ASCCUE: Local Advisory Group Workshop Report – Risk assessment methodologies

July 8th 2004

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CONTENTS

1. Introduction

A workshop was held in Manchester University on 8th July 2004 to obtain feedback on the first draft of the proposed conurbation scale screening methodology of the ASCCUE project. Feedback was sought from the local advisory group members and other local experts or interest groups. In particular, guidance was sought on the nature of the themes to be considered, the methodological framework for the GIS work and the specifics of the methods for each theme (such as data and thresholds). It was a half day workshop attended by 8 project staff and 13 external advisors.

2. Overview of the research framework and proposed risk assessment methodologies

A report was circulated in advance of the workshop which presented the proposed conurbation scale risk assessment and mapping methodologies to be used for the ASCCUE project. These methodologies are the framework of the "risk characterisation" work being led by Work Package 2.

The research activity associated with Work Package 2 of the ASCCUE project involves characterising the physical templates of the two case study locations (Greater Manchester and Lewes, Sussex) and assessing potential climate change impacts (under prescribed scenarios) in a GIS environment. The screening work then goes on to explore the degree of risk to established development and the nature of constraints on future development. The methodology developed in this work package is a broad scale screening methodology only. When complete it will form part of the toolkit to be developed to assist with climate conscious planning. In view of this requirement, it was considered very important to obtain feedback at an early stage in order to be able to take account of input from policy makers and other interested parties in a range of relevant fields.

In addition, Work Package 2 provides the overall context for the research and explores interactions between climate change and the urban environment. Accordingly, the document also provided an over-arching research framework for the wider project.

3. Workshop structure and aims

The workshop began by presenting the draft proposed methodological framework and specific data and methods to use to consider a range of future climate related risks in the urban environment. Although comment on the overall research framework was welcomed, the primarily aim was to obtain feedback on:

- nature of the themes to be considered;
- the methodological framework for the GIS work; and
- the specifics of the proposed methods for each individual risk theme.

It was noted that the methods were still undergoing development and would continue to do so in order to take account of research outcomes from within the project, from BKCC more widely and, where possible, from the wider research community. Despite this, it was considered important to engage with the potential user community at an early stage. A list of participants and affiliations is given in Appendix 1.

The morning was organised around the UKCIP decision-making framework. After an introductory session and briefing, the participants were asked to select between three thematic groups broadly relating to the three exposure units considered within the ASCCUE project: Building integrity, Human health and comfort, and urban greenspace. A handout was produced to guide participants through the process and to help structure the feedback obtained from them. The human health and comfort write up uses the handout structure (see Appendix 2). The handout ensured a workable structure and provided a framework for discussion within the groups. The discussion itself could be more wide ranging where the group felt this was appropriate.

It should be noted that although these were the breakout groups used for the workshop event they do not map directly onto the research agenda of the dedicated work packages for built environment integrity (CRiBE), human thermal comfort (Oxford Brookes) and urban greenspace (CURE). For example, the human thermal comfort work package and conurbation scale health risk screening are entirely independent of one another since health is not being considered as an element of human comfort. It is also worth noting that it was found that a risk framework does not fit well with the human comfort work and an alternative methodology based on human comfort impact assessment has since been developed to better incorporate the themes of interest to this group. The new methodology is available within the latest version of the methodology document.

In order to provide an accurate report of the workshop, the results have been written up using the original break out group section headers.

The session ended with a report back from each of the breakout groups and some general discussion relating to future steps.

4. Breakout Groups

Appendices 3-5 contain the detailed write ups from each of the breakout groups. The following is a summary of the main points raised within each:

Human Health and Comfort (Appendix 2)

- The scope and remit of the human thermal comfort work package was discussed, particularly the differentiation between health and human comfort.
- It was confirmed that human health related themes would be of interest as well as the separate and independent human comfort work.
- It was considered important to look at a range of events and their impacts, similarly a range of timescales.
- The methods need to be flexible, for example to allow new data to be input as quickly as possible. They also need to be able to look at different scenarios and a range of associated outputs.

