
GRaBS Expert Paper 1

the case for climate change adaptation

By Kate Henderson



Foreword

Climate change is already with us, and the urban environment amplifies its impacts. Green and blue infrastructure has a substantial role to play in adapting our towns and cities to climate change, and, as this paper highlights, policy responses are needed at an international and European level, through to the national and local levels.

This is the first Green and Blue Space Adaptation for Urban Areas and Eco-towns (GRaBS) project Expert Paper. It sets out the case for climate change adaptation and, in particular, argues that people or places facing poverty and disadvantage must not be disproportionately affected by climate change, or by policy or practice responses to it.

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GRaBS

The GRaBS (Green and Blue Space Adaptation for Urban Areas and Eco-towns) project is a network of leading pan-European organisations involved in integrating climate change adaptation into regional planning and development.

The 14 project partners, drawn from eight EU Member States, represent a broad spectrum of authorities and climate change challenges, all with varying degrees of strategic policy and experience. The GRaBS project partners are:

Austria:

- Provincial Government of Styria

Greece:

- Municipality of Kalamaria

Italy:

- Etnambiente SRL
- Province of Genoa
- University of Catania

Lithuania:

- Klaipeda University Coastal Research and Planning Institute

Netherlands:

- The Amsterdam City District of Geuzenveld-Slotermeer

Slovakia:

- Regional Environmental Centre for Central and Eastern Europe, Country Office Slovakia

Sweden:

- City of Malmö

UK:

- London Borough of Sutton
- Northwest Regional Development Agency
- Southampton City Council
- Town and Country Planning Association
- University of Manchester

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For further information about the GRaBS project, visit www.grabs-eu.org

Climate change – the scale of the challenge

Climate change is the greatest emerging humanitarian challenge of our time. It is causing 300,000 deaths a year and is affecting the lives of 325 million people, according to a new report, *The Anatomy of a Silent Crisis*,¹ produced by former United Nations (UN) Secretary-General Kofi Annan's think-tank, the Global Humanitarian Forum. The report estimates that by 2030 the number of people affected by climate change will double to 660 million, impacting on the lives of 10 per cent of the world's population. Of the fatalities due to weather-related disasters, 99 per cent are in developing countries, according to the study. And within developed countries climate change disproportionately affects the most vulnerable groups in society (the elderly, the disabled, and lower-income households), as well as having a major economic impact.

Anthony Giddens' recent book, *The Politics of Climate Change*, highlights how problems related to individuals' and governments' immediate experience of climate change – such as heatwaves, drought, flooding, and storms – are now making it more likely that climate change impacts will be taken seriously and attract active policy interest.² For example, the 2003 European heatwave and Hurricane Katrina made a significant impact on the governments and citizens of developed countries owing to public concern sparked off by these 'close to home' climate-related disasters. According to research carried out by Wood and Vedlitz³ only a small percentage of the people in developed countries agree with the statement 'My life is directly affected by global warming and climate change', but, nevertheless, political momentum is growing in response to the need to adapt to a changing climate.

Climate change policy

At the international level, the Kyoto Protocol, an international agreement made in 1997 linked to the United Nations Framework Convention on Climate Change, set binding targets for industrialised countries (and separately the European Union) to reduce greenhouse gas emissions over the five-year period 2008-2012.⁴ The Kyoto Protocol included measures to adapt to the adverse effects of climate change and provisions for a UN Adaptation Fund. This fund helps to finance adaptation programmes and projects in developing countries that are Parties to the Kyoto Protocol.

The UN Climate Change Conference in Bali in 2007 saw the adoption of the Bali Action Plan.⁵ This placed significant importance on climate change

adaptation, identifying 'adaptation as one of the five key building blocks required (shared vision, mitigation, adaptation, technology and financial resources) for a strengthened future response to climate change to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012'.⁶

The next UN Climate Change Conference is due to take place in December 2009 in Copenhagen. Parties at the Copenhagen Conference need to shape and agree an effective and ambitious international response to climate change, with adaptation as a key objective.

At the European level, the European Commission (EC) recently published a White Paper, *Adapting to Climate Change: Towards a European Framework for Action*.⁷ The White Paper identifies the EU's vulnerability to the impact of climate change and sets out why an adaptation strategy is needed at an EU level. It looks at the impact of climate change on a number of sectors, including:

- **Human health and well-being:** As Europe experiences more extreme climate events, weather-related deaths and diseases could increase.
- **Water:** The quality and availability of water resources is a fundamental concern raised by a changing climate. Parts of Europe already experience high levels of water stress, with consequences not just for human health but also for food production.
- **Agriculture:** Climate change will potentially impact on crop yields, livestock management and the location of production. Soil fertility will be affected by the depletion of organic matter resulting from



Above

Floods, heatwaves, droughts and storms are bringing awareness of climate change impacts closer to home

climate change. Forests are also likely to be affected in terms of productivity and the geographic range of tree species. There will also be additional pressure on fisheries and aquaculture, with potentially severe impacts on coasts and marine ecosystems.

