Managing Adaptive REsponses to changing flood risk,

Work Package 2 – MARE City Partner Priorities

University of Sheffield in collaboration with the partners of the MARE project

FV 121214

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1 Introduction

This report describes the activities carried out at the start of MARE to identify the requirements of the city partners to help them manage current and future flood risk within their cities and build capacity for flood risk management.

The activities taken to do this were designed to enable the different city partners to highlight their own specific requirements and where appropriate to draw these together to provide a general context to help shape the delivery of the MARE Work Package 2 outputs, and their application in demonstration projects, as illustrated in Figure 1.

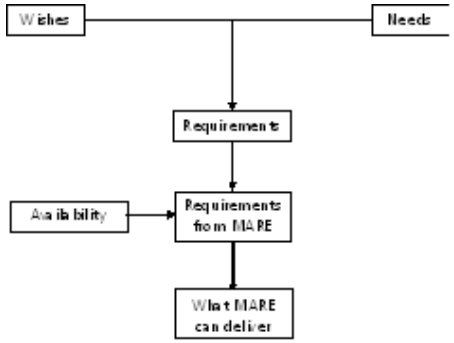

Figure 1: the MARE work package 2 process

2 The process

The process for the needs and requirements analysis comprised 4 steps:

1. Identifying the key requirements of each city partner;
2. Collating the results of Step 1 into a consolidated list of requirements;
3. Circulation of the consolidated list to allow city partners to prioritise these in terms of importance and urgency where they saw fit;
4. To collate the scoring to classify the requirements in terms of importance and urgency in a four point scale.

2.1 Step 1: Identifying the key requirements of each partner

Interviews were carried out with each of the city partners. The results of these interviews are presented in Appendix 1.

2.2 Step 2: Collating the results of Step 1

The results were tabulated and consolidated into themes, which reflected as best as possible the emerging framework for sharing knowledge and experience. The themes and needs can be seen in Tables 1 and 2.

2.3 Step 3: Prioritisation by city partners

The consolidated list of requirements was circulated to the city partners. Two of the partners (Bergen and Dordrecht) were particularly focussed on their specific issues so decided not to participate in this activity, but Hannover and the two English partners, Rotherham and Sheffield perceived that they had a common interest due to their inland location and carried out the prioritisation. Rotherham and Sheffield carried out their own initial assessments and then consolidated these into a single prioritisation. The results from Hannover and Rotherham/Sheffield are presented in Appendix 2.

2.4 Step 4: Four point classification

The results of the prioritisation were collated and the different themes and needs for technical and non technical issues were classified in a four point scale and checked against the wishes identified by Bergen and Dordrecht. These are presented in Tables 1 and 2.

Table 1: Technical themes and needs

			Priority groups	
Theme	Ref	Need	Importance	Urgency
Coastal	C1	Joint probability of high sea levels with extreme river and/or surface water events	Very High	Very high
Cross cutting	CC1	Emergency responders. Planning, resource management and other implications. Linking assessments to the planning process.	Low	Low
	CC2	Other aspects of flood event management	Low	Low
	CC3	Recovery	Low	Low
	CC4	Data management and data sharing.	Low	Low
Quality	Q1	Meeting the needs of the WFD as well as the FD	Low	Low
River	R1	More information on water levels, not just the 100 year flood. Want flood extents, depths and velocities for different probability events leading to the establishment of economic damages.	Very High	Very high
	R2	Management of both extreme flows and low flows (in time of drought)	High	High
	R3	Management of residual flood risk	Medium	Medium
	R4	Real time and historic information on river levels and rainfall	High	Very High
	R5	A tool relating rainfall to gauge levels in and around urban area, and then relating gauge levels to flood levels	Very High	Very high
River / Surface water	RS1	How will climate change affect rainfall, droughts and river levels.	High	High
	RS2	Interactions between urban drainage systems and rivers. What happens, how frequently and how will climate change impact on this?	High	High
	RS3	Groundwater, making flood worse and reverse How does it interact with all the above?	Low	Low
	RS4	Ways of using common data (eg DEMs) for multiple applications.	Low	Low
	RS5	Modelling interactions	Medium	Medium
	RS6	Guidance on structural and non structural responses	Medium	Medium
	RS7	Rainfall and climate change impacts at different spatial and temporal scales	High	High
	RS8	Practical application of guidance on rainfall and flows and rainfall tools	Medium	Medium
	RS9	Flood risk assessment, definition/ categorisation of risk	Medium	Low
Surface water	S1	Management of water in green areas so as to overcome the effects of drought and reduce costs of watering.	Low	Low
	S2	Impact of intense rainfall on urban drainage systems and surfaces. Current and future probabilities and consequences (risk).	Very High	Very High
	S3	Similar for small urban watercourses (streams) and the interactions between urban drainage, surfaces and small streams	High	Very High
	S4	Modelling	High	High

