



An evaluation approach for sustainable mega-site remediation in China integrated with remedial duration

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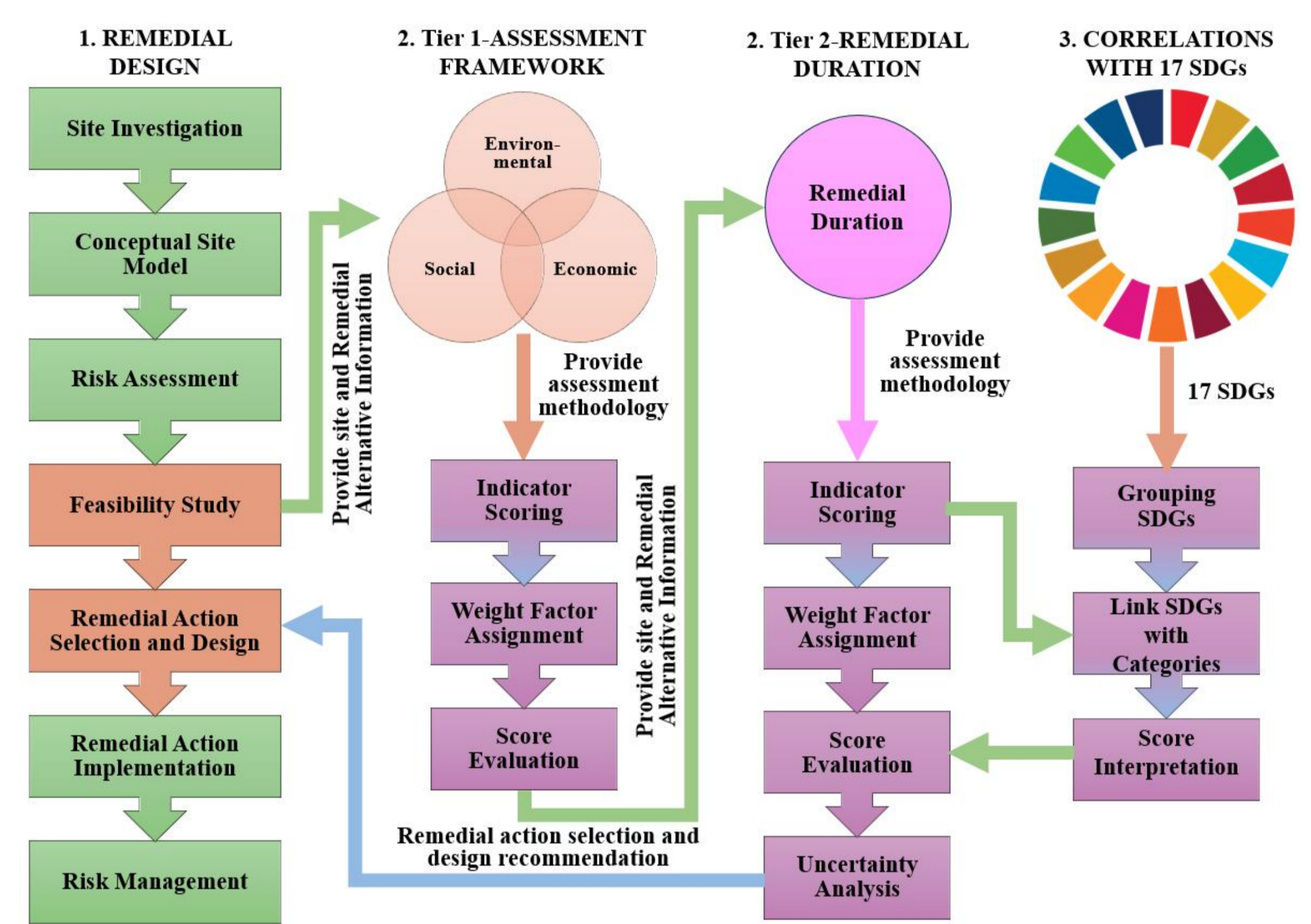
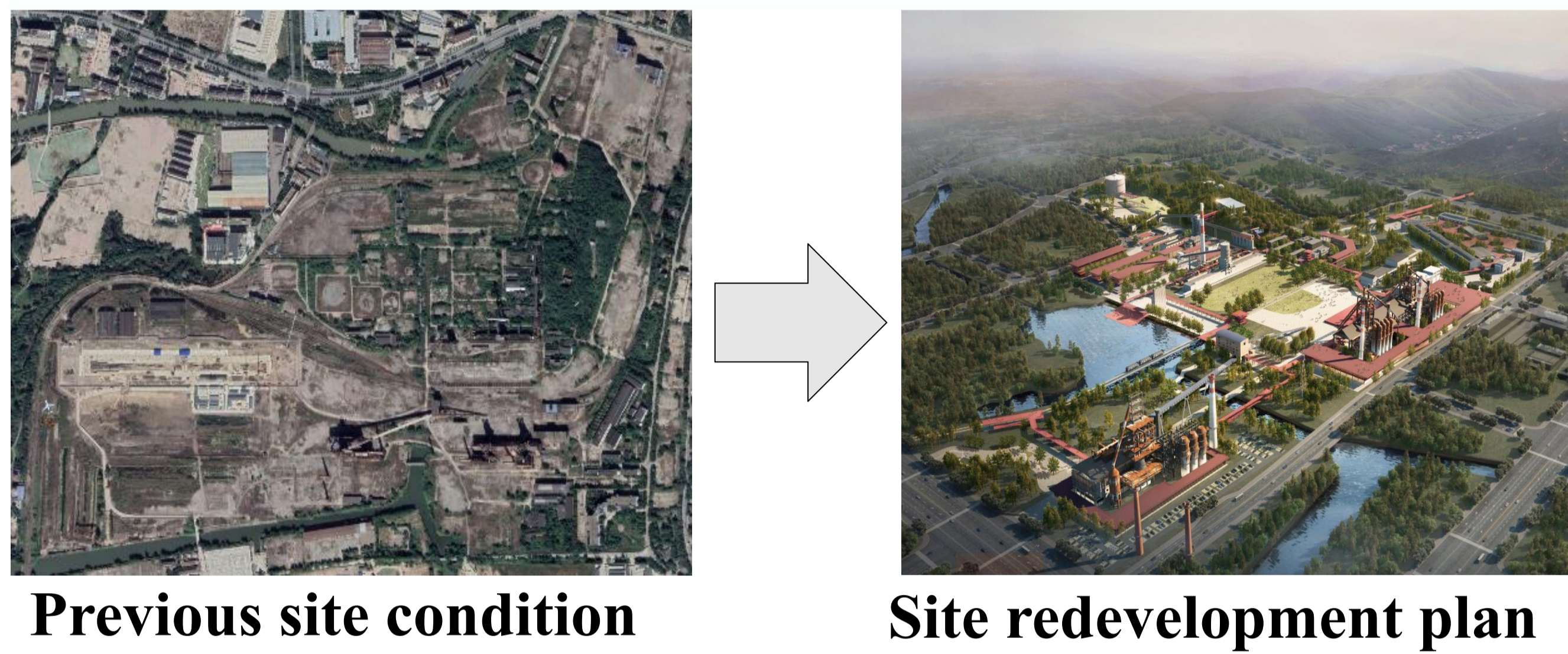
