

DESCRIPTION OF WORK (DOW) TITLE PAGE

Project full name

Urban River basin Enhancement Methods

Project acronym:

URBEM

By associating the project acronym with the Latin for 'city', we show the close connection between rivers and the long cultural heritage of European civilisation.

Part of the work programme addressed/ thematic priorities

City of tomorrow and cultural heritage

Sustainable city planning and rational resource management
Improving the quality of urban life

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1 Project Summary

Problems to be solved

In the past urban watercourses have been confined to narrow river corridors with the channels canalised and concrete and other man-made materials forming the bed and banks of the river. Many urban streams have been converted into closed conduit sewers, and now receive both storm drainage and raw or dilute sewage from the surrounding area. The pollutant loading also frequently leads to poor water quality, indeed this adverse impact of urbanisation often extends to the watercourses downstream of the urban area. In some cases the bacteriological or chemical quality of urban streams may present a severe threat to public health. The result is that many urban watercourses have virtually no aesthetic or amenity value, support a limited range of ecosystems, and do not meet the water quality objectives prescribed by the EC Water Framework Directive (WFD).

Scientific objectives and approach

The URBEM project will provide new tools, techniques and procedures to enhance watercourses located in urban areas. These tools should provide enough scope to cover the differing, multi-functional uses of urban watercourses and their adjacent communities across Europe. URBEM will provide for those who are involved in urban river rehabilitation, the best and most innovative practice with which to develop a comprehensive rehabilitation scheme that will achieve the “maximum ecological potential” requirements of the WFD. As river rehabilitation involves many aspects the project is targeted at different institutions involved in the enhancement of watercourses at all levels.

Expected impacts

The benefit provided by URBEM include the provision of a comprehensive framework to facilitate urban watercourse rehabilitation that takes into account the regional variations in modification and use of watercourses across Europe.

Specific benefits of the URBEM research project will be new tools to assess the potential for enhancement and rehabilitation of urban watercourses, innovative urban watercourse rehabilitation techniques for use in future schemes and decision making support procedures, including social, economic, environmental and safety aspects, to help planners and city authorities effectively prioritise and plan urban river rehabilitation projects that help to achieve “maximum ecological potential”.

In addition the URBEM project will provide guidance, in the form of training and briefing modules, to public, professional and environmental authorities about how to plan, implement and maintain an urban rehabilitation scheme.

2 Scientific/Technical objectives and Innovation

2.1 Scientific/Technical Objectives

Aims of and Objectives of URBEM

The URBEM project will provide new tools, techniques and procedures to enhance watercourses located in urban areas. These tools should provide enough scope to cover the differing, multi-functional uses of urban watercourses and their adjacent communities across Europe. URBEM will provide for those who are involved in urban river rehabilitation, the best and most innovative practice with which to develop a comprehensive rehabilitation scheme that will achieve the “maximum ecological potential” requirements of the WFD. As river rehabilitation involves many aspects the project is targeted at different institutions involved in the enhancement of watercourses at all levels. Thus the overall objective of URBEM is:

- To provide a comprehensive framework to facilitate urban watercourse rehabilitation that takes into account the regional variations in modification and use of watercourses across Europe.

The specific technical and scientific objectives of the URBEM research project are:

- To develop new tools to assess the potential for enhancement and rehabilitation of urban watercourses,
- To develop innovative urban watercourse rehabilitation techniques for use in future schemes,
- To develop decision making support procedures, including social, economic, environmental and safety aspects, to help planners and city authorities effectively prioritise and plan urban river rehabilitation projects that help to achieve “maximum ecological potential”.

In addition the URBEM project intends:

- To provide guidance, in the form of training and briefing modules, to public, professional and environmental authorities about how to plan, implement and maintain an urban rehabilitation scheme.

URBEM project outputs and dissemination

The URBEM project intends to facilitate end-user acceptance and implementation of the outputs of the research. Consequently, the URBEM project partners will develop an appropriate dissemination strategy, where demonstration sites and implementation of the results of URBEM will be used as appropriate. The dissemination outputs include:

- Guidance manuals for the partners own work and end users such as regional and national authorities.
- A training package developed during the project and prepared on CD-ROM, to assist end users in the application of the techniques.
- Public exhibition with the city councils involved in the project to disseminate the research and results associated with the respective study sites.
- Publication of the scientific advances in appropriate international refereed journals.

URBEM project benefits

The intention of the URBEM project, by successful completion of all component parts is to give the following environmental and social benefits:

- improved urban water quality, and thus reduced risk to public health
- improved methodologies for planning and managing rehabilitation of urban watercourses
- improve awareness and incorporation of safety issues with respect to citizen proximity to urban watercourses
- enhanced bio-diversity in the urban environment
- enhanced aesthetic value of urban watercourses, and raising of awareness in the public of the value of urban watercourses
- improved community links with urban watercourses thus improving quality of life for urban citizens
- provision of tools and methods that contribute to sustainable development and implementation of WFD, and
- promotion of urban watercourse rehabilitation.

2.2 Innovation

Innovative contribution of URBEM

The breadth of research proposed for URBEM exceeds that currently in progress in any member state but draws together active researchers from six countries. Projects already completed under the LIFE program such as the restoration of the River Cole (Bettes and Fisher, 1998) and the River Skjern (Klijn, de Jong and Pedrol, 1998) have already demonstrated the synergy obtained by drawing together active researchers to compare and contrast their approaches to common problems. Resource management agencies, researchers and practitioners recognise that the analytical procedures and frameworks being developed, validated and applied in river management must rely on interdisciplinary perspectives (Goodwin and Hardy, 1999). The URBEM project involves parties from a number of fields in order to ensure the results cover all perspectives. The scope of the URBEM project has emerged from experience gained in discussions with parties involved in river enhancement projects and the interest this has generated amongst the user communities in several countries. URBEM will contribute innovative ideas and techniques, and disseminate to a wider audience, via the breadth of research mentioned. This will advance the state of the art concerning urban watercourse rehabilitation. These innovations are set out below under the main aims of the project.

2.2.1 New tools to assess the potential for enhancement and rehabilitation of urban watercourses

URBEM will provide a method for assessing the potential of urban rivers for rehabilitation. This tool will, for the first time, integrate physical, chemical, biological, aesthetic, social and economic factors. By integrating economic, social and environmental aspects within the planning and development process decision-making should be improved (Wade *et al* 1993). To be successful, in the context of the built environment, any urban watercourse rehabilitation scheme has to be sensitive to the desires and aspirations of the local citizens. URBEM will provide advances in methods to assess the importance to the public of watercourses and their rehabilitation. The local population needs to be involved wherever possible at all stages during the development and implementation of a scheme (Wade *et al* 1998). URBEM will provide a method to facilitate citizen involvement, and thus is in accordance with Local Agenda 21 principles, the Aarhus Convention of 1998 and the Water Framework Directive (WFD) of 2000.

Aesthetic evaluation and assessment of river corridors is a presently underdeveloped field of research. URBEM will identify criteria that contribute to aesthetic quality, specifically in the context of urban watercourses. The relationship between criteria such as coherence, legibility and significance with existing urban river landscapes in different geographical contexts will be assessed, in order to develop a common method that incorporates the factors that contribute to increased aesthetic and amenity value. Taking into account regional variations in the type of modification and the specific functional uses of watercourses will also be considered in the new assessment and problem solving tools. By ensuring that within the assessment structure there is enough choice of variables to accommodate regional differences it is hoped to create a tool that is applicable across the whole of Europe.

2.2.2 Innovative urban watercourse rehabilitation techniques for use in future schemes

URBEM will investigate new materials and techniques for incorporation into urban river systems in order to enhance the visual and ecological value. Due to the differences between rural and urban areas presently developed rehabilitation techniques for rural areas may not be suitable, and thus new urban-specific techniques will be developed. URBEM will thus extend the range of materials and techniques available for design of rehabilitation schemes. URBEM will also investigate methods to incorporate features within schemes to improve water quality. The consequent advance in knowledge in this area may allow urban watercourses that were previously thought too degraded to be potential rehabilitation sites. In many urban rivers the flow regime has been altered by urbanisation. URBEM will investigate methods to return the flow regime towards its original or improved state within the particular physical constraints of the urban environment. In many restoration schemes to date attention has been confined only to the river channel itself. The approach of URBEM is based on the belief that the whole river corridor and its interactions with the urban environment are an integral part of the system (Gardiner, 1992). Rehabilitation techniques that take into account safety features, and thus allow citizens, and especially children, access to rehabilitated urban watercourses will also be investigated.

2.2.3 Decision support procedures, including social, economic and environmental aspects

Information and techniques arising from the development of the new integrated assessment tools will be refined into a decision making support methodology. As a result URBEM will provide planners and environmental authorities, for the first time, with a tool which could be used to justify, prioritise and plan urban river rehabilitation schemes in the future. In addition this tool will allow authorities to address some of the content of the *water management plans* that are required as part of the WFD. This methodology will be designed to be an easy to use procedure giving results based on sound scientific principles, but for use by non-scientific staff. It will incorporate physical, chemical, biological, aesthetic, social and economic factors. Central to determining the appropriateness and success of policies to promote sustainable development is the development of indicators of sustainability (Levett, 2000b); URBEM will develop sustainability indicators specific for watercourse rehabilitation. In giving a standard methodology it will again be transferable across Europe, and give a frame of reference for the associated information and results.

2.2.4 Increase in application of ecological concepts for urban watercourse rehabilitation

The WFD requires that heavily modified bodies of surface water be restored to achieve maximum ecological potential. For the purposes of URBEM maximum ecological potential needs to be defined in the urban context. Derivation of this definition will make a valuable contribution to the implementation work throughout Europe of the WFD. In the past watercourse rehabilitation may have relied too heavily on physical restoration, and the concept of the “form and function” theory, i.e. that if you restore a watercourses physical form the full ecosystem function should naturally succeed. This theory, although founded on scientific principles, does not always occur in example rehabilitation projects. Consequently a conceptual basis for remediation measures for ecology needs to be explored. Similarly a robust description purely within the ecological concept of rehabilitation as opposed to the aspirations of full restoration should be appraised.

Within URBEM a new method derived by one of the project partners to assess the ecological status of watercourses will be applied and tested on a selection of the project’s urban watercourse study sites. It is expected that this assessment system will also be adapted to constitute an ecological tool to check the effectiveness of rehabilitation measures, possibly by careful work to incorporate project “indicators of success”. It is also intended to promote a working system to exploit cross-disciplinary teams of biologists, ecologists and physical scientists. If successful this may be used as a blueprint to encourage the application of other cross-disciplinary teams to watercourse rehabilitation projects.

3 Project Workplan

3.1 Introduction

The overall objective of URBEM is

- To provide a comprehensive framework to facilitate urban watercourse rehabilitation that takes into account the regional variations in modification and use of watercourses across Europe.

The specific technical and scientific objectives of the URBEM research project are:

- To develop new tools to assess the potential for enhancement and rehabilitation of urban watercourses,
- To develop innovative urban watercourse rehabilitation techniques for use in future schemes,
- To develop decision making support procedures, including social, economic, environmental and safety aspects, to help planners and city authorities effectively prioritise and plan urban river rehabilitation projects that help to achieve “maximum ecological potential”.

In addition the URBEM project intends:

- To provide guidance, in the form of training and briefing modules, to public, professional and environmental authorities about how to plan, implement and maintain an urban rehabilitation scheme.

3.2 The structure of URBEM

For convenience of organisation and management, the overall project is divided into 7 themes, each led by one of the partners. Within these themes there are different work packages that divide up the work into discrete and manageable units.

To provide an initial “basis” for the other themes, Theme 2 is an initial overview of existing rehabilitation schemes across Europe. The three technical and scientific objectives of URBEM form the main part of the

project, of which the development of new tools to assess the potential for enhancement and rehabilitation of urban watercourses forms the “core”. All the partners at a certain stage will be involved in the “core” part of the project creating an interdisciplinary group, which work synergistically together. The other areas of URBEM are designed to provide complimentary information and innovative ideas to the “core” area of the project.

The URBEM partners have appointed a leader for each of the work packages to co-ordinate the work on the packages. The work package leaders will collaborate with the URBEM Co-ordinator in achieving effective management and delivery of the project goals.

3.3 The Project Themes

This section describes the approach to each of the project themes, which are elaborated further in the detailed descriptions of the work-packages associated with each theme. The project is described here down to the level of work-packages, some of which will themselves be further subdivided into topics for the execution of the research.

3.3.1 Theme 1 Project Integration, Co-ordination and Delivery

Summary:

Within his theme, the Co-ordinator will ensure that the project deliverables are achieved on programme and will take particular responsibility for reporting. In addition the work on dissemination and development of a training programme are included in the theme.