- Methods should be simple and transparent.
- Systems feedback would be important to try and bring into the final methods.
- A means for prioritising risks would be useful. This could assist authorities in prioritising risk management activities.
- Success could be measured in a number of ways – for example a reduction in the number of deaths/hospitalisation associated with events and a reduction in the amount of damage incurred.
- In terms of human comfort, success could be measured through an increased use of open space.
- The robustness of methods could be tested through examining historical data and events, they could also be approved by expert groups. Some suggestions for appropriate groups were made.
- Methodological uncertainty should be communicated with the output but too much complexity should be avoided.
- Other sources of information were suggested, for example, records of complaints to Environmental Health offices.
- For air quality, hazard data should reflect acute and chronic impacts, where possible.
- The 2020s were highlighted to be of particular interest to policy makers.
- Some additional themes relating to fire and disease risk were noted.

Building Integrity (Appendix 3)

- The group felt infrastructure or built environment integrity was a more appropriate title for this group.
- Decisions are made over fairly short time horizons – it would be a major challenge to convince decision-makers to invest and plan for future uncertain events.
- Methods needed to account for differences between new and existing buildings.
- Some suggested contacts were given for wind related risk assessment at the neighbourhood scale but it was recognised as a very difficult issue to cover.
- One suggested measure of future success could be through making sure that property would be insurable in the future.
- It was felt that none of the participant's organisations adequately incorporate climate change within their decision making processes as yet.
- The importance of the city as a system was raised – i.e. what affects the function of the city. The ability to be able to cope with disturbances would be one way of assessing success.
- A number of additional datasets were suggested to aid with the risk assessment tasks.
- The importance and role of economics was highlighted.
- Other additional themes suggested were fire and air pollution.

Greenspace (Appendix 3)

- All greenspace should be considered. There is less concern for farmland but spaces within otherwise built up UMTs are considered very important.
- The methods need to be replicable elsewhere.

- Climate change is not currently used as a basis for developing more greenspace. This is usually based on recreation.
- There are guidelines for the amount of greenspace needed for new developments.
- The screening method would identify the contribution of greenspace to urban life.
- The risk assessment methodology needs to make more of the integration between work packges.
- The methods could take account of loss dynamics.
- Some suggestions for assessing success were to monitor greenspace density over time.
- There were some specific suggestions regarding potential greenspace policies such as floodplain forests.
- On the whole there is a lack of policies in this area.
- Some additional themes, for example, relating to vegetation disease were noted.

5. Conclusions

The workshop was a very useful review of the first draft of the methodology. The methods received broad support from all of the participants in attendance. It also helped identify additional expert groups who may be useful to liaise with for subsequent versions, prior to the development of the final toolkit.

The detailed comments are still in the process of being reviewed by the ASCCUE team but some issues have already been incorporated in the updated version of the methodology document (National Steering Group version).

Summary produced by Sarah Lindley,
September 2nd 2004

Appendix 1 Participants and affiliations

Name	***Organisation***	***Break out Group***
David Brierley	Bridge risk management Ltd.	Building Integrity
Ian Wray	Northwest Development Agency	Building Integrity
Ed Hough	British Geological Survey	Building Integrity
Simon Hill	ARUP	Building Integrity
Bob Benson	Manchester City Council Emergency Planning Section	Building Integrity
Lesley Stewart	United Utilities	Building Integrity
Kate Zabatis	United Utilities	Building Integrity
Nicolas Theuray	University of Manchester	Building Integrity
Darryn McEvoy	University of Manchester	Building Integrity
Julie Gwilliam	University of Cardiff	Building Integrity
Nick Hepworth	Environment Agency	Human Comfort
Nick Folkes	Manchester City Council	Human Comfort
Anja Ueberjahn-Tritta	Oxford Brookes University	Human Comfort
Sarah Lindley	University of Manchester	Human Comfort
Patrick Steele	Greater Manchester Research	Human Comfort
Stephan Pauleit	University of Manchester	Urban Greenspace
Susannah Gill	University of Manchester	Urban Greenspace
Jon Lovell	TEP	Urban Greenspace
Pete Stringer	Red Rose Forest	Urban Greenspace
John Thompson	Environment Agency	Urban Greenspace
John Handley	University of Manchester	Urban Greenspace

Appendix 2 The human health and comfort break out group

General points

It was noted that although the title of the session was human comfort, all of the specific themes in the document covered health rather than human comfort. Part of the break out session involved looking at some human comfort related issues but most did focus on issues of health and climate change. This was partly due to the expertise of the participants at the workshop. There was clarification that the detailed neighbourhood scale work package research would not consider health issues and that the only work related to health would be at this spatial scale. The human comfort related issues were considered to be particularly appropriate for the planning community, representatives of whom were unfortunately unable to attend the event. The participants in this group included representatives of the Environment Agency, Manchester City Council (Environmental Health) and Greater Manchester Research (Association of Greater Manchester Authorities).