Table 2: Non technical needs

		Priority groups	
Ref	Need	Importance	Urgency
NT1	Raising the awareness of administrators and changing the culture of administrators	Very High	Very High
NT3	Linking people within organisations.	Very High	High
NT2	Raising the awareness of other stakeholders	High	Very High
NT4	Linking organisations	High	High
NT5	Communication with citizens	Medium	High
NT7	Embedding water into the culture and conscience of the city.	Medium	High
NT6	Developing a coherent vision (consensus) for land and water management	Low	Low
NT8	Developing integrated responses which will satisfy the needs of multiple drivers from diverse stakeholders	Low	Low
NT9	Knowledge transfer: Scientists – professionals; Professionals – decision makers and public	Low	Low

3 Conclusions and key messages

The MARE partners set out to address those issues which the city partners identified as having very high priority in terms of importance or urgency in Tables 1 and 2. The actions taken are as follows:

3.1 Coastal theme – Reference C1

This need was specific to Bergen in Norway, and reports on the impact of climate change on sea levels and rainfall were produced (WP2). An approach to addressing the joint impact of high sea levels and extreme surface water events was tested in the case study entitled "The Lungegård lakes, transforming a fjord" (WP3).

3.2 River theme – Reference R1

This was addressed using the Adaptation Tipping Point Approach described in MARE 2 - Methods to attain flood protection standards (WP2). The benefits in carrying out a more detailed analysis than suggested in the EU Floods Directive are described in the case study entitled "The Hannover Flood Risk Management Study" (WP3).

3.3 River theme – Reference R5

This is outside the scope of the MARE project, but there is a significant amount of research being undertaken in this area.

3.4 Surface water theme – References S2 and S3

These are addressed by a combination of the Adaptation Tipping Point Approach described in MARE 2 and in MARE 3 – "preparing for extreme events incorporating changing climate conditions". Several of the case studies in WP3 address these issues.

3.5 Non technical theme – References NT1, NT2 and NT3

These are addressed through the formation of Learning and Action Alliances (WP1), the approach and tools for the development of local strategies for managing flood risk (WP2) and in MARE1: "Water management and urban planning - Methods to improve inter- and transdisciplinary planning processes" (WP2). All of the case studies in WP3 contribute to these.

3.6 Other priorities.

Although not described here, many of the other priorities have been addressed in the outputs of MARE and those of other projects like SAWA and SKINT in the North Sea Region and FRC in the North West Europe region.

3.7 Key messages.

The very high priority needs were identified in the planning process of the MARE project, and so it is no surprise that the activities identified in WP2 addressed these needs. However, the deeper analysis carried out during the first year of the project provides a marker for those needs that although not currently urgent are still high priority issues for the MARE city partners. As identified in 3.6 above many of these have been addressed to some degree or another in MARE and in SAWA, SKINT and FRC, but there is a need for a review of needs and of what is currently available to satisfy these needs before new projects are proposed. The approach used in MARE to identify the stakeholder needs has been demonstrated to work, but this needs to link to a review of what is available. The framework for sharing knowledge and experience developed by MARE and its partner projects provides a vehicle for this task, but, it is likely some encouragement will be required to motivate organisations to participate.