The URBEM project involves 12 organisations drawn from 6 European countries and thus will require careful attention to the management of the research to ensure that it delivers its outputs. The project integration, co-ordination and delivery is a core management function of the project Co-ordinator. The project integration will be achieved via communication between the project Co-ordinator, each of the work package leaders and the researchers engaged in the work packages. Full team meetings will be held at project workshops twice a year. These workshops will provide opportunities for representatives of all the research teams to discuss their findings, and future approaches to work, and constitutes a regular meeting of the work package co-ordinators. Any additional necessary meetings will be scheduled with the project workshops where possible to minimise the travel costs. The Co-ordinator will use the project workshops to review progress and define the detailed work programme for the coming months. Project management will be undertaken using the Co-ordinator’s established project management system.

URBEM will make information on urban river rehabilitation much more widely available, raising awareness across Europe. As well as usual methods of reporting, URBEM will use the opportunities of the Internet to innovatively allow access to the new tools, techniques and methodologies developed during the project. An URBEM web site will be created to allow interested parties anywhere in Europe or the rest of the world to benefit from the research undertaken.

The Co-ordinator will establish a project Internet site with public and private areas. The public area will give information on the project outputs, whilst the private site with an FTP area will be the main vehicle for electronic communication of data, software and results between the URBEM project team members. Use of e-mail between all project partners will be an essential form of communication. Development of a training package that will incorporate the findings of URBEM into an educational program aimed at end-users (general public, professionals involved with river rehabilitation and urban planning and decision-making authorities) is also part of the project co-ordination theme.

The Co-ordinator will take final responsibility for the documentation and reporting of the project. Project team members will be encouraged to publish the results of the research in refereed scientific journals and conferences as appropriate. Public outputs from the project will be recorded and made available through the public area of the project Internet site.

This theme includes the following work-packages:

- W1 Project integration and co-ordination
- W11 Training & Dissemination

3.3.2 Theme 2 Existing case study selection

Summary:

It is important that the URBEM project builds on the experience that is already available, so this theme will review information available from rehabilitation schemes that have already been carried out throughout Europe. The project would collect information from past and present rehabilitation schemes, and build it into the further research and conclusions within URBEM.

This theme is aimed at maximising the benefit that can be derived from any urban river rehabilitation schemes that have already been carried out, by collecting any information that can assist in the new areas of work. It is expected that information will be available from among others, the various River Restoration Centres throughout Europe, the European Centre for River Restoration and bodies throughout Europe who are responsible for urban rivers. This search will concentrate mainly within Europe but not exclusively, since urban river rehabilitation has also been carried out in other continents. Particular attention will be paid to the most innovative schemes, either in their approach to the problem or in the techniques that were used. Information from these schemes will be passed on to the relevant work packages. It is expected that information from some of the most successful schemes can also contribute to the dissemination phase of URBEM. These case studies will provide information on:

- innovative techniques for urban river rehabilitation,
- procedures used by local authorities to implement rehabilitation schemes,
- techniques to involve local communities,
- any post-project appraisal techniques,
- indicators of success used.

This theme will ensure that experience from different countries within Europe will be shared throughout Europe. It is believed that this sharing of available information will lead to advances in techniques and methods throughout Europe.

This theme includes the following work-package:

- W2 Existing case studies

3.3.3 Theme 3 New tools to assess the potential for urban watercourse rehabilitation.

Summary:

This theme will develop a new method to assess the potential for rehabilitation of urban watercourses. Six urban areas across Europe have been identified as study sites. In these areas data about urban watercourses will be collected and monitoring carried out. New physical, chemical, biological, ecological and aesthetic tools to assess the potential for urban watercourse rehabilitation will be derived. All the partners will be involved in various parts of this theme. The new method will be implemented on each study area in order to verify and improve the methodology.

The objective of this theme is to develop “tools” which can help the urban planners and environmental and local authorities to identify which reaches of urban watercourses are most suitable for rehabilitation. Specific variables relevant to an urban environment will be included. Several urban areas (*Newcastle UK, Lyon France, Dresden Germany, Oeiras Portugal, Ljubljana, Slovenia and Vienna, Austria*) have been identified to constitute the research areas. These study sites will give the opportunity to develop a new assessment tool for urban rivers. Data will be collected from watercourses at the selected sites.

The emphasis of the monitoring should be towards sites that have a significant amount of existing data available (that may be provided by local environmental organisations for instance). URBEM does not intend to engage in large amounts of additional monitoring on all study sites. Although it is important to have a consistent amount and variety of data collected from all study sites across Europe, the emphasis of the project is to create an easy to use “*assessment of potential for rehabilitation*” tool. As such therefore, the assessment tools should be based primarily on standard data sets that may be conveniently assessed, and are normally available on any urban watercourse in Europe, hence the stress on using data collected by any local environmental authorities. It is recognised however, that this existing data may need to be augmented to cover additional parameters. The first stage of the project will involve discussions and decisions on which parameters it is necessary to have

information on to facilitate rehabilitation, thus looking at the minimum and the ideal amount of data. It is anticipated that the variables are likely to include:

- Hydrological regime
- Hydraulic regime, including interaction with urban water systems
- Proximity of river regulating structures including their impact and necessity to the site
- Groundwater influences (including interactions with groundwater aquifers)
- Chemical and biological water quality
- Pollution sources (diffuse and point)
- Land use, including extent of urban areas
- Flood risk areas
- Topography
- Channel geomorphology (slope, sediment, erosion etc.)
- In-stream and bank-side flora and fauna
- Sociological and economic data
- Aesthetic, landscape and amenity value
- Safety requirements
- Watercourse ecosystem and ecological status

Additional monitoring may be required to be able to match up similar types and amounts of data from each of the study sites. It is intended to choose about four of the study sites to conduct any additional monitoring, and possibly only on one area for each site – for example a site may be missing chemical data - so that will be monitored, another may have no ecological data so that will be monitored. Project partners providing study sites are to carry out any information gathering of existing monitoring data and any additional monitoring on their own sites only. Advice required for some additional monitoring will be required from some partners – for example it is foreseen that one partner will need to provide advice on how to implement a specific, innovative ecological monitoring system.

Despite the best efforts to have similar data for all sites, it is inevitable that in having a range of sites across Europe we will have certain differences in the data. This is not a disadvantage however, as it will then be possible to compare the value of different levels of monitoring and data on the outcome of the rehabilitation process. The value of different levels of monitoring ties in directly with how to assess the most suitable sites for rehabilitation, by looking at the minimum data needed for a successful rehabilitation project to be undertaken. Developing a scaling of expected success of rehabilitation relative to the type, amount and quality of data available can further this idea. Consequently by developing a critical level of data requirement, this can be incorporated as a first stage of rehabilitation assessment –

- what data do you have already?
- what sort of rehabilitation are you trying to achieve?
- what additional data will you need for the desired rehabilitation result?

It may be difficult to use the same type of method to monitor the same parameters across Europe and so region specific criteria may be considered as appropriate.

In an urban environment, aspects such as aesthetic value may be more significant than chemical or biological water quality. Existing methods to assess the aesthetics of a river will be reviewed and assessed and an appropriate method developed. The improvement of the aesthetic quality of a river is one of the key issues of an urban watercourse rehabilitation scheme.

It is expected that the development of the assessment technique will involve four stages:

1. *Normalise data*: The data collected must be normalised so that the data sets from different channels can be compared in the same context. Regional variations in data types, the way it is collected, and inherent differences in the types of watercourse will be accommodated by normalising the data.
2. *Combination of variables*: The data collected will include information on a wide range of urban watercourse aspects. Each of these sets of data will allow a score or index to be assigned to the contribution of that particular aspect to the rehabilitation potential of the watercourse. These scores must then be combined in a flexible way to obtain a composite assessment of *rehabilitation potential* for each river. Possible techniques for combining the parameters include decision matrices, flow charts and multi-criteria methods.

3. *Development of assessment tool:* In the light of the results and data collected a method will be developed to rank different reaches of rivers in order to determine their appropriateness for improvement. The method will take account of the relative importance of all the variables. The aim is that the new method will be:
 - simple to apply
 - quick, so that it can facilitate a decision making process
 - suitable for urban planning
 - up-dateable, as the community expectations and opinions change with time
 - applicable to cities across Europe, whilst taking into account regional variations
4. *Implementation & review of technique:* Once the method has been developed it will be applied to data from the study sites. An expert panel drawn from the partners will assess whether the results are realistic. The result will be a complete evaluation of the potential for rehabilitation and improvement of the rivers in urban areas. As the method will be tested on different urban environments, there would be the chance to accommodate different types of problems and situations such as regulation of water regime, occurrence of structures, and other specific conditions of urban environment. This will contribute to testing of the method and lead to improvements if they are needed. After this final review the method will be ready for application to other European cities.

When all the data is available and the required monitoring and assessment is complete, the information will be summarised in a report that will also contain the results of Theme 4 (Social appraisal tool).

This theme includes the following work-packages:

- W3 Study site monitoring
- W4 Aesthetic evaluation
- W5 Development of tool to assess the potential of an urban watercourse for rehabilitation
- W6 Implementation and review of the new assessment technique

3.3.4 Theme 4 Social appraisal tool

Summary:

This theme will develop new specific social appraisal tools. These would assess both the importance that is given by the citizens to the present urban watercourses and their desires and attitudes related to improvements to the watercourses. The methods will be tested and implemented on selected cities.

The objective of this theme is to develop a method to assess the social value of urban rivers. URBEM will develop a specific tool, which will be designed for local or environmental authorities. For urban planners it is important to know the value to the local citizens of urban watercourses in order to make decisions about where and how to make any improvements. The development of any rehabilitation scheme for urban watercourse must involve an assessment of the expectations and opinions of the local citizens. The social appraisal tool will also investigate the type of issues that are most important to the local community, such as, recreational opportunities, transport routes, wildlife enhancement, flood defence issues and safety. The tool will be specific to the environment associated with urban watercourses. It is expected that the development of the assessment technique will involve four stages:

1. *Normalise data:* Although urban areas may contain many similar features it is anticipated that across Europe there may be regional differences in social views. The data collected must be normalised so that the data sets from different urban areas can be compared in the same context. Normalising the data should accommodate regional variations and inherent differences in social viewpoints.
2. *Combination of variables:* The data collected will include information on a wide range of differing social views. Each of these sets of data will allow a score or index to be assigned to the contribution of that particular aspect to the rehabilitation potential of the watercourse. These scores must then be combined in a flexible way to obtain a composite assessment of citizens' views. Possible techniques for combining the parameters include decision matrices, flow charts and multi-criteria methods.
3. *Development of assessment tool:* In the light of the results and data collected a method will be developed which can accommodate all likely social views, and take account of the relative importance of all the variables. It is expected that there will have to be various iterations and refinements to the tool based on the

information gathered from citizens, at this stage, and at the more formal implementation and review stage. Ultimately the aim is that the new method will be:

- simple to apply
- quick, so that it can facilitate a decision making process
- suitable for urban planning
- up-dateable, as the community expectations and opinions change with time
- applicable to cities across Europe, whilst taking into account regional variations

4. *Implementation & review of technique:* Once the method has been developed it will be applied to the study sites. The result will be an evaluation of the citizen views on the rehabilitation and improvement of the watercourses in urban areas. As the method will be tested on different urban environments, there would be the chance to accommodate different types of problems and situations. This will contribute to testing of the method and lead to improvements if they are needed. After this final review the method will be ready for application to other European cities.

The social appraisal tool that is developed will form one of the URBEM deliverables and the results will also be of use to the final part of Theme 3 (New Tools to assess the potential for rehabilitation of urban watercourses).

This theme includes the following work-package:

- W7 Development of new social appraisal tool

3.3.5 Theme 5 Innovative rehabilitation techniques

Summary:

This theme will investigate innovative watercourse rehabilitation techniques.

A number of successful case studies will be selected, from those gathered as part of Theme 2, as examples of current practice. Any approaches that are suitable for innovative application to urban watercourse rehabilitation will be identified. Amongst other methods it is envisaged that innovative techniques will be developed from:

- **Use of infiltration and sustainable urban drainage to re-naturalise the flow regime**
In many urban rivers the flow regime has been altered by urbanisation. This means that the time and spatial flow patterns in the channel are different in character to how they were before urbanisation. Within the urban constraints it is important to investigate methods to return the flow regime towards its original or improved state. This may involve encouraging the use of infiltration and retention or other forms of sustainable urban drainage. The URBEM project would investigate the best ways to incorporate such techniques into an urban environment in order to naturalise the flow regime of the river whilst improving runoff quality. The restoration of the natural flow regime through the urban area may lead to benefits in the river downstream.
- **Use of new materials and techniques for bank protection to improve visual and ecological impact**
In designing protection works within urban river channels an over-riding concern is that erosion of the bed or the banks should not threaten the surrounding urban area. In the past this has led to the use of concrete or steel sheet piling to protect river banks. These materials are visually unattractive and provide a very limited range of habitats and ecological interest. There have been significant advances recently in the development of new materials for bank protection which can withstand high flow velocities but can also incorporate biological interest, for example the use of cable linked concrete blocks with voids which can support plant and other life. The URBEM project will investigate such materials and techniques to investigate how best they can be incorporated into urban river systems in order to enhance the visual and ecological interest.
- **Methods of incorporation of wetlands and floodplains to maximise the opportunity for improvements in water quality**
If the water quality in an urban watercourse is poor then this can be an over-riding constraint on the options for rehabilitation. In some cases it can be possible to design a rehabilitation scheme that will lead to improvements in water quality. Depending upon the spatial constraints this can be achieved by the use of wetland or floodplain areas. By providing such areas, which are normally characterised by low flow velocities, it is possible for example to reduce suspended sediment loads. The presence of

plant life in these areas can also provide biological treatment of pollutants. URBEM will investigate how best to incorporate such areas within an urban context and to indicate the effectiveness of such systems.