Stage 1 – Identify problem and objectives

A: Generic Questions – With respect to the whole process of managing human health & comfort related risk associated with a changing climate:	
Where does the need to make a decision come from?	• Public information needs - The potential need for alerts to be issued to warn the general public in respect to a variety of human health related concerns and related policy (such as air quality, flooding, extremes of heat, wind/storm, disease). A useful example was given about the recent excessive temperatures experienced in France for which there had been little preparation. This highlighted the need to be prepared for similarly hazardous events in the UK. • Resource implications of planning for hazard events and planning for future mitigation and adaptation. This needs to operate on different temporal scales. • The need to identify areas most at risk and the resource implications of handling risk. • The need for appropriate land use planning. • Comfort issues may affect the use of outdoor space (positive and negative consequences). There is also a strong link to greenspace use which will be affected by the nature and the design of the open spaces.
Who are the main stakeholders?	• NHS & Health Protection Agency • Local planners • Environmental Health • Environment Agency • Water companies • National Parks • Business • Communities • Others could potentially be relevant related to the wider ranging impacts of the particular climate change

	related processes.
Is the problem one of explicitly needing to adapt to c*limate change* impacts?	• Climate change impacts recognised as far reaching and complex. • Key impacts for consideration suggested as: o Extremes of temperature (especially heat) o Storms and wind o Flooding o Air quality o Disease (winter minimum temperatures no longer low enough to eradicate insects/disease) o Drought (affecting a range of issues from landscape perception and its impact on tourism, e.g. reduced protection against fire o It was noted that these can be positive as well as negative • Many other drivers are associated with the problem. o Poor planning in the past may compound the problem o Lifestyle changes o Economic drivers – may be positive feedbacks through more home tourism opportunities. o Car ownership o Meteorology and the dispersal of pollutants o Technology – can be positive as well as negative for example through providing means of reducing per vehicle emissions as well as contributing to one or more hazards.
B: Specific risk assessment related questions - in terms of human health & comfort:	
What does a screening methodology for risk assessment need to do?	• Needs to look at a range of events and their impacts • Suggestion to look at appropriate responses • Needs to be flexible with the ability to look at different scenarios. • Speed of output is important so that new information can be incorporated quickly • Range of timescales required • Risks need to be ranked in terms of importance and into a set of priorities for action. For example associated with the most serious potential health threats and the most vulnerable sectors/groups. Again the importance of adequate resource allocation was stressed. • Systems feedback an important consideration – eg what ongoing impact might be the response of having more air conditioning to make higher temperatures more comfortable?
Who are the main stakeholders in the risk assessment process for this exposure unit?	• These are similar to those mentioned above. • The role of the general public was stressed • Expert groups were considered important in relation to the specific risk themes. For example these may include groups like architects.

Stage 2 – Establish decision-making

A: Generic Questions – With respect to the whole process of managing human health & comfort related risk associated with a changing climate:	
How can success be measured?	• Real world outcomes of policies - a number of indicators were suggested o Reduction in the number of excess deaths associated with particular hazard events/situations. For example a benchmark could be the NETCEN investigation into the impacts of high temperatures & ozone. o Reduction in the number of hospital admissions associated with hazard events o Reduction in the cost of damage associated with particular hazard events/situations o Reduced frequency and severity of hazards (longer term in terms of mitigation measures) o Increased use of open space o Quality of life indicators may be useful o Community views
What legislative requirements/constraints need to be considered?	• Climate change related impacts need to be considered within the current legislative framework o Environment and Planning Law e.g. Environment Act (95) o National Air Quality Strategy and Air Quality Management Areas o WHO standards o Regional, national & EU frameworks • This needs to be an ongoing process to be able to respond to new frameworks
What strategic level activities are likely to impact on conurbation scale procedures?	• Environment Agency flood risk mapping • Long term land use changes
Are you already using specific climate change related decision making procedures?	• Areas that have some climate related links are o Managing effects of cold periods o Summer ozone and PM o Cultural issues
B: Specific risk assessment related questions – in terms of human health & comfort:	
How can the success of the screening risk assessment methodology be measured?	• Risk assessment methodology itself is more difficult • One idea is to take a particular hazard that has occurred to see if the risk assessment methodology would have worked, i.e. consider historical data • Produce test indicator layers for future scenarios