Appendix 1. City partner wishes

Bergen

Bergen's predominant wishes are to understand and quantify the range of potential climate change impacts on rainfall.

They have three main cases to consider.

- Impacts on urban areas which cause surface water flooding, mainly from impervious surfaces. Typically the rainfall is short duration and very intense , and mainly occurs in summer;
- Rainfall resulting in surface water runoff from green space into the urban area. This could be surface water and/or groundwater and typically there will be 50 mm depth of rainfall over a four hour period;
- Rainfall resulting in flooding from rivers. In this case up to 200mm may fall over a period of 1 – 2 days and responses may involve the regulation of flows into and out of lakes;

In addition to the above Bergen also wish to receive guidance on joint probabilities (coastal surge and heavy rainfall) and the probability of consecutive extreme events.

Dordrecht

The Dordrecht alliance has identified three principal areas where they have needs.

Modelling

There is a need to identify the capacity and effectiveness of available modelling tools for application in urban flood risk management. As part of the assessment and guidance it will be necessary to consider the implications for data collection and management, how the urban flood risk assessment models can be linked to modelling tools covering other aspects of flood risk management and how the tools can be validated and models verified to legitimise the outputs.

Flood resistance and resilience and disaster management

Guidance is required for individual measures and for linking portfolios of measures using cost benefit analysis to provide strategic options for flood risk management.

Tools and guidance for surface water flood risk management.

There is a need for a range of tools and guidance for their use. The downscaling of daily and hourly rainfall generated by national tools to short temporal resolution rainfall is typical of what is needed.

Hannover

More information on high water levels, not just the 100 year flood. Want flood extents, depths and velocities for different probability events leading to the establishment of economic damages.

The current priority is river flooding, but there is also a need to know about surface water.

Communication with citizens.

Real time and historic information on river levels and rainfall.

A tool relating rainfall to gauge levels in and around Hannover, and then relating gauge levels to flood levels.

Management of water in green areas so as to overcome the effects of drought and reduce costs of watering.

Embedding water into the culture and conscience of the city.

Ways of using common data (e.g., DEMs) for multiple applications.

How will climate change affect rainfall, droughts and river levels?

Interactions between urban drainage systems and rivers. What happens, how frequently and how will climate change impact on this?

Impact of intense rainfall on urban drainage systems and surfaces. Current and future probabilities and consequences (risk).

Similar for small urban watercourses and the interactions between urban drainage and streams.

Groundwater, making potential floods worse. How does it interact with all the above?

Emergency responders. Planning, resource management and other implications. Linking assessments to the planning process.

Other aspects of flood event management.

Recovery.

Data management and data sharing.

Linking people within organisations.

Linking organisations.

Knowledge transfer.

Scientists – professionals

Professionals – decision makers and public

Developing a coherent vision (consensus) for land and water management.

Raising the awareness of administrators and changing the culture of administrators.

Rotherham/Sheffield

The drivers for the current demonstration projects are regeneration and flooding within the high and medium probability of flooding areas along the River Don. However there is a need to consider flooding from other sources within the urban areas and the management of exceedance pathways in general and particularly in areas defended from river flooding. In this respect there is also a need to develop approaches to managing the residual risk, particularly from overtopping of defences. For all these themes there is a need for guidance on potential local responses in the form of adaptable measures, which will have no regrets outcomes.

Rainfall is an issue, and although current government guidance on allowing for climate change is shortly to be revised, a better understanding of the issues is needed. An improvement to the current UKCIP 09 rainfall tool is expected in spring 2010, and a review of how to apply this in demonstration projects (and beyond) may be beneficial.

From the opposite perspective there is also a need to develop a knowledge and experience base for drought proofing.