- **Incorporation of safety features into rehabilitation techniques**

Urban areas are widely used by their citizens, and as such any publicly accessible areas must incorporate various safety features. Safety can include personal safety with respect to proximity to running water and health and safety aspects of water that may be polluted with sewage or chemical pollutants. URBEM will look at the incorporation of safety features into watercourse rehabilitation techniques to help address these issues.

This theme includes the following work-package:

- W8 Innovative techniques for urban river rehabilitation

3.3.6 Theme 6 Decision making support methodologies

Summary:

The legislation and the problems associated with the improvement of rivers located in the cities are different across Europe. Despite this the different European bodies in control of urban watercourses should approach a river rehabilitation scheme in the same way in order to:

- *identify achievable goals*
- *make sure that every relevant variable is considered*
- *involve and communicate the results to the citizens*

A common procedure to optimise the efforts of public and environmental authorities will be delivered from this theme.

The EC Water Framework Directive has stated that the unit of management for surface water systems should be the river basin. Consequently this provides a framework in which regulatory and environmental authorities should manage watercourses. However, there is often a breakdown in connectivity between a large urban environment such as a city and the river basin in which it is located. A city may be the main source of downstream pollutants to a watercourse and the main user of water supply flowing from upstream. Thus there is often an imbalance in the impact that an urban area can have on a watercourse opposed to the percentage of the total river basin area it occupies. This imbalance may be turned to an advantage though if the high economic status of the urban area is utilised to fund any watercourse rehabilitation. Introduction of the river basin concept from the WFD will assist in encouraging urban authorities to consider more carefully rehabilitation of urban watercourses.

Urban authorities would benefit from a systematic process that can be adopted to go from the initial idea of implementing a scheme to the final scheme construction. Such a process is not just concerned with the technical aspects of producing designs and technical specifications but also social aspects.

Theme 6 will develop a comprehensive set of methodologies designed for public and environmental authorities based on the scientific knowledge, and assessment tools developed in Themes 3 and 4. Those partners who represent, or work with, urban authorities will work together across Europe exchanging their experiences, evaluating existing rehabilitation schemes, setting principles and criteria, and defining the best way to approach and plan a new urban river rehabilitation scheme.

Methods to involve citizens in the process of urban river rehabilitation will be established thus furthering the work of Theme 4. The project will indicate how citizens can be made part of the decision making process. Those of the partners who are involved in urban planning will work together, using their experience and taking into consideration existing rehabilitation schemes, to develop appropriate methods to:

- Involve the citizens at the initial stages of a rehabilitation project
- Select preferred scheme
- Communicate progress to the citizens
- Display and disseminate the results

The methodologies developed will not be presented as a complicated manual, but will be in the form of a user guide to the assessment tools, and a document intended to raise the awareness of what is or is not achievable in terms of urban watercourse rehabilitation. The user guide is intended to be easy to use and for the end-users will not contain detailed coverage of the research upon which the tools are based.

This theme includes the following work-package:

- W9 Decision making support methodologies

3.3.7 Theme 7 Indicators of success

Summary:

This theme will develop a simple and robust method to quantify the level of success of rehabilitation projects, considering the social, economic and ecological benefits. Indicators will be selected to enable judgements to be made as to whether the goals established during the development of the rehabilitation project have been achieved.

This theme tries to solve the uncertainty surrounding the assessment of the success of an urban watercourse rehabilitation scheme. It has been the experience of some organisations that projects have been carried out with a lot of effort in terms of costs and human resources but the results achieved have not been assessed. Post project appraisal is an often overlooked area of any rehabilitation project, and it is especially useful to:

- identify possible weaknesses in the project
- learn what could have been done better
- gain experience for further schemes
- avoid possible mistakes in the future.

The easiest way to assess the success of a project is to identify suitable indicators that measure and communicate the level of success. The indicators will not necessarily give a comprehensive picture of the post-project results. Rather they should be sufficient to enable the success of the project to be assessed in a simple way.

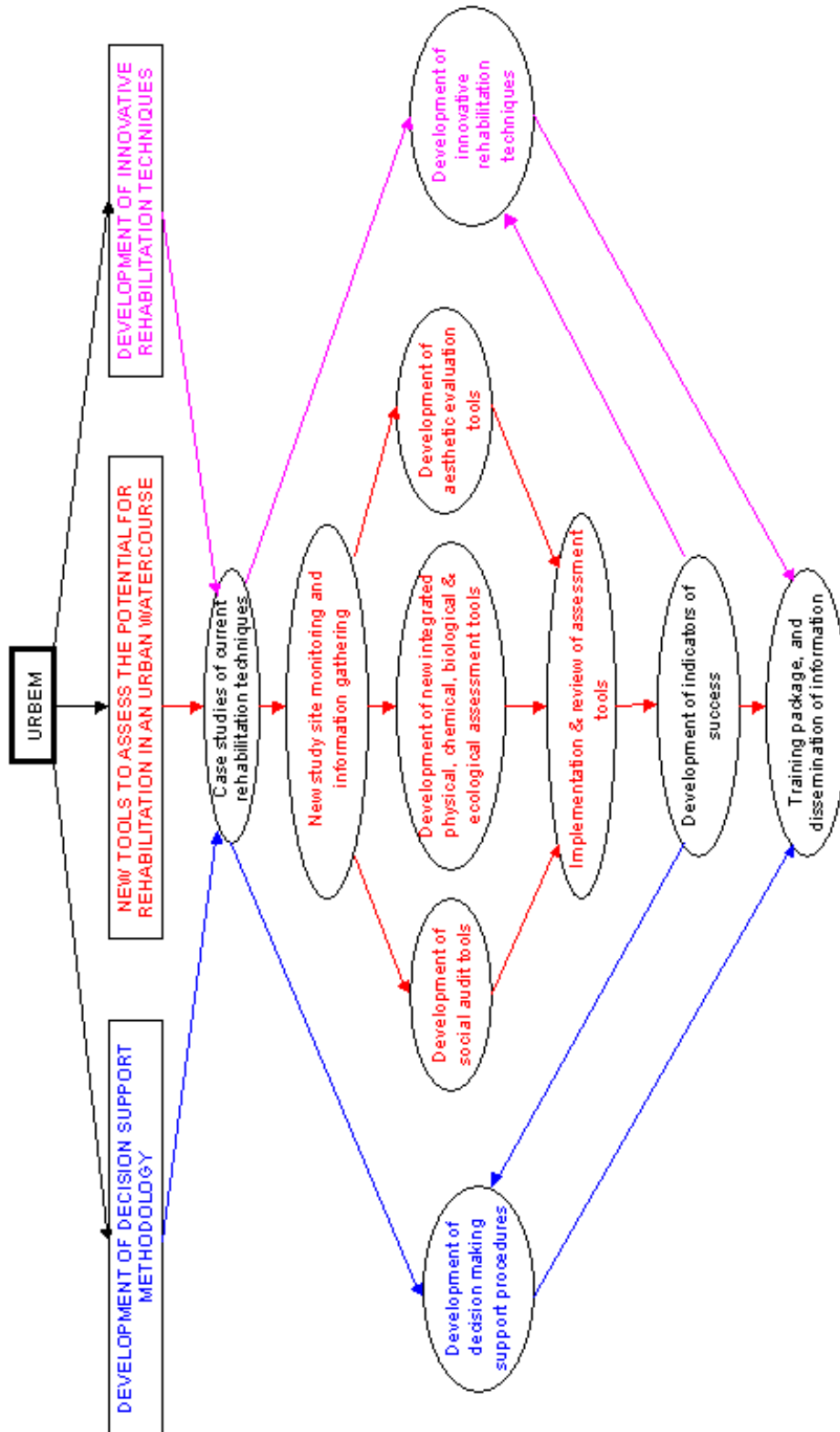
Identifying suitable indicators will help ensure an integrated management approach that allows stability and flexibility of the projects. The indicators should also try to take into account the fact that we live in changeable society and climate. In order to ensure that urban watercourses and any rehabilitation projects are to survive long-term, indicators need to be found that will be applicable to the present and also transferable to any future changed conditions. In addition thought should be given to maintenance issues, thus reassuring implementing authorities that rehabilitation is sustainable in an economic sense.

Research will be carried out to identify the key indicators for an urban river rehabilitation scheme. Analysis of existing case studies, gathered in Theme 2, will offer a general overview of current post-scheme appraisal and show which indicators have been used successfully so far. New indicators will be developed for specific purposes to assess the performance of the scheme, particularly related to those showing social, economic and ecological benefits. Application to existing schemes will be carried out in order to refine the set of indicators.

This theme includes the following work-package:

- W10 Development of indicators of success

Graphical presentation of project components



3.4 Project description broken down into work packages**Table of work packages**

Work package No	<u>Work-package title</u>	Lead contractor No	Person-months	Start month	End month	Deliverable No
1	Project integration and co-ordination	1	23	1	36	1-1 to 1-4
2	Existing case studies	3	16	2	12	2-1 to 2-8
3	Study site monitoring	4	20	4	24	3-1,3-2
4	Aesthetic evaluation	7	12	2	13	4-1 to 4-4
5	Development of new techniques for the assessment of the potential of urban rivers for rehabilitation	1	22	2	21	5-1 to 5-3
6	Implementation and review of new assessment technique	10	17	18	29	6-1 to 6-3
7	Development implementation and review of new social appraisal tool	2	19	8	19	7-1 to 7-4
8	New techniques for urban river rehabilitation schemes	6	26	5	28	8-1, 8-2
9	Approach and procedure to support public and environmental authorities	1	11	14	32	9-1 to 9-3
10	Development of indicators of success	3	13	18	29	10-1
11	Training & dissemination	9	23	5	36	11-1 to 11-6

Table of Deliverables

<i>Deliverable No</i>	<i>Deliverable title</i>	<i>Month</i>	<i>Nature</i>	<i>Dissemination level</i>
1-1	First annual progress report with draft TIP	13	Re	CO
1-2	Second annual progress report	25	Re	CO
1-3	Third annual project report with final TIP	36	Re	CO
1-4	Final URBEM project report	36	Re	PU
2-1	Selection of existing river rehabilitation projects	6	Da	PU
2-2	Documentation detailing indicators of success from existing rehabilitation projects	12	Re	PU
2-3	Documentation detailing procedures used by public and environmental authorities from existing rehabilitation projects	12	Re	PU
2-4	Documentation detailing existing rehabilitation techniques from existing rehabilitation projects	12	Re	PU
2-5	Documentation of the social appraisal tool from existing rehabilitation projects	12	Re	PU
2-6	Documentation detailing any safety features built into rehabilitation schemes from existing rehabilitation projects	12	Re	PU
2-7	Documentation detailing any existing aesthetic evaluation methods used from existing rehabilitation projects	12	Re	PU
2-8	Documentation detailing any schemes to encourage community involvement from existing rehabilitation projects	12	Re	PU
3-1	Data collected on relevant parameters from monitoring sites	14	Da	PU
3-2	Report on monitoring work	24	Re/Da	PU
4-1	Identification of parameters to be monitored for aesthetic assessment	2	Me	RE
4-2	Methodology for the classification of the aesthetic value of urban rivers	9	Me	PU
4-3	Classification of the aesthetic value of the selected urban rivers	12	Da	PU
4-4	Documentation of the methodology prepared for the workshop in a suitable format to form part of the training package.	13	Re	PU
5-1	Identification of the parameters for study site monitoring	3	Me	RE
5-2	Initial methodology to assess the potential for rehabilitation of a reach of river	17	Me	RE
5-3	Documentation of initial methodology for the assessment of the potential of urban rivers for rehabilitation	21	Re/Me	RE
6-1	Tool to assess urban river rehabilitation potential tested and reviewed	26	Me	PU
6-2	Documentation of assessment tool implementation results	29	Re/De	PU
6-3	Information gathered to be used in the training package	29	Re/Da	PU
7-1	Documentation of draft social appraisal tool & citizen participation ideas	14	Re	RE