Are all of main risks identified (section 6)?	• Health was considered complementary to human comfort issues • It was noted that additional consideration of conurbation scale human comfort themes were being considered by the research team

Are all of the hazards considered (section 6)?	• Additional hazards of interest were:
	  o Disease vectors (link to the need for increased pest control and impacts on vegetation). Suggested contact Public Health Observatory (Liverpool JM).
	  o Fire hazard
	  o Health and safety (e.g. use of water bodies)
	  o Society issues such as crime rates
	• It was noted that the more subjective elements of human comfort would be more difficult to capture

Are all of the elements at risk/vulnerabilities considered (section 6)?	• Could consult other experts, examples are GPs to help refine age groupings for particular hazards • Consideration of complaints to Environmental Health may be useful, for example for air quality, noise, odours (the latter two being an issue when people live more outdoor lifestyles and have open windows). This links to other sectors such as industry and waste (landfills for example). • The potential for a vulnerability index was discussed – it was considered important to keep measures simple and transparent (Social deprivation important) • Community history would be an important determinant of vulnerability (and tolerance/resilience) • There is a need to consider individual vs. community adaptation especially where there is a feedback to the problem (e.g. air conditioning)

Stage 3 – Assess risk

A: Generic Questions – With respect to the whole process of managing human health & comfort related risk associated with a changing climate:	

Which climate variables are important?	• Temperature
	  o Means and extremes (hot & cold). Combinations with other factors, e.g. warm nights, seasonality issues
	• Humidity
	• Rainfall
	• Windspeed and direction
	  o Available from 10-11 radiation monitoring sites across the GM & Hulme library since the 1980s
	• Changes to seasons
	• Cloud cover affecting ozone production
	• PM in the atmosphere

	• Flexibility in the data runs and results generation

How might uncertainty be best handled?	• Important to be able to produce data quite quickly for policy purposes. • Produce different scenarios • Give a range of outcomes, ideally with probabilities.
B: Specific risk assessment related questions –in terms of human health & comfort:	
How should the risks be prioritised?	• Prioritisation could be made part of the risk assessment process • Preference for quantification where possible since thresholds are the key to understanding • Preference for flexibility and simplicity
What variables/data could be screened out?	• It was noted that some of the data are subject to change, e.g. air quality management areas expected to be revised to a smaller area

What variables/data need to be added?	• Consideration of exposure
	  o Numbers of people and the characteristics of those people
	  o Working as well as residential population
	  ▪ Employment data
	• Measure of disease hazard
	• Measure of fire hazard
	  o Impacts on Emergency Services
	• Flooding impacts on sanitation and water supply

C: Specific risk assessment related questions (2) – Using section 6 of the risk assessment document as a guide, in terms of human health & comfort:	
6.1.3 Health and air quality	
Hazard Layers	
• Which measures/data are most appropriate?	• Annual mean & 24 hour mean PM (24 hour mean preferred) • Ozone • Hazard data to reflect standards where possible • Hazard data to reflect acute and chronic impacts where possible. • NO2 long term
• Which measures/data are acceptable?	• Quantitative measures preferred but qualitative measures acceptable where necessary (i.e. where quantitative thresholds are not available) • Some areas may not have any quantitative indicators for example flooding and health. • Need to look at indirect impacts (such as disruption to services) as well as direct impacts). • Quality of Life indicators
• Which measures/data are <u>not</u> acceptable?	• Since many areas are still being actively researched assessments will be improved over time. • Qualification of methods and data required. • Can note where further research is needed.
• Which additional measures/data may be	• Possibility for mini workshops with specific expert groups suggested.

required? What is their availability?	
Vulnerability Layers	
• Which measures/data are most appropriate?	• Quantitative measures which can be backed up with known relationships and/or thresholds. • Expert group approval
• Which measures/data are acceptable?	• Quantitative measures preferred but qualitative measures acceptable where necessary (i.e. where quantitative thresholds are not available)
• Which vulnerability measures/data are <u>not</u> acceptable?	• Too much complexity to be avoided.
• Which additional measures/data may be required? What is their availability?	• Health Observatory a good place to start for information • Need to stress uncertainty and how robust the data are expected to be.
Risk Tables	
Are the risk tables appropriate?	• The risk tables are acceptable in principle but it is important to be able to refine the thresholds wherever possible.
Notes:	• Other issues raised were as follows: o Timescales. o Policy timescales much shorter than the timescales needed to look at climate change impacts. For example 5 years is more usual. o The 2020s is of particular interest to local government o Further off time periods would need to look at other issues that are not so relevant for the 2020s, for example water scarcity. o Stakeholders would vary depending on the theme and the timescale of the output. o Method should be as simple as possible whilst still being meaningful.