- **Energy:** Climate change will have a direct effect on both the supply of and demand for energy. Increasing summer temperatures will add to the demand for cooling, and the impacts of extreme weather events may affect electricity distribution.
- **Infrastructure:** Extreme climatic events have significant economic and social impacts, especially where infrastructure is damaged – for example domestic and commercial buildings, transport, and energy and water supply.

At a national level, the Climate Change Act 2008 makes the UK the first country in the world to have a legally binding, long-term framework to cut greenhouse gas emissions.⁸ The Act creates a framework for building the UK's ability to adapt to climate change.

The climate challenge in Europe

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, issued in 2007, predicts with very high confidence that climate-

Box 1

The Green and Blue Space Adaptation for Urban Areas and Eco-towns (GRaBS) project

The EU-supported, TCPA-led GRaBS project has five key objectives:

- To increase partner expertise on the use of green and blue infrastructure to help new and existing urban development adapt to projected climate change.
- To identify and influence regional planning policy and delivery mechanisms for adaptation.
- To develop and use a risk and vulnerabilities assessment tool, to aid strategic planning for climate change adaptation responses.
- To develop regional and local adaptation action plans, including a high-level policy statement.
- To improve community awareness and engagement in the planning process for green and blue infrastructure.

related hazards will mostly increase throughout Europe, but that these changes will vary according to regional geography.⁹ The IPCC Report states that up to 1.6 million people annually will be threatened by sea level rise and by coastal flooding related to increasing storm incidence and severity. Flash floods are expected to increase throughout Europe, and winter floods are likely to increase in maritime regions. Frequent and prolonged droughts, along with increased risk of fire, will result from warmer and drier conditions in Southern Europe and the Mediterranean region.

The IPCC report indicates that across Europe short-duration events for rainfall are likely to increase. In urban areas, owing to extensive urban sealing, increased run-off¹⁰ will result in surface water flood (fluvial flooding). This was a major contributor to the floods of 2007 in the UK. The Pitt Review¹¹ emphasises that this is already a serious problem and is likely to increase under a changing climate.

During periods of high temperatures residents of urban areas will suffer significantly. This is because buildings store heat and contribute to the urban heat island (UHI) effect.¹² This can result in temperature differences of up to 7°C between centres of large conurbations such as London and their surrounding rural areas.¹³ But even small urban centres demonstrate a UHI effect.¹⁴ Heatwaves are expected to increase in frequency and severity in a warmer world,¹⁵ and the UHI will accentuate the effects of regional warming by increasing summer temperatures relative to outlying districts.¹⁰

The case for climate challenge adaptation

As this paper has indicated, tackling climate change is not just a matter of reducing greenhouse gas emissions. Changes in the climate – longer summers, more severe storms, and sea level rise – are already being experienced. According to the US National Oceanic and Atmospheric Administration,¹⁶ atmospheric carbon dioxide concentrations are now at their highest levels for 650,000 years, and as a result many urban areas are already vulnerable to increased temperatures and flooding.

Regional and local spatial planning and urban design can provide solutions that will make our communities less vulnerable to these risks. Green infrastructure such as gardens, parks, productive landscapes, green corridors, and green roofs and walls, and blue infrastructure such as water bodies, rivers, streams, floodplains and sustainable drainage systems, play a vital role in creating climate-resilient development. However, this role is not sufficiently recognised at present and is

Box 2

Climate change in the GRaBS project partner areas

The EU-supported Green and Blue Space Adaptation for Urban Areas and Eco-towns (GRaBS) project has 14 partners, drawn from eight EU Member States, representing a broad spectrum of municipal authorities and climate change challenges, all with varying degrees of strategic policy and experience.

The partners include the Municipality of Kalamaria in Greece and the University of Catania and Etnambiente SRL (a public-controlled company that works within the Province of Catania) in Sicily. Such Southern Mediterranean areas will need to adapt to increased and prolonged drought conditions. According to the IPCC Report, without adaptive measures there will be risks to health due to more frequent heatwaves, particularly in Central and Southern Europe.