7-2	Results of implementation of draft tool & ideas to project study sites	16	Re	RE
7-3	Workshop consisting of training session on social appraisal tool	18	De	PU
7-4	Finalised social appraisal tool with associated documentation	19	Re/Me	PU
8-1	New techniques for urban river rehabilitation	27	Me	PU
8-2	Documentation of techniques for urban river rehabilitation	28	Re	PU
9-1	New decision support methodology for public and environmental authorities	30	Re/Me	PU
9-2	Documentation of new decision support methodology for public and environmental authorities	32	Re	PU
9-3	Best practice guidance for citizen involvement	32	Me	PU
10-1	Indicators of success for urban river rehabilitation projects	29	Me/Re	PU
11-1	Internet site updated throughout the project	1-36	De	PU
11-2	Multi-media training package aimed at end users	36	Re/De	PU
11-3	International workshop/conference	36	De	PU
11-4	Journal publications and conference papers	1-36	Re	PU
11-5	Exhibitions set up by city councils for citizens in the location of study sites.	36	De	PU
11-6	Two guidance manuals detailing methodologies developed in URBEM	36	Re/Me	PU

Nature of deliverables

Re = report; Da =data set; De = demonstrator; Me =methodology;

Dissemination level

PU = public

RE = restricted to a group specified by the consortium (including the Commission Services)

CO = confidential, only for members of the consortium (including the Commission Services)

Table of Dependencies between Work-Packages through Deliverables

Work-package	Deliverable	Contribution to work-packages	
1	1-1	PROJECT OUTPUTS	
	1-2		
	1-3		
	1-4		
2	2-1		11
	2-2	5, 10	
	2-3	5, 7, 9	
	2-4	5, 8	
	2-5	5, 7, 9	
	2-6	5, 8	
	2-7	4, 5	
	2-8	5, 7, 9	
3	3-1	6	
	3-2	5, 6	11
4	4-1	3	
	4-2	6	11
	4-3	6	11
	4-4	12	
5	5-1	3, 6	
	5-2	6	
	5-3	6	11
6	6-1		
	6-2		
	6-3		11
7	7-1		
	7-2		
	7-3		
	7-4		
8	8-1		11
	8-2		11
9	9-1		
	9-2		11
	9-3		11
10	10-1		11
11	11-1	PROJECT OUTPUTS	
	11-2		
	11-3		
	11-4		
	11-5		
	11-6		

3.5 Work package descriptions

DWP Work-package description: Project Integration and Co-ordination

Work-package number	1									
Start date or event	Month 1									
Lead Contractor number	1	Others	2	6	4	3	10	8	9	7
Person-months per partner	15	Others	1	1	1	1	1	1	1	1

Objectives and input to work-package

This work package is the overall co-ordination and management of the research project. There is no specific input to the package, other than work package progress reports, but the work involves close liaison with all themes and work-packages in the URBEM project.

Input deliverables: Progress reports from the Work Package Leaders

Description of work

The project co-ordination will encompass the following activities:

- Detailed project planning and review
- Regular internal reporting on progress of the research within the work packages
- Monitoring of project progress
- Identification and resolution of any difficulties that arise during the project
- Co-ordination between the different areas of the project
- Setting up and running progress meetings, and workshops
- Setting up and updating project website
- Annual Reporting to the EC Research Directorate
- Preparation of the Final Report and Technology Implementation Plan (TIP)

To ensure that the project runs smoothly, the overall technical co-ordinator will chair the coordination and steering committees. Also they will ensure that information is disseminated smoothly between the partners and the Commission.

Deliverables	Costs (%)¹
1-1. First annual progress report with first draft TIP	5.2
1-2. Second annual progress report	3.6
1-3. Third annual project report with final TIP	3.6
1-4. Final URBEM project report	3.0

Milestones and expected results	Costs (%)
Project workshops held in months 1, 6, 11, 18, 25, 30 and 36.	-
Progress reports and cost statements submitted to the EC in Months 13 and 25	-
Month 36 and the final reports no later than 2 months after the end of the contract	15.4

¹ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Existing case studies

Work-package number	2							
Start date or event	Month 2							
Lead Contractor number	3	Others	6	9	10	7	11	12
Person-months per partner	9	Others	1	1	1	1	1	2

Objectives and input to work-package

This work package aims to collate information from existing urban river rehabilitation schemes

Input deliverables: None

Description of work

Sources of information on existing schemes will be identified and data collected. It is anticipated that data will be available through existing River Restoration Centres and through institutions responsible for urban rivers throughout Europe. However the project partners themselves will be able to collect information from contacts in the following countries: UK, France, Germany, Austria, Portugal, Slovenia. Information will also be collected on urban river rehabilitation schemes throughout the world. The partners are already aware of work that has been carried out in Japan and the USA.

A common format for data collection and arrangement will be adopted to make the information clearer and easier to use. The information to be collected from past rehabilitation schemes will include:

- Indicators of success, addressing physical and biological parameters,
- Rehabilitation techniques,
- Procedures for public administration,
- Social assessment tools
- Aesthetic assessment
- Public health and safety aspects
- Citizen involvement

This information will then be passed to the relevant work packages. The information will be considered for presentation on the project web-site, and consolidated into a report. This report will contribute to the dissemination of the results of the project.

Deliverables	Costs (%)²
2-1 Selection of existing river rehabilitation projects	1.2
2-2 Documentation detailing any indicators of success used	0.6
2-3 Documentation detailing any selection methodologies used by public and environmental planning authorities	0.6
2-4 Documentation detailing any existing innovative rehabilitation techniques	0.6
2-5 Documentation detailing any social appraisal tools used	0.6
2-6 Documentation detailing any safety features built into rehabilitation schemes	0.5
2-7 Documentation detailing any existing aesthetic evaluation methods used	0.6
2-8 Documentation detailing any schemes to encourage community involvement	0.6

Milestones and expected results	Costs (%)
Month 9 Information gathered on existing case studies	3.6
Month 12 Report on case studies	5.3

² For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Study-site monitoring

Work-package number	3									
Start date or event	Month 4									
Lead Contractor number	4	Others	10	11	3	6	8	7	12	5
Person-months per partner	5	Others	1	1	2	2	5	1	2	1

Objectives and input to work-package

The objective of this work-package is to collect all the relevant information about a range of selected urban watercourses in the following *Six cities (Newcastle, UK; Lyon, France; Dresden, German; Oeiras, Portugal; Ljubljana, Slovenia and Vienna, Austria)* across Europe.

Input deliverables: 4-1 & 5-1

Description of work

The data to be collected will be defined early in the project, as the first part of Work Package 4 (Development of a new assessment procedure). The information to be collected may include the following parameters, and primarily make use of existing data where possible:

Hydrological and hydraulic regime	Groundwater influence
Pollution sources (diffuse and point)	Extent of urban areas
Flood risk areas & flood defence requirements	Topography
Channel geomorphology (slope, sediment, erosion etc.)	In-stream and bank-side vegetation
Water quality status - chemical and biological	Sociologic data
Economic data	Aesthetic, landscape and amenity factors
Safety requirements	
Proximity of river regulating structures including their impact and necessity to the site	

The data collection sites will be selected to ensure that data will be collected for a range of different rivers with a range of problems. Co-operation and communication between partners is important, as those that define the monitoring may not actually carry it out. Consistency of data collection will be ensured by following a standardised method, for example a ranking or scale system, in order to have comparable information to use in the assessment tools.

Deliverables	Costs (%)³
3-1 Data collected on relevant parameters from the monitoring sites	3.5
3-2 Report on monitoring work carried out	7.6

Milestones and expected results	Costs (%)
Month 3 Selection of the suitable urban rivers sites	0.5
Month 4 Specification of data that needs to be monitored (from WP 5)	0.8
Month 11 End of the collection of the existing data	6.2
Month 20 End of collection of new monitoring data	10.2
Month 24 Reporting of all the collected data	11.1

³ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Aesthetic evaluation

Work-package number	4				
Start date or event	Month 2				
Lead Contractor number	7	Others	3	10	1
Person-months per partner	4	Others	4	2	2

Objectives and input to work-package

The objective of this work package is to develop an evaluation methodology to classify the aesthetic quality of urban watercourses and their surroundings.

Input deliverables: 2-7

Description of work

There are a wide range of methods to assess the aesthetic appeal of a river corridor. The factors that may be considered include:

- Visual analysis methods for before-and-after restoration conditions
- the presence of litter, oil or foam on riverbanks,
- formal criteria such as unity, variety, contrast, space defining boundaries, focal points, transition areas.
- Ecological criteria such as diversity and integrity,
- more subjective criteria such as unique character, complexity or legibility.

Aesthetic evaluation relies on some objective and subjective criteria or factors that may be considered and integrated in the overall assessment.

The existing methods will be reviewed and a new method will be developed specifically for urban rivers and their surroundings that combines appropriate factors. The aim is then to define a method of incorporating all these factors together to develop an overall appreciation of the aesthetic of the river. This is likely to involve multi-criteria decision analysis such as indices or a matrix approach.

This method will then be benchmarked on the selected urban river corridors in order to assess their aesthetic quality. To enable this to be carried out those partners that have supplied and monitored urban watercourse study sites will be trained to apply the method. The method will be explained and taught in a workshop during month 11. The notes and the materials produced for this workshop will contribute towards the final guidelines and also form part of the training and dissemination documentation from URBEM.

Deliverables	Costs (%)⁴
4-1 Identification of parameters to be monitored for aesthetic assessment	0.7
4-2 Methodology for classification of aesthetic value of urban rivers	2.0
4-3 Classification of the aesthetic value of the selected urban rivers	1.5
4-4 Documentation of the methodology prepared for the workshop in a suitable format to form part of a training package	1.0

Milestones and expected results	Costs (%)
Month 11 Workshop	4.0
Month 13 Report on methodology for assessing the aesthetic quality of urban rivers	5.2

⁴ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: New tool to assess the potential for urban watercourse rehabilitation

Work-package number	5									
Start date or event	Month 2									
Lead Contractor number	1	Others	6	9	10	11	4	3	8	7
Person-months per partner	6	Others	2	1	2	1	2	2	5	1
Objectives and input to work-package										
The objective of this work package is to develop a new tool to assess the potential for urban watercourse rehabilitation. The methodology to apply the new tool will be defined so it can be implemented and tested on the urban watercourse study sites.										
Input deliverables: 2-2 to 2-8 inclusive, 3-2 when completed.										

Description of work										
There are a wide range of factors that are involved in deciding whether it is feasible to rehabilitate an urban watercourse. A decision on exactly which factors to monitor will be made here as the initial part of Work Package 5, and then implemented in monitoring for selected urban watercourse study sites as part of Work Package 3. Once the monitoring work of Work Package 3 has finished, the remainder of the Work Package 5 work will be completed by developing an overall method of assessing and combining each of the monitored factors in some quantitative way.										
It is expected that this overall method will involve two stages:										
<ul style="list-style-type: none"> • identification of different methods to score or rate factors (hydraulic, ecological, chemical, biological, social, and aesthetic indicators), • identification of a method to combine and standardise factors into an assessment tool 										
Also it is anticipated that were appropriate some form of algorithm will be developed to take account of regional variations across Europe in the type of watercourses, the way in which they are monitored, and the different emphasis that is placed on them.										
The work package leader will seek the opinions and input of all the partners for this assessment tool.										
A workshop will be held, during Month 18, in order to discuss the suggested method to combine different parameters, to assess the urban rivers potential for river rehabilitation and agree how to apply the resulting tool.										

Deliverables	Costs (%)⁵
5-1 Identification of the parameters to be monitored at study sites	2.0
5-2 Initial methodology to assess the potential for rehabilitation of an urban watercourse	7.8
5-3 Documentation of initial methodology	2.0

Milestones and expected results	Costs (%)
Month 3 Identify main factors to be monitored at study sites	2.0
Month 17 Initial methodology	9.0
Month 18 Workshop	9.8
Month 21 Production of initial report defining the assessment tool	11.8

⁵ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Implementation and review of the new assessment tool

Work-package number	6									
Start date or event	Month 18									
Lead Contractor number	10	Others	1	6	11	4	3	9	7	5
Person-months per partner	8	Others	2	1	1	1	1	1	1	1

Objectives and input to work-package

The objective of this work package is to apply the assessment tool developed in Work Package 5 on the urban watercourse study sites, analyse the results and review and improve the tool if needed.

Input deliverables: 3-1, 3-2, 4-2, 4-3, 5-1, 5-2, 5-3

Description of work

Once the tool to assess the potential for river rehabilitation has been defined it will be applied to the urban watercourse study sites. Consequently the study site watercourses will be classified according to their potential for rehabilitation. This new information will form part of the knowledge base from which a local authority can plan how and, above all, where to carry out urban watercourse rehabilitation to achieve the “maximum ecological potential” that the WFD requires.

In addition an Authority responsible for water management could use the tool as a starting point for the WFD required “water management plan” and its implementation. Similarly an NGO could use a tool to prompt discussions with all relevant stakeholders about watercourse rehabilitation.