Appendix 3 The building integrity break out group

Stage 1: Identify problem and objectives

Naming / focus issue
The first issue discussed was the relevance of naming this work package 'building integrity'. It was thought that infrastructure or built environment integrity would be more relevant according to the research that is to be carried out.

Need for decision
With respect to the whole process of managing building integrity related risk associated with a changing climate, the group thought the need to make a decision came from insurers, the maintenance/safety of services (e.g. utilities) but also from the potential economic impacts associated with climate change. Addressing the economic dimension was an issue that was highlighted throughout much of the breakout session.

Main stakeholders
The main stakeholders were considered to be the users of services (the clients), infrastructure providers, insurers, regulatory bodies, local authorities and politicians. The role of ODPM was also highlighted.

Explicitly addressing climate change
Explicitly accounting for climate change was considered to be a major issue. However, the participants highlighted an important tension i.e. that investment decisions tended to be made using fairly short time horizons, whereas climate change issues were often not considered a priority due to the long time horizon involved. A major challenge is therefore to convince decision makers of the necessity to invest and plan for future uncertain events. Other issues raised included the need to look at urban form and the resilience of infrastructure to climate change impacts.

Screening methodology
The screening methodology needs to take into account the difference between new and existing buildings (planning for future build or adapting existing stock). It was also suggested that data should be quantitative wherever possible.

The problem of wind was discussed, with explanations given as to the difficulty of establishing accurate predictions for wind scenarios in the future. The difficulty of mapping wind at the conurbation level was also discussed and it was agreed that a broad interpretation perhaps with some form of qualitative expression would still be very useful. Bob Benson mentioned the possibility of accessing data through Simon Thirlbeck (Protect Institute, UMIST) concerning the mapping of wind at the neighbourhood level. This institute has mapped the potential extent of a blast of a bomb in an urban area. It could be useful to link with this research to see if their methodology can be applied to wind in an urban area (other methodologies exist for modelling wind in urban environment, the problem is that there is little generic work that has been done and that could be applied without detailed modelling of the city).

Again, economics was brought up as an issue needing to be considered. The screening methodology needs to take into account economics as much as possible, locating the major economic assets of the conurbation or the infrastructures that could potentially be at risk. This led to discussion on the need for investigation at more detailed spatial scales, specifically focusing on the resilience of infrastructure i.e. those nodes that, if damaged, would cause the most severe impact on the city as a system.

The main stakeholders in the risk assessment process for building integrity were thought to be the insurers, homeowners, building societies, regulatory bodies, local authorities, and politicians.

Stage 2: Establish decision-making criteria

Measurement of success
With respect to the process of managing building integrity related risk associated with a changing climate, it was thought that success could be measured by the complete identification of causes of harm. Making sure that property will be insurable in the future as well as making sure there is business and service continuity were considered key factors. Resilience was also thought to be an important measure of success.

Legislation
The legislative requirements/constraints to be considered are planning regimes, building regulations and CDM regulations. The design of infrastructure is seen as critical.

Strategic activities
Strategic level planning that is likely to impact on conurbation scale activity includes the influence of national Government policies – mention was made of the need for effective lobbying of Parliament, professional liability, regional development strategy (in particular housing allocation) etc. Specific comment was made on the consultation process that occurs to inform national policy making (with United Utilities, Environment Agency etc.)

Use of climate change procedures
None of participant's organisations incorporate climate change adequately within their decision making process as yet. However, there are some positive developments. Those mentioned include the insurance industry, Norwich Union for instance have developed flood maps and an extremely precise Digital Terrain Model (DTM). Similarly, the Environment Agency has developed extreme floodplains mapping (1 in 1000 years flood) – however, it is important to note that these do not take climate change into account. United Utilities are a regulated body and as such tend to work on a 5-year time horizon. Although climate change is not yet considered formally by the design and construction industries, there are some advances i.e. accounting for climate change in loading calculations. BGS and NERC are beginning to take climate change into account in their work, for instance in their work on subsurface issues.

Measuring the success of the screening methodology
Success of the methodology can be measured by an ability to identify any important breaches in the urban system, which would affect the ability of the city to function i.e. the critical components such as electricity supplies, utilities, major transport routes. Success could also be measured in the iterative process of relating conurbation scale risk assessment to the more detailed neighbourhood level work.

