools and guidance.

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