

# Sustainable Remediation: Challenges for an Interdisciplinary Approach to Contaminated Site Management

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The remediation of contaminated sites is generally considered beneficial to the environment because it removes or reduces, immobilises, and/or shields the contamination to acceptable risks for the current and future use of the site. However, the remediation activities themselves can also negatively impact the environment, affect local communities, and involve high costs that are disproportionate to the benefits of remediation. Sustainability is increasingly being included as an objective of a remediation project, considering the overall environmental, social and economic impact of the entire site remediation project when determining the appropriate remediation methods.

The aim of this study is to assess how 'sustainable remediation', as well as the tools that are being developed to evaluate the sustainability of remediation projects, have evolved over the last five years.

Special attention will also go to the inclusion of social aspects in the sustainability assessment of site remediation, since because previous research has regularly indicated that this remains a concern in remediation projects [1].

Many studies focus on life cycle assessment (LCA) to compare the environmental impacts of different options for site remediation. However, these LCA studies are more and more integrated in an overall assessment, in which also economic and social issues are also considered. The SuRF-UK indicator framework [2] has been used in several cases as a basis for a sustainability evaluation, and often the SuRF-UK indicator categories are further refined to allow to address case-specific issues. There is an increasing attention for 'gentle' or 'green' remediation options, and a growing number a remediation case studies also put emphasis on recourse recovery and circular economy. Stakeholder involvement is considered, in the development of the tools and as part of the sustainability assessment itself.

It can be concluded that considerable progress has been made over the past five years regarding the application of the principles of 'sustainable remediation', at least in remediation projects that are described in literature, and where sustainability evaluation is an explicit goal. However, a number of aspects are still only rarely addressed. Among these, green/sustainable finance in relation to remediation projects, and sustainable remediation in developing countries are topics that need more attention in the near future.

## References

- [1] V. Cappuyns, "Inclusion of social indicators in decision support tools for the selection of sustainable site remediation options." *J. Environ. Manag.* Vol. 184, pp. 2016. 45-56. <https://doi.org/10.1016/j.jenvman.2016.07.035>
- [2] CL: AIRE, "Sustainable Remediation Forum UK. A Framework for Assessing the Sustainability of Soil and Groundwater Remediation. Published by Contaminated Land: Applications in Real Environments (CL: AIRE). SuRF-UK report CL: AIRE, London. UK, 2010, ISBN 978-1-905046-1292-5, 53p Available: <https://www.claire.co.uk/component/phocadownload/category/16-surf-uk-bulletins?download=61:surf-uk-framework-final-march-2010>