Other risks and hazards
The risk of fire was raised as well as the economic risk (economic cost of a potential event). All relevant hazards were deemed to have been identified and only the effect of air quality on exterior walls of buildings was added. The elements at risk / vulnerability which have been overlooked include the location of older people, and the location of utility infrastructure and emergency services. This final point was expanded upon in the plenary session, in particular the location of schools used for housing evacuated people in an emergency, and the location of fire stations in areas at risk of flooding.

Stage 3: Assess risk

Due to overrunning stages 1 & 2 this section had to be dealt with in a much shorter time period.

Section A Climate variables
The most important climate variables to consider were cited as wind, flood, soil moisture, rain (extreme rainfalls and lack of) and temperature (exterior and interior of buildings). Other non-climatic factors relevant to building integrity were issues such as earthquakes (which affected Manchester recently but which are not likely to impact on building integrity)

Section B
Due to time constraints, this section was skipped. Participants were asked to send their answers / comments to Nigel Lawson by the end of July.

Section C
Hazard: measures / data
All hazard data in section 6 of the document were deemed acceptable and appropriate but concerns were raised that there should be greater concentration on the most important impacts on the economy in terms of duration and severity (not just what is appropriate or acceptable but what is important). The economy, and functioning, of the system should be the main objective of the risk assessment methodology.

Other additional data sources that may be of benefit to the ASCCUE project include the Norwich Union database and geological maps of 1/50k or smaller (available in some cases in 1 to 10k). Pathways and alluvial deposits were also considered interesting for describing potential flood areas.

Vulnerability: measures / data
All the vulnerability data in section 6 of the document are acceptable and appropriate. Additional data could be added to the list, especially the location of vulnerable people (e.g. old people's homes) and individual, key economic infrastructure that could affect the conurbation as a whole e.g. airports, power lines, and utilities.

Risk table
The risk tables were criticised on the basis of the scales used, as well as their definition. More precisely defined thresholds were recommended. Risk threshold should be used to describe each category according to the impact on the conurbation as a whole e.g. long-term disruption of services such as electricity. The discussion generally expanded on the idea of the city as a system. Thresholds need to reflect this and may need to be specific to the hazard.

There was also a suggestion that reviewing environmental impact assessments relating to specific issues, such as flood risk, may assist the threshold definition process.

Comments and input to the risk assessment methodology were requested by the end of July – to be forwarded to Nigel Lawson.

Appendix 4 The greenspace breakout group

The following is a listing of the main points mentioned during the workshop.

Stage 1 – Identify problem and objectives

A: Generic Questions – With respect to the whole process of managing greenspace related risk associated with a changing climate:

Where does the need to make a decision come from?
The group mentioned a number of arguments why the risk of greenspaces to climate change should be considered in urban planning. It was noted that:

- The important functions and values of urban greenspaces are known, however, there is a need to know more about the risk to these functions from climate change.
- The main climate related functions were considered to be:
  - Positive:
    Flood storage
    Flood attenuation
    Demand for water under drought conditions
    Thermal building protection
    Microclimate protection in public and private open space (including wind)
    Pollutant absorption – GHG
    Biodiversity corridors/conduits for migration
  - Negative:
    Threat to building integrity
    Potential for windthrow
    Release of VOCs
    Threat to greenspace quality (e.g. Bisgrove & Hadley climate change and gardens)
- All greenspace should be considered. However, greenspace is too generic a term and needs to be looked at in a more differentiated way. The UMT methodology can provide this differentiation but also other greenspace classifications recently introduced for policy making should be looked at . The project will be mainly concerned with urban greenspaces, less concerned with farmland.
- But farmland will be subject to increasing development pressure therefore important to consider it.
- The greenspace within UMT units is also important, for instance residential greenspace, because it can have the same importance than public greenspaces, for instance for biodiversity or rainwater infiltration.
- To map this greenspace, replicability of cover sampling methodology is needed because of variations between UMT units – e.g. in London there will be more high rise than in Manchester.
- There are opportunities for greenspace planting in east Manchester with derelict land. Also rivers and water corridors are being opened up – these are not necessarily greenspace more urban landscaped areas.
- Greenspace is subject to pressures of development, but there are also opportunities of regeneration.
- In the future there will be less greenspace.
- There is a need to protect some areas from urban development
- Climate change will act on greenspace functions, and greenspace functions will also act on climate change.
- Climate change is currently not used in arguments to protect important greenspace functions – generally recreation is used.