It is likely that the assessment tool will need to be reviewed during development to account for any practical problems that may arise during the testing on study sites. All the project partners involved in this work package will contribute to evaluating, addressing and correcting these problems.

A workshop during Month 25 will discuss:

- results of the implementation
- possible problems identified
- improvement of the assessment tool
- final definition of the assessment tool
- presentation of good and bad practice when implementing the tool

Information on the implementation of the assessment tool will constitute the basis for part of the multi-media training package.

Deliverables	Costs (%)⁶
6-1 Tool to assess urban river rehabilitation potential tested and reviewed	4.5
6-2 Documentation of assessment tool implementation results	1.0
6-3 Information gathered to be used in the training package	1.0

Milestones and expected results	Costs (%)
Month 25 Workshop	4.0
Month 26 End of application of assessment tool to study sites	4.5
Month 29 Report on final methodology	6.5

⁶ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Development, implementation & review of social appraisal tool

Work-package number	7						
Start date or event	Month 8						
Lead Contractor number	2	Others	3	6	10	1	12
Person-months per partner	6	Others	5	1	1	2	4

Objectives and input to work-package

The objective of this work package is to develop and review an audit tool which:

- identifies all stakeholders in any river rehabilitation project
- generates information about how citizens perceive the urban environment
- enables citizens to participate in consultations about any rehabilitation project
- generates indicators against which urban watercourse rehabilitation can be measured.
- tests the tool on the study sites and the local citizens & revises the tool in light of this testing

Input deliverables: 2-3, 2-5, 2-8

Description of work

The tasks within this work package are:

- research and review of existing social appraisal tools, including case studies from Work Package 2
- initial drafting of audit tool and citizen participation ideas based on information gathered
- development of social appraisal, and citizen participation “awareness” information for urban citizens
- development of training information for urban decision makers on how to use social appraisal tool
- implementation and review of the social appraisal tool to project study sites
- final draft of the social appraisal tool, and citizen participation information
- workshop to present the new tool and how it should be used

Previous general social appraisal and social involvement work will be adapted to the specific needs of URBEM and urban watercourse rehabilitation. For example, how can technical information about the quality and management of rivers be presented in an accessible way?

Implementation is likely to involve a variety of ideas to integrate information into citizen participation and community discussions. On how to apply the social appraisal tool, give a format for questionnaires, or devise decision matrices. In addition it may help to facilitate meetings and workshops, and ideas for events and forums that bring together citizens and decision-makers.

Deliverables

The deliverables will be:

	Costs (%)⁷
7-1 Documentation of draft social appraisal tool and citizen participation ideas	4.8
7-2 Results of implementation of draft tool and ideas to project study sites	1.8
7-3 Finalised social appraisal tool with associated documentation	1.0
7-4 Workshop consisting of training session on social appraisal tool	1.0

Milestones and expected results

	Costs (%)
Month 14 Draft of social appraisal tool & training session prepared	4.8
Month 17 Social appraisal tool completed	6.2
Month 18 Workshop on social appraisal tool	7.6
Month 19 Final draft of social audit tool prepared	8.6

⁷ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: New techniques for urban river rehabilitation

Work-package number	8						
Start date or event	Month 5						
Lead Contractor number	6	Others	1	10	3	8	12
Person-months per partner	8	Others	4	5	5	1	3

Objectives and input to work-package

This work package aims to develop innovative techniques for urban watercourse rehabilitation

Inputs deliverables required: 2-4, 2-6

Description of work

Innovative techniques will be developed, which will include, amongst others:

- **Methods to naturalise the flow regime of a river:**

Information gathered in Work Package 2 will be used to investigate any current methods for re-naturalising watercourse flow. This will be analysed for suitability to urban watercourses. It is expected that new methods specifically applicable to urban watercourses will have to be developed. The impact of infiltration, attenuation and other sustainable urban drainage systems on modifying the flow regime will be investigated. On the basis of these results, and other ideas from the project partners, recommendations will be made on rehabilitation methods to re-naturalise flow in urban watercourses

- **New materials and techniques:**

A review of information from Work Package 2 will be carried out with respect to materials and techniques that are currently and have been previously used for bed and bank protection. Particular attention will be paid to materials that can both withstand high flow velocities but also incorporate ecological interest, for example, inter-linked concrete blocks. Discussions may be held with manufacturers about the development of new materials. Ideas for materials and techniques will be developed as a result of these investigations and discussions.

- **Method of incorporation of wetland, floodplains and sustainable urban drainage methods:**

This area of work will investigate ideas to allow traditionally land intensive wetland and floodplain features to be incorporated into often severe spatial constraints of an urban watercourse environment. In addition sustainable urban drainage systems and their positive effect on water quality will be investigated for suitability to incorporation into urban watercourse rehabilitation.

- **Method to incorporate safety features into rehabilitation techniques.**

Types of safety features appropriate to urban watercourses will be investigated. These will then be compared to the sort of rehabilitation techniques that may be used for urban watercourses. Where possible ideas for incorporating and modifying rehabilitation techniques to accommodate safety features will be explored. Any radically new ideas may be developed into full technical specifications; otherwise this information will be summarised as a “best practice” type document detailing where safety features may be incorporated.

Deliverables

8-1 New techniques for urban river rehabilitation
8-2 Documentation of techniques for urban river rehabilitation.

Costs (%)⁸

8.9
3.0

Milestones and expected results

Month 8 Recommendations on how to naturalise flow regimes
Month 13 Recommendations on incorporation of wetlands, floodplains and sustainable urban drainage methods into urban schemes
Month 23 Specifications for new materials and techniques
Month 26 “Best Practice” guidelines and ideas for incorporation of safety features
Month 28 Production of final report

Costs (%)

2.0
5.0
9.0
10.0
11.9

⁸ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Decision support methodologies

Work-package number	9						
Start date or event	Month 14						
Lead Contractor number	1	Others	9	2	10	11	5
Person-months per partner	5	Others	1	1	1	1	2

Objectives and input to work-package

The objective of this work package is to define a decision support methodology for public and environmental authorities.

Input deliverables: 2-3, 2-5, 2-8

Description of work

The following work will be undertaken:

- Information from study sites (Work Package 2) will show how previous rehabilitation schemes have been planned.
- Study site information will help to identify general issues that must be addressed for a rehabilitation scheme
- Study site information, combined with the specific experience of the partners, will be used to produce outline procedures for public and environmental authorities.
- The outline procedures will include information to enable facilitation and optimisation of resources and time.
- The study site information will also be used to develop best practice guidance on all aspects of a rehabilitation project including how to ensure citizens are fully involved in projects and decision making both before, during and after the work is carried out.
- A decision support system will be developed based upon the procedures to encapsulate the knowledge generated in the URBEM project.

A workshop will be held in month 25 in order to collate the experience and knowledge that was gained from the study site information and consultation with partners. The workshop will be used to establish that the approaches under development are practicable for public and environmental authorities. Community groups will also be involved to ensure that measures for involving citizens are suitable.

The procedure developed during this work package will form part of the Guidance Manual.

The procedure will also be encapsulated in a decision support system designed to make expert knowledge available across the boundaries of the professional disciplines involved in the planning and management of urban rivers

Deliverables	Costs (%)⁹
9-1 New decision support methodology for public and environmental authorities	4.0
9-2 Documentation of decision support methodology	1.0
9-3 Best practice guidance for citizen involvement	1.3

Milestones and expected results	Costs (%)
Month 25 Workshop	4.0
Month 32 Final decision support methodology	6.3

⁹ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Development of indicators of success

Work-package number	10						
Start date or event	Month 18						
Lead Contractor number	3	Others	2	7	6	12	1
Person-months per partner	7	Others	1	1	1	2	1

Objectives and input to work-package

The objective of this work package is to find indicators with which to assess the success of a rehabilitation scheme. It is important to be able to measure the effects of interventions in the river system to determine the effectiveness of expenditure on rehabilitation measures and their contribution to achieving a sustainable future in the urban context.

Input deliverables: 2-2

Description of work

The following work will be undertaken:

- Information from project study sites on indicators of success (work package 2) will be analysed.
- The most advanced monitoring methods used across Europe to assess the success of a scheme will be researched.
- This information will be compared, combined and enhanced to be more specific and suitable for urban rivers.
- Through collaboration among those partners who have long experience of river restoration, parameters will be selected which demonstrate the key components and issues of rehabilitation schemes.
- New methods to convert these parameters into appropriate indicators will be developed.
- The indicators will be demonstrated through baseline assessment of the project sites

These methods must be easy to use and measure, and be able to provide robust answers.

Indicators will be identified for all the benefits which can be expected from a river rehabilitation scheme, including:

- improvement of water quality
- improvement of ecological value and biodiversity
- improvement of amenity value
- improvement in social and economic well-being

Deliverables

10-1 Indicators of success for urban river rehabilitation projects

Costs (%)¹⁰
5.1

Milestones and expected results

Month 29 Documentation of method for indicators of success

Costs (%)
5.1

¹⁰ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

DWP Work-package description: Training & dissemination

Work-package number	11											
Start date or event	Month 5											
Lead Contractor number	9	Others	1	8	10	11	4	2	6	7	12	5
Person-months per partner	6	Others	4	3	2	2	1	1	1	1	1	1

Objectives and input to work-package

To ensure the results of the URBEM project will be put into practice by as wide a range of end users as possible including EC citizens, public authorities and professionals, there are three aims:

- To document the project results
- To develop a set of training materials to educate end-users of the URBEM results
- To disseminate the project outputs to the potential user-community

Input deliverables: 2-1, 3-2, 4-2, 5-3, 6-3, 8-1, 8-2, 9-2, 9-3, 10-1

Description of work

- An exploitation and dissemination manager will be appointed at the beginning of the project to ensure the results of URBEM are fully utilised.
- Set up the project internet site and make available significant results from the study (part of Work package 1)
- Produce two guidance manuals; one on best practice for selecting rehabilitation schemes, including social appraisal tool, decision making methodologies, and the integrated assessment tool; the other detailing innovative rehabilitation techniques
- A multi-media training package will be prepared from all relevant project data and results to assist the users of the two best practice guides in their application to rehabilitation projects.
- Initial ideas about the content and presentation of the training package will be discussed between the project partners at a workshop in month 30.
- The training package will be targeted at end users and three sub-modules will be developed addressing the interests and requirements of the three major users of the module: the general public, environmental professionals and urban decision makers.
- Partners will publish papers on project advances especially, at the-end-of-project International Conference, in such journals as "Urban Water"
- The City Councils, and other end users, will exhibit the results of the demonstration studies and social appraisal tools to the public and invited stakeholders.

Deliverables

11-1 Internet site updated throughout the project	Costs (%)¹¹
11-2 Multi-media training package aimed at end users	1.2
11-3 International workshop/conference at the end of the project.	3.0
11-4 Journal publications and conference papers.	2.0
11-5 Exhibitions set up by city councils for citizens in the location of study sites.	1.0
11-6 Two guidance manuals	2.0
	3.5

Milestones and expected results

Month 5 Internet site set up	Costs (%)
Month 29 Produce outline and initial version of training material	0.5
Month 30 Ideas discussed at workshop	6.5
Month 32 Presentation of material to selected target audience to provide feedback	7.5
Month 34 Prototype multimedia training module produced	9.0
Month 36 International Conference and public exhibitions	11.0
Month 36 Guidance manuals	11.5
	12.8

¹¹ For the DWP, the costs are percentages of the **total** project budget. The deliverable costs are **incremental** and the milestone costs are **cumulative**

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4 Contribution to objectives of programme/call

4.1 Overview

URBEM is proposed under:

<i>Key Action 4:</i>	<i>City of tomorrow and cultural heritage,</i>
<i>Section 4.1:</i>	<i>Sustainable city planning and rational resource management,</i>
<i>Sub-section 4.1.2:</i>	<i>Improving the quality of urban life.</i>

URBEM will contribute to a better understanding of urban decision making to support sustainable development, through development of analytical and monitoring approaches and impact assessment tools for aspects of urban policy implementation. URBEM will address some of the complex interactions between broad policy and societal aspirations for the development of the urban environment and the functioning of the natural systems associated with rivers in the urban context. The project proposes the comparative assessment of different approaches for reducing the overall impact of urban activities on the aquatic environment. Key goals are the characterisation, assessment and reduction of water pollution and the development and assessment of strategies, and decision support tools to optimise the social and environmental opportunities of the urban river corridor. URBEM will deliver solutions and best practices for sustainable development and for improving the quality of urban life through the rehabilitation of the waterside integrating waste water, efficient land use and optimal urban structure. The outcome of the research will enable forward-looking scenarios and visions for the city of tomorrow to be realised.

