

Joint Defra / EA Flood and Coastal Erosion Risk Management R&D programme

Background to R&D project

Offshore sand and gravel deposits are increasingly under pressure as a resource for dredging material for building purposes and for beach nourishment. The environmental impacts of offshore extractions both in the vicinity of the extraction and on adjacent coastlines have to be evaluated and shown to be within acceptable limits. The SANDPIT project was a European collaborative research project with 17 partners in 7 countries, aimed at strengthening the scientific background against which licensing applications are reviewed. The project addressed questions focussed especially on the hydrodynamic, sediment dynamic and morphodynamic impacts of marine sand extraction, and the time-scales over which they apply.

Defra co-funded the contribution of HR Wallingford to the project, with the following objectives:

1. To obtain measurements of flows in and around a prototype test sand-mining pit, as part of a collaborative field campaign.
2. To improve the methods of predicting sediment transport rates in the vicinity of sand-mining and aggregate-dredging areas.
3. To explore a number of scenarios concerning sand/aggregate extraction from sandbanks and from pits.
4. To produce a book of guidelines synthesising the results, supported by a data-base, based on an inventory of experiences and data relating to sand and aggregate extraction and its consequences; and present a course (with course notes) to disseminate the results to end-users.

Results of R&D project

1. Estimates of gross and net annual sand transport rates have been determined for four contrasting sites in the North Sea, English Channel and Atlantic Ocean. A unique set of field data of depth-integrated transport rates in deep coastal water has been obtained for validation of predictive models.
2. A quantitative assessment of the impacts of large sand extraction pits, both in the vicinity of the pit and at the nearby coastline, is provided to answer the question '*What are the near-field and*



far-field effects of aggregate extractions?

3. Guidelines are given on the rate of recovery of sand banks following mining activities, and the near- and far-field impacts of mining in the sand-bank region to answer the question ‘*will the sand bank recover after removing the sand?*’
4. The key effects of aggregate extraction on sea-bed ecology are collated from a limited literature review. Impacts in sandy habitats are generally believed to be less than in gravel habitats.
5. The variability and unreliability of computer model predictions is highlighted, demonstrating the necessity for field data calibration of any models to achieve anything better than qualitative comparisons.

R&D Outputs and their Use

The detailed and practical results from the project have been published in a hardbound book of c.600 pages – “SANDPIT: Sand Transport and Morphology of Offshore Sand Mining Pits” ISBN 90-800356-7-x – which is available from the website of the publisher (www.aquapublications.nl). The book comprises two parts: Part I (about 150 pages) is aimed at end-users and synthesises the results of the project in terms of usable results and guidelines that respond to a set of questions defined at the outset of the project by representatives of national end-users (including Defra and the EA) from the partner countries. Part II comprises 51 detailed scientific papers of about 10 pages each, covering the various results arising from the research by the different partners. The two parts are bound together in a single volume so that the digested synthesis in Part I can make cross-reference to the Part II papers to access extra details.

The project outputs should be studied by anyone concerned with the regulation of offshore mining of sand and aggregate, and technical advisers who try to predict environmental effects of this activity. The inter-comparison of computer model predictions of a known situation should be particularly noted as a warning against over-reliance on computer predictions in decision making.

This R&D Technical Summary relates to R&D Project FD1912 and the following R&D output:

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Research Contractor: HR Wallingford Ltd (as a partner in the EC Framework Project)

The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website (www.defra.gov.uk/envirom/fcd/research). Copies are also available via the Environment Agency’s science publications catalogue (<http://publications.environment-agency.gov.uk/epages/eapublications.storefront>) on a print-on-demand basis.

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