- At present development is economically driven. This is often short sighted. There is no policy to retain greenspace for climate change. Whilst street tree planting helps it doesn't replace open space.

Guidelines, and standards/ thresholds for provision of greenspace would be a very useful tool. This would include amount of space and would be dependent on the type of greenspace. These standards should be locally specific to take into account local conditions and variations (e.g. depending on the UMT). For instance, there is a need for a policy to require roof greening. The Mayors Office London has published a Strategy for Roof Gardens. Equally, guidance is required for council houses and housing associations. There are stringent guidelines on amount of greenspace required in a major development.

Who are the main stakeholders?

- Policy / decision making arena
    - Regional
    - Sub-regional
    - Local government
    - Central government
    - European
- Landowners – public or private – big category including Peel Holdings, National Trust, United Utilities
- Users of land – tenants/public
- Wider community – as greenspace improves their quality of life
- Need to keep the target group of stakeholders to a manageable size

Is the problem one of explicitly needing to adapt to climate change impacts?

Didn't really discuss this question but it was suggested that the need to adapt to climate change impacts was perhaps indirect rather than direct. Climate change is probably an important additional concern but not the only one and probably not the one most driving greenspace planning.

B: Specific risk assessment related questions – in terms of greenspace

What does a screening methodology for risk assessment need to do?

- Identify relevant hazards and exposure components. It was mentioned that loss of trees by storms could be an important additional issue to the topics addressed in ASCCUE.
- Screening method is more to identify the contribution of greenspace to urban life rather than where things are at risk. Risks to conurbation of loss of greenspace. However, the threat of a catastrophic situation shouldn't stop the ambition in greenspace planning – for example, greenspace recovery following storms.
- Missing from discussion so far is the interaction between the work packages. The risk assessment method needs to incorporate these links.
- The screening methodology could perhaps address the feelings and perception of greenspaces by the community, and the importance of greenspace lost. However, feelings and perceptions may be difficult to incorporate at this stage into our methodology. The recent examples of Platt Fields, Whitworth Park car park proposals show that community wanted to be involved. There are MORI polls about environmental concerns.
- Need some idea of losses dynamics. Is there anecdotal evidence of loss of greenspace to better understand the pressures on greenspace? e.g. Hulme, tree felling along railway lines, Princess Parkway. But does this anecdotal evidence help us? How do we get some more systematic information?
- It was also mentioned that there is a lack of education about tree risk – people don't realise all the benefits of the tree. Some regard trees as a hazard in the urban environment

- Underutilisation of greenspace. Public fear factor after nightfall. Can't see perception changing e.g. Piccadilly Gardens – utilisation change with opening up and security

Who are the main stakeholders in the risk assessment process for this exposure unit?

Stage 2 – Establish decision-making criteria

A: Generic Questions – With respect to the whole process of managing greenspace related risk associated with a changing climate:

How can success be measured?
- Use UMTs as a baseline to understand where positives and negatives are
- Monitor percentages of different surface covers – repeat same monitoring in 5-10 years time to see what is lost/gained etc.
- Compare with historical aerial photographs – e.g. from 10 years ago (aerial photography going back to 1974)
- Finer grained information may be obtained from:
  - Manchester Leisure – database of their parks
  - Trees for Towns study
  - Red Rose Forest – database of new areas planted in RRF area

Protective functions of greenspace operating at different scales in different ways

Holistic multifunctional benefit analysis is required– economic, social, environmental
Success, if under climate change there is a risk reduction in vulnerable areas

Perhaps a combination of vulnerability and hazard gives an indication of where to plant. So, perhaps where the risk of impacts from climate change is greatest e.g. for the health of the residents, there is the greatest need to create new greenspace. Also, where the risks for existing greenspaces are greatest, indicates the highest need to intervene e.g. by replacing hazard trees.

Tensions between floodplain and forest – if plant forest lose volume, but gain interception. Styal is a good example of floodplain forest –there aren't many in Britain. Can we get information in the role of floodplain woodlands to reduce the risk of floodings?