The implications of sea level rise also have significant implications for a number of the GRaBS partners, including the low-lying Amsterdam City District of Geuzenveld-Slotermeer and coastal partners Southampton City Council in the UK and the City of Malmö in Southern Sweden. Scientists at a climate change summit held in Copenhagen in March 2009 presented new research which estimated that sea levels could rise by more than a metre by 2100.^a Working with the partner in Lithuania, the Klaipeda University Coastal Research and Planning Institute, the GRaBS project will assess the risk and vulnerabilities of sea level rise across Europe and help partners to develop adaptation action plans.

Two of the GRaBS partners, the London Borough of Sutton and the Province of Genoa, face challenging flooding issues and will use the risk and vulnerabilities assessment tool being developed by the University of Manchester as part of the project to identify the buildings and people most at risk, at a time in the planning process when action can be taken to adapt future developments to cope with the impact of increased rainfall.

a D. Adam: 'Sea level could rise more than a metre by 2100, say experts'. *Guardian*, 11 Mar. 2009. www.guardian.co.uk/environment/2009/mar/11/sea-level-rises-climate-change-copenhagen



Louise Burston

Above

Southern Europe and the Mediterranean regions are likely to suffer frequent and prolonged droughts

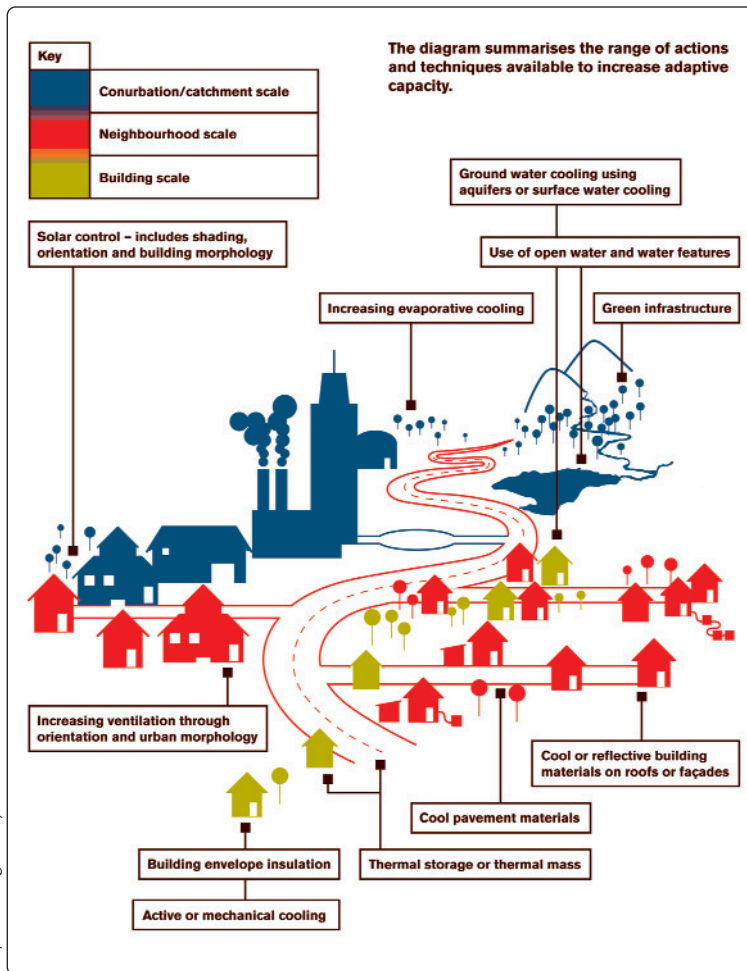
consequently inadequately integrated into mainstream planning.

There is also a strong business case for climate change adaptation. The Global Humanitarian Forum's *Anatomy of a Silent Crisis* report found that global economic losses due to climate change currently

amount to more than US \$125 billion per year, rising to US \$340 billion annually by 2030. Adaptive measures are essential to help manage these costs, and adaptation technologies also provide an economic opportunity for 'green growth'.

In 2006, the former World Bank Chief Economist and the then Head of the Government Economic Service, Sir Nicholas (now Lord) Stern, highlighted in his Review on the Economics of Climate Change that the costs of taking action to address climate change – both through mitigation and adaptation – would be much lower than the costs of inaction over the medium to long term.¹⁷

Much green infrastructure – such as parks, for example – is multi-functional.¹⁸ Parks are important not only for climate change adaptation, but also for health and well-being – a park acts as a reservoir for storm water, a shelter from the sun, and a place in which to take exercise. However, a study by the Commission for Architecture and the Built Environment (CABE) found that public parks and green spaces are chronically undervalued in England.¹⁹ According to the CABE report, because of a combination of historic cost accounting and depreciation most councils in England assign their public parks a notional asset value of just £1 each, making them financially invisible and leading to repeated under-investment. In reality, a single park's physical assets – excluding land value – can have a



Left

Fig. 1 Menu of strategies for managing high temperatures, from *Climate Change Adaptation by Design*

value well over £100 million and can offer huge environmental benefits. In a changing climate the role of parks has never been more important.