From a procedural perspective there is a need for ways of developing integrated responses which will satisfy the needs of multiple drivers from diverse stakeholders. This should be coupled with a programme of raising awareness for all stakeholders.

Appendix 2: Prioritisation by Hannover and Rotherham/Sheffield

Hannover ranking of priorities

Importance of technical needs

Ref	Need	Importance
C1	Joint probability of high sea levels with extreme fluvial and or pluvial events	23
CC1	Emergency responders. Planning, resource management and other implications. Linking assessments to the planning process.	`14
CC2	Other aspects of flood event management	19
CC3	Recovery	20
CC4	Data management and data sharing.	22
Q1	Meeting the needs of the WFD as well as the FD	17
R1	More information on water levels, not just the 100 year flood. Want flood extents, depths and velocities for different probability events leading to the establishment of economic damages.	1
R2	Management of both extreme flows and low flows (in time of drought)	10
R3	Management of residual flood risk	11
R4	Real time and historic information on river levels and rainfall	3
R5	A tool relating rainfall to gauge levels in and around urban area, and then relating gauge levels to flood levels	4
RS1	How will climate change affect rainfall, droughts and river levels.	8
RS2	Interactions between urban drainage systems and rivers. What happens, how frequently and how will climate change impact on this?	9
RS3	Groundwater, making flood worse and reverse How does it interact with all the above?	16
RS4	Ways of using common data (eg DEMs) for multiple applications.	15
RS5	Modelling interactions	12
RS6	Guidance on structural and non structural responses	13
RS7	Rainfall and climate change impacts at different spatial and temporal scales	2
RS8	Practical application of guidance on rainfall and flows and rainfall tools	18
RS9	Flood risk assessment, definition/ categorisation of risk	15
S1	Management of water in green areas so as to overcome the effects of drought and reduce costs of watering.	21
S2	Impact of intense rainfall on urban drainage systems and surfaces. Current and future probabilities and consequences (risk).	5
S3	Similar for small urban watercourses (streams) and the interactions between urban drainage, surfaces and small streams	6
S4	Modelling	7

Urgency of technical needs

Ref	Need	Urgency
C1	Joint probability of high sea levels with extreme fluvial and or pluvial events	23
CC1	Emergency responders. Planning, resource management and other implications. Linking assessments to the planning process.	14
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Importance of non technical needs

Ref	Need	Importance
NT1	Raising the awareness of administrators and changing the culture of administrators	-
NT2	Raising the awareness of other stakeholders	-
NT3	Linking people within organisations.	-
NT4	Linking organisations	-
NT5	Communication with citizens	13
NT6	Developing a coherent vision (consensus) for land and water management	-
NT7	Embedding water into the culture and conscience of the city.	-
NT8	Developing integrated responses which will satisfy the needs of multiple drivers from diverse stakeholders	-
NT9	Knowledge transfer: Scientists – professionals; Professionals – decision makers and public	-

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Rotherham/Sheffield ranking of priorities

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S3	Similar for small urban watercourses (streams) and the interactions between urban drainage, surfaces and small streams	6
S4	Modelling	10

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Importance of non technical needs

Ref	Need	Importance
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NT2	Raising the awareness of other stakeholders	3
NT3	Linking people within organisations.	2
NT4	Linking organisations	4
NT5	Communication with citizens	7
NT6	Developing a coherent vision (consensus) for land and water management	5
NT7	Embedding water into the culture and conscience of the city.	6
NT8	Developing integrated responses which will satisfy the needs of multiple drivers from diverse stakeholders	9
NT9	Knowledge transfer: Scientists – professionals; Professionals – decision makers and public	8

Urgency of non technical needs

Ref	Need	Urgency
NT1	Raising the awareness of administrators and changing the culture of administrators	2
NT2	Raising the awareness of other stakeholders	1
NT3	Linking people within organisations.	3
NT4	Linking organisations	6
NT5	Communication with citizens	5
NT6	Developing a coherent vision (consensus) for land and water management	7
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