What legislative requirements/constraints need to be considered?
- Housing requirements:
  - LAs required to build certain levels of housing over the next years at a minimum density.
  - Is still an open space requirement in development, but government policy is moving away – PPG17 – qualitative rather than quantitative assessment
  - Should be some policy on car parking standards per dwelling
- Economic prioritisation

What strategic level activities are likely to impact on conurbation scale procedures?
- Water Framework Directive – indirect
- Red Rose Forest plan
- Pennine Edge Forest plan
- LA Greenspace Strategies (encouraged by CabeSpace)
- Regional:
  - Regional Strategy
  - Regional Spatial Strategy (incorporating transport)

  - New Flood Zone mapping
  - Regional Parks – Mersey Belt
- New Deal for Communities (Regional?)
- Sport Action Zones

Are you already using specific climate change related decision-making procedures?
In general, policies were conspicuous by absence. Only the EA was mentioned of having climate change related policies encouraging them

- Within EA office facilities
- policy of waterside reclamation
- flood zones – 1/100 and 1/1000 year river flood events
- using land for water storage for droughts – working with United Utilities (JT to send to NL)

- It was also mentioned that the draft policy DP5 contains a section on climate change. However, it is very general and does not contain detailed prescription how to deal with climate change in decision-making.

"Policy DP5 Addressing the challenge of climate change:

As an urgent regional priority, public authorities and other organisations should make firm commitments, implemented by strong practical measures, to reduce emissions of greenhouse gases (principally CO_2) from all sources so as to minimise the damaging impacts of climate change in the North West. The objective should be to enable the North West to make cuts in emissions across all sectors in line with national targets, putting the region on a path to achieve a 60% reduction by 2050.

Local and sub-regional authorities (where appropriate, in partnership with other local, regional and national organisations) should:

- Develop and implement policies, and make provisions within their development plans, housing strategies, local transport plans, community strategies and other related policies and plans, to contribute towards national targets for reducing greenhouse gas emissions. This will entail measures to bring about a shift towards more sustainable production and consumption of energy, which is the key to mitigating the impacts of climate change, and requires: reducing demand for energy, maximising energy efficiency, reducing the need to travel (see policies SD9 and T9) and advancing the development of sustainable energy measures as set out in polices ER13, ER14 & ER15.
- Ensure that development plans and all related strategies take into account implications of climate change for land use in their areas, particularly with respect to development in vulnerable areas, coastal zones and locations at risk of flooding (see policy ER8).
- Identify, assess and apply measures to ensure effective adaptation to the likely environmental, social and economic impacts of climate related changes which are now unavoidable, based on current UKCIP and regional climate information."

- Some further areas for climate change related policies were mentioned in the workshop:
  - Possibility in future – using groundwater not suitable for drinking for watering plants – too costly now
  - Also grey water recycling
  - Perhaps in future – UDP – water butt for every house

B: Specific risk assessment related questions – in terms of greenspace

Due to lack of time, the following questions could not be discussed:

- How can the success of the screening risk assessment methodology be measured?
- Are all of the main risks identified (section 6)?
- Are all of the hazards considered (section 6)?
- Are all of the elements at risk/vulnerabilities considered (section 6)?

Stage 3 – Assess risk

A: Generic Questions – With respect to the whole process of managing greenspace related risk associated with a changing climate:

Which climate variables are important?

- Rain, sunshine wind, frost
- Extremes are important rather than averages
- Air pollution

Some effects of climate change on urban vegetation were discussed:

- Sudden oak death was mentioned as an example were climate change could lead to an increased spread of the disease as the risk increases with warmer summers and wind is important in spreading the disease. Also, frost free periods may mean more pests.
- Increasing length of growing season has very important management implications perhaps increasing costs
    - PS suggested that the tree growing season is in fact decreasing, but SP thought that the tree growing season is increasing as well and this effect can be observed in inner cities where trees are longer in leaf.
    - Crop growing season increasing
- Hot spells – trees suffer depending on planting
- Probably on highways all trees suffer
- Trees in open space can access (ground)water
- Tree species will respond differently to increase of droughts: For instance, alder and willow may be first to go as they need water. The RRF has some anecdotal evidence of tree loss from water deprivation in the hot summer 2003.
- It was also mentioned that broken/ leaking water mains are sometimes feeding trees. Improving the water mains may thus increase the problems for street trees under cc conditions.

What other non-climate factors could be relevant?

- Toxicity
- Pollution
- Pests
- Pesticides/herbicides etc (nutrification)
- Greenspace management and use
    - wildlife
    - playing fields
    - costs – e.g ponds and lakes high maintenance therefore are decreasing in number, are also seen as a liability
- Increasingly litigious society

How might uncertainty be best handled?

- Must be recognised
- Need to identify every single risk and have strategy for dealing with each
- Some kind of protocol is required