Planning for climate challenge adaptation

In seeking to deal with the challenge of climate change, the demands on planning and urban design have never been greater. New developments must be designed to cope with future rather than historical climates. Adapting the existing building stock, which is being replaced by as little as 1 per cent a year in the UK, represents a big challenge, but action is needed to make existing communities and built environments more resilient to climate risks too.²⁰

Cooler countries such as the UK have traditionally focused primarily on securing winter warmth. However, as the climate changes it is likely that we will find our urban areas less suited to the emerging

new climate. Risks – high temperatures, flooding, threats to water resources and quality, and unstable ground conditions – must be planned for and adapted to, ensuring that sustainable housing growth and regeneration is founded on the best environmental data and built to the highest standards.

As illustrated in *Climate Change Adaptation by Design: A Guide for Sustainable Communities*,¹² adaptation of the urban environment can be implemented through design and development at a variety of different spatial scales – conurbation, neighbourhood and individual building. The guide provides a menu of strategies for managing different climate change risks, detailing the range of actions and techniques available to increase adaptive capacity at different scales. As illustrated in Fig. 1, the menu of strategies for managing high temperatures includes groundwater cooling using aquifers at a conurbation scale; increased ventilation through orientation and urban morphology at the neighbourhood scale; and active or mechanical cooling at a building scale.

Box 3

Lessons from the City of Malmö, Sweden



Above

Sustainable drainage systems and green roofs at Augustenborg, Malmö

A recent GRaBS project visit and study tour to Malmö helped project partners to increase their understanding of how green and blue infrastructure can help new and existing mixed-use urban development adapt to projected climate scenarios, such as considerable sea level rise. It provided the opportunity for those attending to meet the planners, officers, politicians and residents of Malmö who are working together to tackle a variety of environmental and social issues, many of which are similar to the those facing communities elsewhere in Northern Europe (and beyond).

Visits to the Ekostaden Augustenborg Community Project and the Green Roof Institute and a walking tour of the Bo01 district and the wider Western Harbour area allowed the project partners to see at first hand how innovative concepts in sustainable development and infrastructure can be applied on the ground.

Augustenborg, once a run-down 1950s neighbourhood, has been redeveloped and re-energised as an ecologically, socially and economically sustainable quarter, with climate change adaptation playing a key role. Project partners were shown how green and blue spaces have been incorporated into the regeneration plans to address issues such as surface water flooding (fluvial flooding) due to increased rainfall intensity. With extensive community participation, innovative new surface water systems, green roofs, gardens and recreation areas have been installed and courtyards renovated, with the urgent need to adapt to a changing climate acting as a regeneration catalyst for the area.

Malmö's Bo01 and Western Harbour areas demonstrate how an old industrial estate and docklands can be transformed by collaborative, high-quality urban design into leading national and international examples of environmental city living. The Bo01 district is supplied by 100 per cent locally generated renewable energy and offers a low-carbon lifestyle with excellent public transport and cycling facilities and an ecological playground.

Malmö's experience highlights how sustainability is not just about environmental infrastructure: Malmö has transformed itself from an industrial city to a knowledge-based city, with a university of 20,000 students (the eighth largest in Sweden). There has also been a strong focus on social sustainability, with parks designed to act as a focal meeting point for all

Learning to reduce vulnerability

Adaptation to climate change means learning to live with more extreme weather events and changing weather patterns, and preparing for other changes that are unavoidable. To succeed under a changing climate, individuals, organisations and governments will all have to make significant changes in both policy and practice. Through international, European, national, regional and local policy there must be a clear consensus on the need for adaptation, and climate change adaptation strategies must ensure that decisive action is taken.

As this paper highlights, the impacts of a changing climate in Europe could be severe. It is vital that decision-makers, politicians and communities, and regional and local municipalities across Europe learn how to make a more informed and strategic response to climate change adaptation. Communities must reduce their vulnerability to the environmental, social and economic damage resulting from long-term climate change impacts such as extreme temperature increases and flooding. Here, study visits and the sharing of best practice and expertise, as encouraged by initiatives such as the GRaBS project, have a vital role to play. Learning from and building upon the experiences of pioneering places such as Malmö can help to ensure that equally successful models of sustainability are developed in towns and cities across Europe and beyond.

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