Marine Management Organisation

Evidence Supporting the Use of Environmental Remediation to Improve Water Quality in the South Marine Plan Areas

Aim

The South Plan Analytical Report (2014) highlights an issue of poor water quality within the south inshore marine plan area and, in particular, the Solent, Dart and Exe estuaries. This project explores existing evidence related to environmental remediation as a tool to influence water quality with a view to providing evidence to inform south marine plan policies.

Introduction and methodology

Under the Water Framework Directive (WFD), English water bodies must meet 'good' ecological and 'good' chemical status by 2015. The Environment Agency's River Basin Management Plans identify that a number of water bodies in the south inshore marine plan area will fail to meet 'good' status by 2015 and identify a number of issues which may also lead to failure to meet standards under the Bathing Water Directive and Shellfish Waters Directive.

Water quality may be affected by waste water and trade and industry discharges, water treatment works and sewerage disposal points, and additional sources such as sewage overflows during periods of heavy rain, agricultural run-off and domestic drainage which are only likely to increase in response to population and industry growth. Measures to control water quality at the source are regulated by the Environment Agency but there may also be potential for water quality issues to be addressed directly in the marine environment through marine planning.

This project explores the potential for 'natural systems' such as filter-feeding shellfish, mudflats, or kelp to be used to improve water quality. The report presents the current water quality issues in the south marine plan areas alongside a review of available literature on environmental remediation options. This information was used to consider the potential feasibility of the options for addressing water quality issues in the south marine plan areas and the report explores how the evidence presented might inform and / or influence marine plan policies.

Results

Scores of 1 to 3 with equal weighting were assigned to ecological, chemical, and microbial water quality issues in WFD assessment unit areas within the South plan areas based upon the WFD water status. This allowed comparison of areas within the South plan areas in terms of an overall water quality score. There was insufficient information to assign equivalent scores for turbidity. Areas with the lowest scores (lowest water quality) include the Exe Estuary (4/9), The Dart Estuary (5/9), Southampton Water (5/9) and Portsmouth Harbour (5/9) reflecting poor water quality (microbial and chemical levels). The Solent was assigned a total score of 6/9.

A number of remediation options thought to possess the capacity to remove excess nutrients, microbes, and chemicals or reduce turbidity of water bodies were reviewed and a total of thirteen options were identified as potentially suitable for use in addressing the water quality issues of the south marine plan areas, i.e. those where available evidence supported their potential to improve one or more of nutrient/ecological, microbial, chemical or turbidity issues. These include mussels (*Mytilus edulis* or *Modiolus modiolus*), oysters (*Ostrea edulis* or *Crassostrea gigas*), and macroalgae, seagrass and saltmarsh. The potential costs, ecological and technical feasibility were also considered through an expert judgement-led approach. *Mytilus edulis* culture in particular was suggested to be a high potential candidate for remediation.

The environmental conditions available at the different locations within the south marine plan areas were considered alongside the conditions required for the remediation options. It was found that only some of the thirteen options proposed are likely to be suitable at certain

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locations. Three case studies were reviewed in more detail, incorporating consideration of the nature of remediation required (chemical, nutrients, etc.); for example, based on evidence within the report it is suggested that bottom culture of bivalves may be one of the most appropriate remediation option for the Exe Estuary.

Conclusions and recommendations

The report provides an overview of the available evidence related to environmental remediation of relevance to the south marine plan areas. Numerous factors (remediation effectiveness, environmental conditions required and those available, cost, additional indirect benefits, etc.) which will influence any decision regarding remediation options are evaluated and expert judgement applied where no other evidence could be obtained.

There are a number of potentially suitable remediation options that might support improved water quality in the south marine plan areas. A framework detailing the use of this information to identify optimum bioremediation options is presented; site-specific considerations and an integrated assessment of parameters such as those considered within this report are of paramount importance in informing such decisions.

The report reviews findings against the draft south marine plan policies (March 2015) and identifies a number of benefits and risks of promoting environmental remediation as a potential route to improve water quality in the south marine plan areas.

The report recommends that a number of evidence gaps are filled before the outputs can be used to fully support marine plan policies including:

- Improved information on costs and the area required for remediation options.
- Improvements in spatial species and habitat data and understanding of temporal variability and condition to allow evaluation of existing natural remediation sites and potentially suitable sites.
- Current and future baseline layers for ecosystem services provision.
- Information on the suitability of remediation options relative to the site conditions.
- Further work to investigate the sequestration of hazardous chemicals and microbial-contaminated shellfish biomass.
- Information on the use or disposal of cultivated material, and any costs involved.
- Development of effective culture and management schemes to enable optimum bioremediation.
- Exploration of conflicts/synergies between remediation options and other marine uses.
- Further evidence relating to scaling up remediation options to operational scales.
- Estimation of the contribution of biodeposit burial and denitrification loss for bivalve species to overall bioremediation potential

MMO comments

The information within this report will be used to inform development of marine plan policies.

The project provides a useful review of the information available related to the potential for environmental remediation to improve water quality in the south marine plan areas. The further evaluation undertaken utilising expert judgement provides an initial indication of the remediation options potentially suitable for specific locations; however further evidence is required to provide confidence in the most appropriate options for these locations.

Further information

Please direct any correspondence to the Evidence Team by emailing evidence@marinemanagement.org.uk