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E-mail: research.competitions@defra.gsi.gov.uk

SID 5 Research Project Final Report

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Project identification

1. Defra Project code: FD2112

2. Project title:
   Broad-Scale Ecosystem Assessment (BSEA)
   BSEA Toolbox 1

3. Contractor organisation(s):
   Cascade Consulting
   in association with:
   HR Wallingford
   Babtie, Brown and Root
   IECS, University of Hull
   Alconbury Environmental Consultants
   University of Cambridge

4. Total Defra project costs (agreed fixed price): £ 140,925

5. Project: start date ..... 9th January 2004

   end date ..... 28th March 2006

6. It is Defra's intention to publish this form.
   Please confirm your agreement to do so.....**YES** ☒ **NO** ☐

   (a) When preparing SID 5s contractors should bear in mind that Defra intends that they be made public. They should be written in a clear and concise manner and represent a full account of the research project which someone not closely associated with the project can follow.
   Defra recognises that in a small minority of cases there may be information, such as intellectual property or commercially confidential data, used in or generated by the research project, which should not be disclosed. In these cases, such information should be detailed in a separate annex (not to be published) so that the SID 5 can be placed in the public domain. Where it is impossible to complete the Final Report without including references to any sensitive or confidential data, the information should be included and section (b) completed. NB: only in exceptional circumstances will Defra expect contractors to give a "No" answer.
   In all cases, reasons for withholding information must be fully in line with exemptions under the Environmental Information Regulations or the Freedom of Information Act 2000.

   (b) If you have answered NO, please explain why the Final report should not be released into public domain

Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

Background

The scoping study on broad scale ecosystem impact modelling (BSEIM) identified a general lack of guidance on how to undertake broad scale ecosystem assessment, and a specific gap in guidance for ecosystem analysis of flood and coastal management plans (CFMPs and SMPs).

This Technical Report FD 2112 has therefore been commissioned by the Department for the Environment, Food and Rural Affairs (Defra) and the Environment Agency to provide consolidated ecosystem assessment guidance for practitioners in flood management policy analysis. The work is a component part of a wider research initiative into broad scale modelling of flood and coastal defence activities. Outputs are in a format that allows integration within CFMP and SMP.

Objectives

The overall project objective of FD2112 is to establish and demonstrate, through use of case studies, good practice procedures for data collation/ interrogation and the assessment of ecosystem effects and risks resulting from river and coastal cell management policies/ options. The guidance has been developed in response to practitioners in England and Wales requiring a method for integrating ecology as part of broad-scale flood risk management.

Guidance

Broad Scale Ecosystem Assessment (BSEA) provides the framework for the assessment of the ecosystem effects and risks resulting from river catchment or coastal cell management policies/ options. BSEA is GIS-based and uses readily available, nationally consistent broad scale data.

The approach establishes ecosystem status, ecosystem drivers and the broad habitats supported, using information on hydrology, geomorphology and ecology. The primary objective is to maintain and improve broad scale ecosystem function.

The BSEA steps involve the following:

1. Establish catchment understanding (broad habitats & ecosystem drivers),
2. Define Broad scale Ecosystem Criteria (BEC),

3. Map & tabulate the BEC,
4. Expert consultation on catchment characteristics and suitability of BEC, and
5. Use of BEC in policy development and/ or policy appraisal.

Catchment or coastal cell understanding is developed using a set of seventeen tools/ methods that allow the presentation, interrogation and interpretation of information for:

- Freshwater catchments - channel condition, floodplain connectivity and channel continuity, and
- Coastal cells - shoreline migration, tidal inundation and coastal flooding, and mobile sediment availability.

Having established the condition and functioning of the catchment or coastal cell, BEC are defined that describe catchment opportunities and constraints. For example, this may include areas that require protection (e.g. ecologically sensitive, functionally important) combined with areas that could be improved (e.g. previously degraded river, historic flood banks limiting floodplain connectivity). These are not limited to the aquatic system, but may also include wider functional or non-functional wetlands. BEC are mapped to give spatial context to the opportunities and constraints.