4.2 Sustainable urban development

URBEM will review the current state of the art of river rehabilitation, and create innovative rehabilitation techniques that are specific to urban areas, such as reopening of covered and culverted watercourses – “daylightening”. Via rehabilitation, watercourses should regain much of their natural function – they will be used more sustainably, and they will contribute to the overall sustainability of the urban areas in which they are situated. There is often a conflict between economic and employment growth and environmental and natural resources issues, which can be especially apparent in urban areas. URBEM cannot fully address all of these issues. However, by facilitating co-operation between all stakeholders to increase awareness of the wide ranging influences of any urban regeneration, URBEM will give a sound context for urban watercourse rehabilitation that fully incorporates “sustainability”. Central to this is the engagement of Local Agenda 21 networks to promote public participation in the urban decision-making process and seeking social sustainability (Levett, 2000a).

4.3 Enhancement of cultural identity

As urban pressures grow there is a risk that degradation of urban watercourses will create negative impacts on the health of the community, its economic prosperity and the overall quality of the citizens’ life. Urban watercourses were historically regulated for economic or industrial purposes, although the structures that formed this regulation may now be poorly maintained or in a state of disrepair. However, they are part of a community’s cultural or industrial heritage. Regeneration of urban areas should seek to incorporate such historical features to maintain local or cultural identity. Rivers and streams within cities can act as an interface between natural and man-made systems. They have an important role in bringing into a city a more natural landscape and they can be important features and focal points in the community. The diversity brought by flowing water within the urban environment is an important attribute that adds to an increased aesthetic perception and appreciation. URBEM, through promoting the rehabilitation of urban watercourses, can help to increase the aesthetic and overall value of urban areas and thus contribute to meeting the expectations of citizens, increasing their association with their environment, and enhancing their cultural identity.

4.4 Increasing citizen and stakeholder participation in urban decision making

The involvement of the community in decision-making processes associated with the area within which they live, increases the citizens sense of personal responsibility for an area (Levett, 2000a), and produces a positive force of civic pride. In turn this responsibility translates into a healthy caring for the environment and a sense of well being at the ability of the community to actively participate in and influence the activities that shape, and maintain, the immediate environment in which they live. URBEM recognises the importance of stakeholder participation in urban decision-making, and also realises that there are at present limited methodologies in place for such involvement. URBEM will research and develop a social appraisal technique that can be utilised to gauge the views of the urban community regarding urban watercourses in their area. In turn the results of this

assessment will be incorporated into decision making methodologies that will be created for the use of urban planning authorities.

4.5 Better understanding of urban decision making for sustainable development

Better public understanding of planning processes needs transparency and openness and this can actively assist in ensuring sustainable development. By being transparent and open to all interested parties it allows for all options to be investigated, and the most sustainable solution to be found. URBEM will develop a decision support methodology based on the integrated physical, chemical, biological, aesthetic and social appraisal tools developed in the main part of the project. It is envisaged that this methodology will be used by non-scientific end-users involved with urban planning to systematically decide on suitable urban watercourse rehabilitation schemes, based on sound scientific knowledge. It will thus allow a transparent and comprehensible urban decision making process.

4.6 Characterisation, assessment and reduction of pollution

Urban watercourse rehabilitation is not only concerned with physical or aesthetic improvements to the watercourse, but for a watercourse to function properly as an ecosystem the chemical and biological quality of the water, if polluted, needs to be improved. This entails characterising and addressing any pollution and water quality issues. Sources of aquatic pollutants in the urban environment may include any combination of the following:

- diffuse surface and storm water runoff
- point sources of pollution from direct discharges into the watercourse
- municipal sewage
- illegal or uncontrolled domestic cross-connections
- road and paved area drainage
- oils and other toxic spills
- contaminated sediments

One of the main component parts of URBEM is the research and development of an integrated assessment tool that will include chemical and biological aspects to characterise the water, and any possible pollution, in the watercourse. The assessment tool will help rank the potential for rehabilitation of various urban watercourse sites and will incorporate pollution factors. Recommendations on how to identify and initiate schemes that will help to remediate diffuse or “grey” water pollution problems are included but it is outside the scope of URBEM to provide specific measures to treat point sources of pollutants. The type of watercourse rehabilitation measures that might be developed as part of the project, such as wetland areas, and oxygenating pool and riffle sequences will make a positive contribution to improving water of general poor chemical and biological quality. Considering water quality issues in this broad way will also accommodate issues regarding public health and safety with respect to potentially harmful sewage or chemical pollution in watercourses.

4.7 Optimised methodologies and best practice to improve the quality of urban life

Rehabilitation of urban watercourses improves the quality of urban life by creating an urban area that is aesthetically pleasing, minimally polluted, and has a functioning ecosystem with associated wildlife. The concepts of linear parks and wildlife corridors are very appropriate for urban watercourses; a linear park takes advantage of the river corridor concept to utilise the space adjacent to the watercourse itself as an area for public recreation. In a similar way the idea of a wildlife corridor is to allow areas of linked urban land that can act as wildlife refuges, and promote the natural movement of wildlife in such a way as to sustain a functioning ecosystem within an urban area. River corridors and their adjacent land can provide a wildlife corridor in this way. Good practice in urban watercourse rehabilitation relies on comprehensive and effective analysis of potential rehabilitation sites. URBEM, through site monitoring, information gathering and research will develop comprehensive assessment tools to look at the potential of a site for rehabilitation. These tools will integrate physical, chemical, biological, aesthetic and social aspects to allow for full understanding of the components of an urban watercourse and the rehabilitation that will be required. The use of these tools will also allow rehabilitation site selection to be optimised, and successful rehabilitation schemes to be undertaken. Also central to the idea of improved quality of life is public safety. Improving the quality of life of urban citizens by rehabilitation of watercourses must therefore include safety aspects. URBEM intends to address safety by looking at incorporating safety features into innovative rehabilitation technique development. The UK Royal Society for the Prevention of Accidents (RoSPA) quotes that 44% of all cases of drowning in the UK in 1999 were in rivers and streams. Thus safety features will be especially pertinent for any rehabilitation techniques that concern the bank-side or waters fringe. In addition, sections on perceptions of safety in the social appraisal techniques and on addressing the health and safety aspects of water pollution will be included.

4.8 Inclusion of end-users in consortia

The Fifth Framework Programme seeks to support research, which solves problems of concern to European citizens and has a strong link to the end-user community to ensure the uptake and exploitation of the research advances. URBEM is inter-disciplinary in nature and involves an integrated team of partners including:

- institutions involved in river restoration, landscape enhancement, urban water systems and related sciences,
- organisations responsible for the design and implementation of existing rehabilitation schemes,
- town councils and urban planning authorities
- water supply and sewage companies
- environmental economists and sociologists with experience of impacts, constraints and benefits of regeneration schemes
- developers of training and dissemination material

These six components of the partnership will work together collaboratively in order to deliver the most appropriate outputs from the project. An important aspect of this collaboration is the inclusion of end users who in some cases will provide the urban watercourse study sites to be used for information gathering, and for testing of the various assessment tools once created. In addition these end users will be able to pilot the planning prioritisation methodologies for urban watercourse rehabilitation.

Within the exploitation plans for URBEM there will be more opportunity to involve other end-users and beneficiaries of the project outcome. It is envisaged that via exhibitions and educational outreach programmes into local schools the general public can become more familiar with the concept of urban watercourse rehabilitation and also understand that there are processes available that allow them a say in urban decision making. Additionally there may be the opportunity to promote and facilitate local community participation in maintenance of any rehabilitation works. This concept of “ownership” of urban regeneration sites by the local citizens is again designed to engender civic pride.

Dissemination of the project results are expected to be targeted, amongst others, at various non-governmental organisations. These can include conservation bodies, safety organisations etc that may not have been directly involved with the research stages of URBEM but whom we feel will be able to utilise and benefit from the outcomes of the project.

5 Community added value and contribution to EC policies

5.1 European dimension of the problem

The Conference on River Restoration, 2000, run by the European Centre for River Restoration highlighted the issues from different parts of Europe on river restoration. In Southern Europe many rivers have been modified to accommodate water resources needs and in Eastern Europe uncontrolled development and industrialisation necessitate a constant battle to reduce further degradation of watercourses. In Western Europe although there is a strong legislative background to protect and enhance the environment, there are no standard methods for river restoration, it is slow to gain acceptance and is hampered by inadequate dissemination of information. It is clear that despite regional variations in types of pressure on European watercourses, there is a need for standardised methodologies, to promote, fund, undertake, and manage watercourse rehabilitation.

Specifically in an urban context, higher population densities, together with the expectations of urban citizens for an improved quality of life in 20th century Europe significantly increased pressure on the resources of urban areas. The degradation of the physical, chemical, biological and aesthetic aspects of urban watercourses by canalisation, introduction of man made materials, culverting, receiving sewage and polluted urban runoff, can have a very negative impact on the surrounding community, even in terms of health and general economic prosperity. To address the needs and aspirations of citizens of the 21st Century living in urban areas the URBEM project will improve urban watercourses in terms of river regime, water quality, ecology, aesthetics and amenity value. These steps are vital in the movement towards an environmentally sustainable future for cities in Europe.

There is a wide interest from urban authorities across Europe in the rehabilitation and enhancement of urban watercourses but there is a reluctance to embark on new schemes for a number of reasons:

- Lack of information on rehabilitation and enhancement techniques and their performance
- Difficulty in converting the initial concept into a final design
- No methodology for assessing the enhancement potential of urban rivers to optimise the use of resources

- No methodology to involve all stakeholders in urban river enhancement; the public, national and local authorities, business and non-governmental organisations
- No methodology to evaluate indicators of success of enhancements

The problems of selecting, designing and implementing rehabilitation and enhancement schemes for urban rivers occur across Europe. The nature of individual catchments and streams may differ from one area to another but the bio-physical processes at work are common to all EU countries. Research could be carried out at the level of individual countries but each country would then lack important shared knowledge and experience. It is only by working at the European level that all the EU countries can benefit by the wide knowledge and experience available. The outputs of URBEM will provide urban planners, catchment managers and environmental scientists, engineers and designers with standard tools to facilitate the adoption of best practice in selecting sites for potential enhancement, and in designing river enhancement schemes. The development of such tools will provide decision makers and end-users with information on the technical and socio-economic impacts of urban river enhancement.

5.2 European added value of the consortium

Expertise in the restoration of urban watercourses is spread across Europe and the potential beneficiaries and end-users of the research, including urban planners and public bodies such as local councils and environment agencies, are also located throughout the EU. Projects already completed under the LIFE program such as the restoration of the River Cole (Bettes and Fisher, 1998) and the River Skjern (Klijn, de Jong and Pedrol, 1998) have already demonstrated the synergy obtained by drawing together active researchers to compare and contrast their approaches to common problems. Resource management agencies, researchers and practitioners recognise that the analytical procedures and frameworks being developed, validated and applied in river management must rely on interdisciplinary perspectives (Goodwin and Hardy, 1999).

The URBEM project integrates a team of partners from 6 different European countries – UK, France, Germany, Austria, Portugal and Slovenia. Included are economists, sociologists, engineers, hydrologists, hydraulics experts, environmentalists, researchers, consultants, urban planners, academics and local authority decision-makers. By having such a multi-disciplinary team it is hoped to effectively incorporate the wider aspects (e.g. social) of urban river rehabilitation, and not just the technical and scientific ones. Also included within the project partners are staff with considerable international experience in river rehabilitation. The scope of the URBEM project has emerged from experience gained in discussions with parties involved in river enhancement projects and the interest this has generated amongst the user communities in several countries. The project will enhance national efforts to improve urban watercourses.

The URBEM project partners have an excellent network of contacts with stakeholders in several countries and these links will be of value in obtaining acceptance for the approaches being followed in the research. The results of the URBEM project could provide a sound scientific basis for the development of EU policy in relation to urban river enhancement assessments and best practice within the EU. A number of countries have set up River Restoration Centres (RRC) aimed at disseminating information about river restoration. The intention of this project is to work with these RRCs to ensure that the information that they have available is fully utilised and also to use them to aid in the dissemination of the results throughout Europe. The results of the project would make information that is presently only available in a distributed and incomplete form, available Europe wide and to be presented in a systematic manner. This would aid in the adoption of standard methodologies throughout Europe for the enhancement of urban watercourses.

Through interaction with both current and potential ‘end-users’, the project would take significant steps in raising awareness of urban river enhancement as a valuable mechanism for driving urban regeneration and re-growth.

5.3 Contribution to the implementation and evolution of EU policies

URBEM contributes to a number of EU policies, including the following;

The Water Framework Directive

- *Improvements in water quality, providing cleaner water for amenity and recreational use.*

- *Planning tools to ensure urban river enhancement can be part of river basin management plans.*
- *Development of comparable methods of assessing the overall physical, chemical and ecological status of urban rivers*

Social inclusion

A poor quality urban environment is often an indicator of deprivation, social exclusion and decay of social structures. Tools to facilitate the rehabilitation of urban rivers will enable public authorities to improve the quality of life for all urban inhabitants, including vulnerable citizens in socially and economically depressed urban areas. Citizen participation in URBEM contributes to the development of citizen's networks.