BEC provide the yardstick against which policies or options can be assessed to give a relative assessment of positive, neutral or negative ecosystem impact. BEC integrate existing catchment objectives and can include emerging Water Framework Directive requirements. The initial BEC are used for expert stakeholder consultation. Once finalised the BEC form the framework for biodiversity inputs to policy/ option development and assessment.

The BSEA guidance and methods have been applied to three Case Study areas:

- River Ribble in north-west England: identifying ecosystem objectives which may affect or be affected by flood risk management (linked to management action, biodiversity benefit, flood management consequence, and possible cost). To provide input to CFMP policy development.
- River Derwent in Yorkshire: a relative assessment of the ecosystem consequences of alternative catchment-wide flood risk management policy. To provide input to the Strategic Environmental Assessment (SEA) of a CFMP.
- South Foreland to Beachy Head coastal cell in south-east England: identifying the ecological pressures and opportunities appropriate to flood risk management. To provide input to SMP policy development, as well as the SEA of a SMP.

Conclusions

The guidance is the first phase in the development of the broad scale ecosystem assessment toolbox. The guidance has been consolidated to use existing and available broad scale data, linked to established methods, which facilitate pragmatic analysis to support policy derivation and appraisal. As such the guidance represents a significant step forward for the consistent use of ecosystem assessment at a catchment or coastal cell scale.

However, there are currently a number of limitations to implementation of the guidance. Data availability and suitability at the broad scale are limited, as is the predictive capability of models for ecosystem impact assessment of flood management activities. Accepting these limitations, the guidance has been designed as a framework that should be updated as new information and methods become available.

Recommendations

The guidance can be used as the basis for all broad scale catchment and coastal cell ecosystem assessments, including CFMP and SMP. Further work is required to strengthen broad scale ecosystem monitoring, including data acquisition and interpretation methods, combined with development of better ecosystem impact models (that can integrate hydrology, geomorphology and ecological functioning). These are described in detail in the companion scoping document (FD 2108). There are also opportunities to integrate BSEA into the developing modelling and decision support framework (MDSF) that should be explored.

The BSEA studies should be implemented at project inception to ensure that the opportunities and constraints identified can be fully explored and incorporated. Further piloting of the guidance is recommended on a wider selection of catchments and coastal cells, to test against a wider spectrum of potential policy applications.

The guidance has also been developed so that it can be incorporated into Strategic Environmental

Assessment and can be used as the basis of Water Framework Directive studies (spatial extent of pressures and impacts, programmes of measures, etc).

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
   - the scientific objectives as set out in the contract;
   - the extent to which the objectives set out in the contract have been met;
   - details of methods used and the results obtained, including statistical analysis (if appropriate);
   - a discussion of the results and their reliability;
   - the main implications of the findings;
   - possible future work; and
   - any action resulting from the research (e.g. IP, Knowledge Transfer).

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

FD 2108 Broad Scale Ecosystem Impact Modelling Tools: Scoping Study – Full Report
http://www.defra.gov.uk/science/project_data/DocumentLibrary/FD2108/FD2108_545_FRP.doc

FD 2108 Broad Scale Ecosystem Impact Modelling Tools: Scoping Study - Technical Report
http://www.defra.gov.uk/science/project_data/DocumentLibrary/FD2108/FD2108_970_TRP.pdf

FD 2108 Broad Scale Ecosystem Impact Modelling Tools: Scoping Study - Technical Summary
http://www.defra.gov.uk/science/Project_Data/DocumentLibrary/FD2108/FD2108_TS.doc

FD2112 Broad-Scale Ecosystem Assessment (BSEA)BSEA Toolbox 1: Technical Report
http://www.defra.gov.uk/science/project_data/DocumentLibrary/FD2112/FD2112_4585_TRP.pdf

FD2112 Broad-Scale Ecosystem Assessment (BSEA)BSEA Toolbox 1: Technical Summary
http://www.defra.gov.uk/science/project_data/DocumentLibrary/fd2112/fd2112_4586_TSM.pdf

SNIFFER: FRM02 Broad-Scale Ecosystem Assessment Scotland (BSEA) Toolbox 1
http://www.sniffer.org.uk/completed_further_info.asp?id=309&location=