Sustainability

- *Rehabilitation of rivers in brown field sites is a sustainable re-use of land and will aid in the implementation of Local Agenda 21 plans to maintain quality of life and access to natural resources*
- *Involvement of local communities and stakeholders in the rehabilitation of urban rivers*
- *Provision of instruments for information dissemination and education and promotion of shared responsibility for environmental issues*
- *Provision of public information and professional development opportunities*

Environment

- *Aids to comprehensive environmental impact assessment*
- *Tools for comparing indicators of environmental quality of urban watercourses across Europe*
- *Better ecological status of urban watercourses*
- *Maximisation of opportunities for nature conservation and potential increases in bio-diversity*

Employment

Urban regeneration leads to economic growth and the revitalisation of urban river environments will contribute to this process.

Implementation of Research and Development

Co-operation in community research and implementation of research, technological development and demonstration programmes is promoted by URBEM in a number of ways:

- The promotion of co-operation between end users and research centres
- The dissemination and optimisation of Community research, technological development and demonstration
- Stimulation of the training and mobility of researchers in the community due to the range of locations of the project partners and demonstration sites used in the work packages

6 Contribution to Community social objectives

6.1 Improving the quality of life and health and safety

The URBEM project aims to promote urban watercourse rehabilitation. A poor quality urban environment is often an indicator of social exclusion, decay of social structures, inherent pollution issues and low economic investment. URBEM will introduce new technologies that will help to make urban watercourse rehabilitation a more accessible option for urban authorities. It will provide assessment tools to allow effective and efficient selection of potential rehabilitation sites, develop planning methodologies to help urban authorities facilitate watercourse rehabilitation, and provide information to encourage and promote urban environmental rehabilitation. These four key areas will all help to facilitate urban watercourse rehabilitation, which would have the following benefits to quality of life and health and safety:

- improve the aesthetic and amenity, and tourist value of urban watercourses
- via citizen involvement, integrate a water environment as a positive aspect in the community, which is not seen as a safety risk
- provide the possibility of combining attractive access routes along urban watercourses to work, shops and community centres
- encourage enhanced bio-diversity by regenerating ecosystems, and maximising the wildlife potential of urban watercourses, thus bringing nature to urban citizens
- enable improvements to be made to water quality and thus reduce health risks from pollution
- encourage economic regeneration in depressed areas
- help halt reductions in living standards by improving the physical environment

The URBEM project will develop tools, particularly in Work Packages WP4 to WP7, for helping achieve the above aims, resulting in a better quality of life and health for the populations of the Communities urban areas. The development and application of a social appraisal technique in Theme 4 (WP7) is essential for three reasons. The social appraisal will involve citizens, assessing their expectations and determining what they wish to gain from enhancement projects. Seeking the views of citizens in the decision making process ensures that enhancement work carried out reflects their needs and also promotes a sense of ownership and encourages environmental responsibility. The involvement of urban residents in the social assessment is an opportunity for both adults and children to increase their knowledge of reasonable safe behaviour around water. For instance, in Holland, where water is used more frequently for recreation, fewer children have water related accidents (Urban Design Alliance 1998). The enhancement of the water quality of urban rivers will result in a reduced risk of disease to recreational and amenity users.

6.2 Improving employment and the development of skills

Jobs created directly

The direct application of the methodologies will result in an increased level of urban river rehabilitation and enhancement.

Tourism and related jobs

The rehabilitation and enhancement of European urban waterways would provide benefits to the tourism industry by improving water quality and the aesthetic value of the aquatic environment leading to increased recreational usage. Recreation is increasingly more important in local economies, and the provision of attractive clean watercourses can be significant to the local economy.

Jobs created indirectly

Developing and applying techniques to improve the quality of urban rivers will have indirect positive economic impacts on urban areas. In a number of cities such as London, Cardiff and Newcastle successful urban regeneration has occurred around redeveloped docks and rivers. Improvements to the aesthetic attractions of urban areas can increase the value of both commercial and domestic property by up to 20% (Urban Design Alliance, 1998). Efficient allocation of resources to urban river regeneration will free resources for other urban regeneration projects.

Skills

URBEM will enable Europe to increase its level of expertise in urban rehabilitation and enhancement and promote interdisciplinary skill transfer, ensuring Europe remains at the forefront of developments. Work packages WP5, WP6 and WP9 particularly support the transfer and improvement of skills through the development of new methodologies.

Development of products for potential market exploitation

The URBEM deliverables will be prototype products, the development of which could lead to the export of both technology and services.

Transferral of approaches to training and educational institutions

Through the prototype training module developed in work package 11 and the participation of training institutes, the results of URBEM can be directly transferred to teaching Institutions and public and environmental authorities.

6.3 Preserving / enhancing the environment and the prudent use of natural resources

The provision of a methodology with which to ensure the economically efficient allocation of resources for urban river rehabilitation will make urban river environments more important in determining future urban planning strategies. This should lead to a general improvement of the urban environment and associated effects in improvements for recreational use and health. Specifically, URBEM will contribute to preservation and enhancement in the following ways:

- *Production of a tool that allows users to assess the impacts of future urban river engineering projects and modify these schemes in order to minimise adverse environmental impacts*
- *Helping to evaluate trade-offs between different users, leading to more sustainable solutions*
- *Promoting the rehabilitation of urban rivers throughout Europe will provide a wider range of physical habitats within urban watercourses, leading to increased bio-diversity*
- *Decreasing the level of uncertainty in decision-making. Socio-economic interactions have large impacts on use of resources and currently there is no methodology that accounts for these factors in urban river rehabilitation*
- *Natural resources will be conserved rather than being used to constrain the rivers as less hard engineering techniques will be used and there will be a greater reliance on natural methods and materials to maintain the watercourses*
- *Development of a tool to aid the implementation of Member State's regulations, EU environmental regulations and international commitments in the urban planning and water resources sector. To effectively implement such policy there is a need to provide planners and managers with tools that assess the impacts of different strategies*

All work packages support these contributions and in particular Work Package WP11 (Training and dissemination) will guarantee the dissemination of the research results.

6.4 Stakeholder participation and awareness

Incorporation of economic and social stakeholder opinions through the partners and consultative user groups in the development of the toolkits for planners and guidelines is a vital component of the project

The guidelines produced will support practitioners in the production of River Basin Management Plans, which under the Water Framework Directive must be published and made available for public discussion. The provision of a standardised methodology will allow regional and national efforts to be compared. This standardisation will allow citizens to assess efforts and results. It is important that the reasons for success or failure are transparent if policies are to be developed, implemented and supported.

7 Economic Development and scientific and technological prospects

7.1 The stakeholders

In order to determine the future prospects for implementation of the research outputs of URBEM, it is important to identify the stakeholders at whom the project is aimed. In general terms the stakeholders are “users”, who either provide professional advice and services based on the project knowledge directly or indirectly through implementing decisions and policies and “beneficiaries”, that is the broader public who live in the urban area. The potential users of the URBEM project are:

- Regional, national and local authorities (both administrative and political structures)
- Public sector agencies responsible for urban planning and regeneration
- Private sector consultants supporting urban planning and development
- NGO's and voluntary conservation and community development organisations
- Educators and academic researchers who develop and transmit knowledge and skills to succeeding generations.

The URBEM project consortium members are concerned that the results of the proposed RTD activities should be disseminated and utilised effectively. The nature of the project partnership, with its strong involvement of end-users from the private and public sectors, demonstrates commitment to the exploitation of the anticipated project results. After completion of the research, a specialist exploitation manager could be sought, for example from the European River Restoration Centre, in order to ensure the RTD results are fully disseminated and exploited. The UK River Restoration Project already fulfils this function for national river restoration expertise and advances. Exploitation and dissemination will be given a high profile throughout the term of the project and beyond in the Technology Implementation Plan (TIP). The TIP will be drafted within the early stages of the project and reviewed at the project workshops.

7.2 Exploitation of research results

The economic prospects of any research results may be developed through:

- Application for patents for novel technologies
- Registered designs and copyrights
- Establishing new companies to exploit particular results
- Use of new knowledge by the project partners in their academic, commercial or public service activities
- Broad dissemination through publication in peer-reviewed, professional and academic journals
- Commercial publication and distribution of the project guidelines and CD-ROM
- Dissemination through higher education and professional development activities

The end users in the URBEM partnership are committed to using the products within their own organisations for urban river rehabilitation. The participation of important end-users such as the city councils of Newcastle-upon-Tyne, UK, Oieras, Portugal, and Lyon, France throughout the URBEM project will ensure that the project delivers results that are technically relevant and shaped to the needs of the end-user communities.

Commercial exploitation will take place through the partners. HR Wallingford Group Ltd produces and markets commercially available software through its own software house, Wallingford Software. Wallingford Software is dedicated to developing, marketing and supporting software for the water industry, including models for urban drainage, water supply and river management. Wallingford Software will examine the business case for turning the demonstration-level, pre-competitive software from URBEM into a fully commercial product. With this in mind the partnership will link where possible with other EU projects in integrated water resources management that intend developing toolkits to tackle urban watercourse problems at the catchment scale. Strong linking between successful projects early on will allow development opportunities to proceed from a stronger base.

7.3 Dissemination of research results

The dissemination of research results ranges from raising awareness to the provision of detailed project findings and materials to the building of networks of interested parties. The dissemination goal will be for the methodology to stimulate debate, gain acceptance and to be utilised by practitioners. Dissemination of results outside the project consortium will take place in several ways:

- **Internet site** - Dynamic use of the world wide web through an internet site containing news of project progress plus key research findings. The site will be updated as progress meetings and workshops take place, allowing continuous dissemination throughout the duration of the project

- **Guidance manuals** - The Guidance manuals produced will be of immediate use within the participants own work and will be of use to end users such as regional and national authorities. It is intended that these Guidelines will be disseminated widely to regional and national agencies concerned with the water environment. The validity of the guidelines will be established with the verification of the methodology in a number of demonstration studies as detailed in Work Packages WP6 and WP8.
- **Prototype CD-ROM Training package** - containing information regarding use of the final guideline methodologies of the research results, with the material also available for downloading from the internet. The multi-media training package will be prepared on CD ROM by CUW-UK, in order to assist end users in application of the Guidance manual techniques. The results individual work packages will be summarised in an easy to understand form and presented as a compact training module. The training module will be targeted at end users and three sub-modules will be identified addressing the interests and requirements of the three major users of the module: the general public, professionals and decision makers. The training package will be developed in multimedia environment and will contain the relevant theoretical and applications background and selected graphical, textual and audio material. Links will be provided with the other sources of information and knowledge
- **International end-of-project workshop** - This will concentrate on the benefits of the methodologies developed, how to apply these methods and the lessons learnt, especially in terms of the integration of data, analysis, tools and methodologies
- **Production of Publications** –The results from the project will be presented to as a wide a forum as possible through the use of leaflets, trade papers, and journals
- **Exhibitions**- The city councils will hold exhibitions for citizens in order to increase visibility of results, keep the public informed and involved in the project and to promote environmental responsibility

7.4 Illustrative Individual Partner Exploitation Plans

HR Wallingford will promote progress and results from the work within the water sector through professional meetings, including continuing professional development training courses), and through professional journals read by the water industry such as

- the Journal of Hydraulic Engineering,
- the Journal of Water and Maritime Engineering,
- the Journal of Water and Environmental Management and
- La Houille Blanche.

HR Wallingford has an established link with a commercial technical publisher, Thomas Telford Ltd (TTL), for mainstream publication and distribution of research texts, guides and manuals. We will discuss with TTL the commercial possibility of publication of the guidance documents from URBEM towards the end of the research project. In addition HR Wallingford will seek to utilise the tools and methodologies that constitute the outputs of URBEM in consultancy work concerned with urban river restoration. It is also hoped that some of the social inclusion ideas developed as part of URBEM may be transferable to other types of environmental consultancy, and thus these will be utilised where appropriate.

NEF will disseminate results among practitioners of participatory methods through the UK Community Participation Network, which it co-ordinates. It will write up the project in its monthly newspaper, News from the New Economy. NEF will seek to place articles in journals and magazines such as EG and Local Environment. The indicators chosen for the social assessment technique will become part of NEF's database of indicators. Thus the work carried out as part of URBEM will contribute to furthering development on indicators of success, an integration of social values to environmental and sustainability issues in urban areas. It may then be possible to transfer the use of these indicators to other projects and areas of work, which NEF would seek to do where appropriate.

LNEC will seek publication in internationally refereed professional papers on the river rehabilitation, and will also seek to publish in Portuguese publications, including also Brazilian based ones.

CESUR will use the results of URBEM to promote a seminar with local and other authorities and public groups related with river management. It will participate in other workshops and training courses related with this issue and will also promote a publication of a book on meanings and values of Mediterranean rivers in urban landscapes. It will seek publication in internationally refereed professional national and international journals, but extending the scope of the URBEM results into the field of landscape architecture and environmental psychology.

IOER will hold an international conference to present project findings to the professional community. The outcome of the project will be integrated into CD-ROM guidelines and teaching aids that will be used in conjunction with special seminars and professional development courses. Project findings will further be presented in an ongoing graduate course on stream restoration as well as papers and articles to be presented through professional journals and through an existing website.

CEMAGREF is closely involved with the city council of Lyon in the research it carries out on the study site. The focal point is the ecological management of combined sewer overflows, with the aim to reduce total pollutant load coming from a large sewer network in the natural system using as possible the self purification capacity of streams. The outputs of URBEM will provide required guidelines to define:

- river or stream system "health level" with respect to the WFD,
- self purification capacity of river and stream reaches
- insight into the appropriate management of combined sewer overflows.

Outputs will be first experimented on the study site and then be extended to the other numerous pollution points along the sewer network.

IWHW-BOKU intends to publish the results of the projects in some referenced journals. Furthermore a national provision of the gained new insights of river engineering techniques and restoration measures will be made by a short course. It will be addressed to local authorities and decision-makers as well as to practical engineers involved in planning and design of river training measures.

UNEW will actively use the methodologies from URBEM in its projects in the UK and overseas. By setting urban catchments rehabilitation in the wider framework of whole catchment strategies (CLUWRR) and post-industrial regeneration of contaminated land and water (HERO) the applicability of URBEM outputs will be enhanced. UNEW will incorporate URBEM approaches within the UK EPSRC (Engineering and Physical Sciences Research Council) funded Integrated Graduate Development Scheme in Hydroinformatics and Management Systems. This is an international post-graduate programme based on distance learning material, including modules on Urban Infrastructure Management and Integrated River Basin Management. The results of URBEM will also be disseminated through CLUWRR's international electronic journal "Land Use and Water Resources Research" to be launched in 2002.

NCC will use the outputs from the various research packages and general exchange of experience in a number of ways. There will be inputs directly into the City's development plan review and indirectly into regional plans. The Council and other agencies will use the results to influence the scope and design of river restoration schemes and the related public consultation programmes.

CUW are responsible for producing the proto-type multimedia training package, which will be developed and then used not only for dissemination of well arranged final products among the project participants (regular meetings, workshops), end user and other institutions and individuals involved, but it will be presented in the following ways:

- conventional means: seminars, workshops,
- innovative: Internet based; URBEM web site, CUW-UK Newsletter, hot links to project partners web site, links with other compatible EU funded projects
- training activities performed by CUW-UK (UNEP courses, CIWEM seminars) and other project partners
- Internet availability in public domain (selected parts of the product)
- Internet availability (final developed product) at small nominal charge

JPVO-KA expects to improve investment and be able to benefit from the URBEM project through more optimal solutions to groundwater/urban runoff problems. In addition it may be possible to integrate theories on management and regeneration of urban watercourses developed during URBEM into the everyday workings of the company, thus allowing operation in a more sustainable way.

UL has a developed course of postgraduate studies in environmental disciplines. The results of the URBEM study will be incorporated into the bachelors, masters and doctoral degrees and will be taught as a multidisciplinary seminar in the university. Experience gained from the URBEM project will aid UL researchers in fundamental and applied research and they will aim to get papers published in National and International Journals.

7.5 Development and prospects for the participants

URBEM will result in more urban river rehabilitation schemes being carried out than would otherwise be implemented. Of the schemes that are constructed the impact of URBEM will be that they will have a greater probability of achieving their objectives. The scale of the impact of the project is potentially very large as regeneration and regional development in urban areas is a key issue in improving the quality of life of EU citizens and promoting economic growth. The potential benefits of the project are large, hence the interest in the project from national environmental, national and regional technical advisers and public authorities. The methodologies developed should also be adaptable to watercourses in rural environments. The research partners see particular promise for the commercial exploitation of the application. The toolkit developed along with the guidelines will create market opportunities for consultant participants (HR Wallingford, NEF and LNEC) in countries around the world who are in the process of regenerating urban environments. The position of European science will be enhanced through the project with its:

- *Development of integrated river rehabilitation techniques methodologies*
- *Contribution to improved assessment of the environmental effects of river rehabilitation*

8 The Consortium

Details of Consortium

Project Management

8.1 Management structure

The URBEM project contains a distinct Work Package (WP1) on project integration and co-ordination. It is within the context of this theme that the Co-ordinator will undertake the management of the project. The Co-ordinating institution, HR Wallingford, has an established track record of management of research projects for the EC and other major clients. HR Wallingford will have overall responsibility for the contract management. The co-ordinator will act as principal point of contact with the Research Directorate General, compile the project accounts, submit annual reports and distribute advance payments to the other partners. The project integration, co-ordination and delivery is a core management function of the Project Co-ordinator. The project integration is shown in figure C5.1 and will be achieved through facilitation of communication between each of the project themes. The technical content of the project will be managed through the URBEM Project Co-ordination Committee who will liaise with the URBEM Project Steering Group.

8.2 Management Procedure

The management of the project will be undertaken using established project management procedures developed at HR Wallingford to control its commercial activities. The procedures cover time, cost and programme management, record keeping, communications, and tracing and controlling variations to work. A detailed activity schedule will be produced at the outset of the project scheduling the research tasks in more detail than is usually undertaken at the contract negotiation stage.

The nominated Co-ordinator, Professor Roger Bettess, has substantial experience of managing both research and consultancy projects. Dr Paul Samuels (the HR Project Sponsor, see 5.4 below) will provide support as required to Roger Bettess in case of absence or if difficult issues arise. Paul Samuels has substantial experience of the management and co-ordination of research projects for the EC and for the British Government. Work package leaders will oversee the progress on their particular themes, using their own management procedures. The Co-ordinator has included an allowance for travel to the project partners sites to ensure continuity and conformity to project objectives.

8.3 Decision making structures

The decision structures for URBEM will be based upon those which have proved successful in other multi-national EC research actions under the third, fourth and fifth Framework Programmes. Each contractor will be responsible for the work allocated to their institution and for any Associated and Sub-Contractors to them as required in the Model EC Research Contract. The primary vehicle for decisions will be the six-monthly project review workshops. It is intended that all Contractors will have an equal role in these project workshops, but the Co-ordinator will have the final responsibility to the EC for the direction of the research.

The project workshops will last two or three days. These workshops will provide an opportunity for representatives of all the research teams to discuss their findings and future approaches. A key component of the workshops will be to review progress, and agree targets for the next six months of the research with broader planning up to 18 months ahead, the Co-ordinator will update the project Activity Schedule based upon the agreed programme. The EC Scientific Officer will be invited to attend these joint workshops and will receive copies of the workshop meeting notes by e-mail.

In addition the work package leader will be responsible to the Co-ordinator for the technical delivery and integration of the partners work on each work package. It is envisaged that the work package leaders will call occasional work package technical meetings to progress the science in the task, these will allow team members from different European Institutions to work alongside each other, with occasional short-term secondment of research staff to another partners institution. Such short-term joint working has proved very effective on other EC research contracts co-ordinated by HR Wallingford

In all we anticipate approximately 20 meetings to take place during the project either of the review workshops or the work-package technical meetings. Naturally opportunity will be taken to reduce the need to travel by holding the technical meetings, where possible, in association with a progress workshop.

8.4 Communication Flow

The primary method of communication within URBEM will be by e-mail and the coordinator will establish a password-protected FTP site to allow sharing of detailed information between all project partners, for example, prototype versions of the project output procedures, the DSS will be placed on the FTP site.

The Co-ordinator intends to establish a system of reporting from the work package leaders at frequent intervals to monitor progress against the programme for the project. The work package leaders will be requested to complete a pro-forma report for return to the Co-ordinator by email. The report will identify; progress, achievements in the period, delays and other deviations from the programme, costs against budget, anticipated future difficulties, suggested resolutions for those difficulties and outputs from the theme. These quarterly progress summaries will form the basis of the six-monthly project review workshops, but urgent issues will be tackled as they arise.

The exchange of information between those working on the same WP will be encouraged so that all members of that team are informed about progress. As there is a large overlap between the teams working on the different WPs, there should be a good exchange of information between the teams for the different WPs. The leaders of the WPs will be encouraged to communicate directly with those working on related WPs.

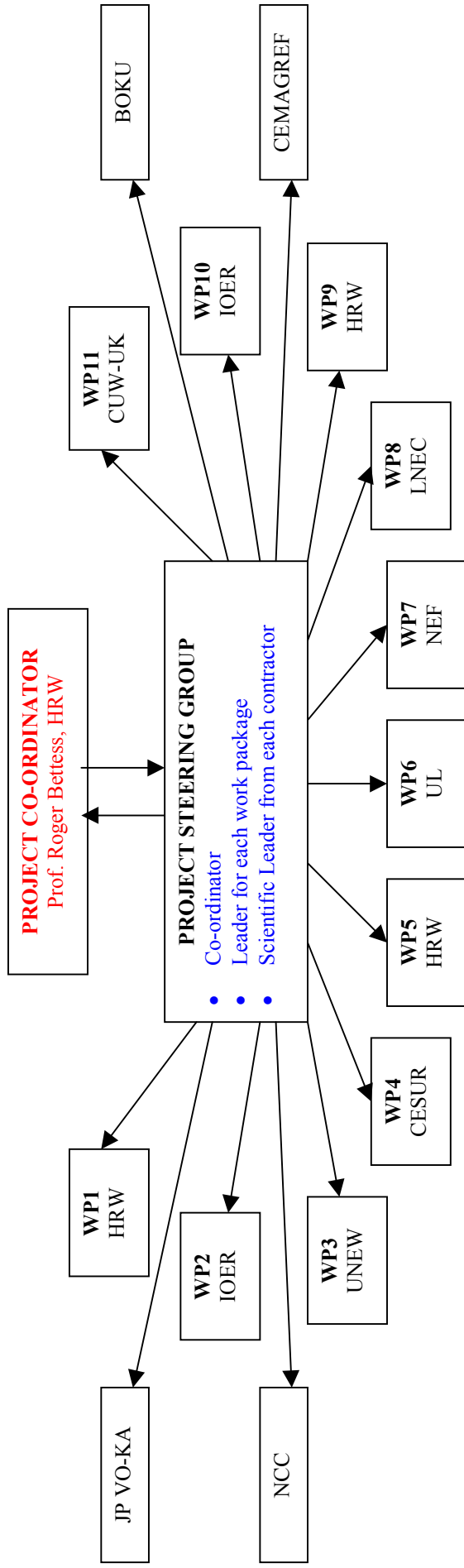
8.5 Quality assurance

The Co-ordinator will establish a Quality Assurance (QA) procedure to ensure that the management of the project, decisions taken and technical progress are recorded in an effective and traceable manner. This will be done using the current HR Wallingford QA procedures, with any appropriate adaptations for the project. Detailed discussions will be held with all partners at the project inception workshop on how the individual Partners' QA procedures will link into the HR Wallingford QA procedure for the project.

A key part of the Company QA system is the appointment of a senior researcher as a project sponsor with the responsibility to check the progress of the project at critical stages and ensure the technical integrity and quality of the research. It is proposed that Dr Paul Samuels will act as the project sponsor for URBEM.

Each work package will also have a leader who will take responsibility for its completion. The URBEM project involves 12 organisations drawn from 6 European countries and thus will require careful attention to the management of the research to ensure that it delivers its outputs, in a high quality way in terms of content, relevance, usefulness and presentation.

Figure C5.1 Project Management Structure



Work Packages (WP)

- 1 Project integration and co-ordination
- 2 Existing case studies
- 3 Study site monitoring
- 4 Aesthetic evaluation
- 5 New assessment tool
- 6 Implementation and review of new assessment tool
- 7 Develop, implement and review new social assessment tool
- 8 New innovative rehabilitation techniques
- 9 Decision support methodologies
- 10 Development of indicators of success
- 11 Training package & dissemination

Project consortium abbreviations

HRW	HR Wallingford, UK	CR
IOER	Institute für ökologische Raumentwicklung, Germany	CR
UNEW	University of Newcastle-upon-Tyne, UK	CR
CESUR	Centre of Urban and Regional Systems, Portugal	CR
UL	The Faculty of Civil Engineering and Geodetic, Ljubljana, Slovenia	CR
NEF	New Economics Foundation, UK	CR
LNEC	Laboratório Nacional de Engenharia Civil, Portugal	CR
CUW-UK	Centre for Urban Water, UK	CR
CEMAGREF	Agricultural and Environmental Engineering Research, France	CR
BOKU	Universität für Bodenkultur, Austria	CR
NCC	Newcastle City Council, UK	AC
JP VO-KA	Vodovod - Kanalizacija Ljubljana, Slovenia	AC

CR = Principal contractor, AC = Assistant Contractor