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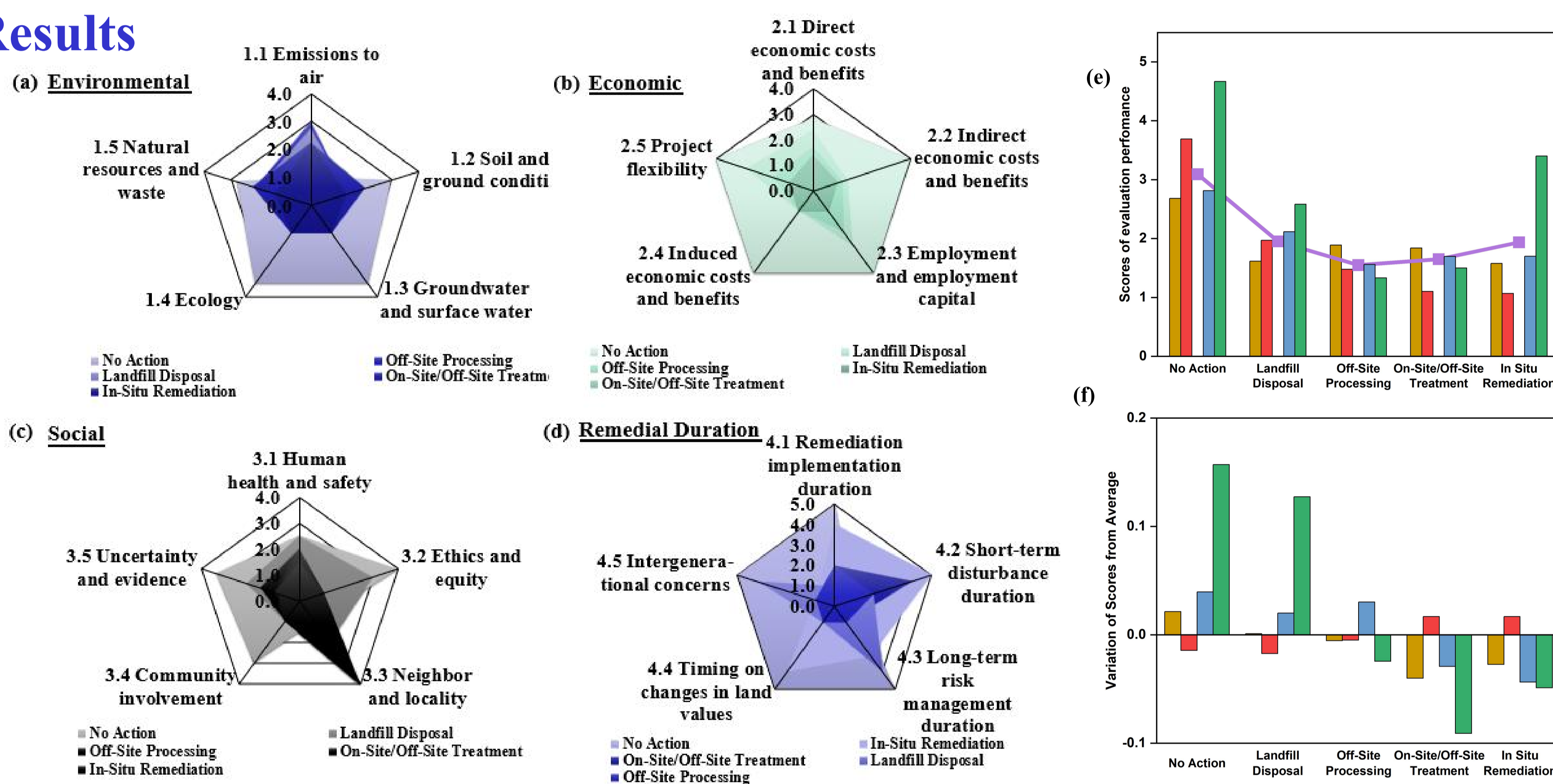
Motivation: Due to the fast-paced redevelopment of contaminated sites in developing countries, there is a lack of appropriate quantitative approaches to evaluate sustainability for the selection of remedial alternatives. Practically, this study proposed an integrated evaluation approach for sustainability assessment, incorporating remedial duration, was developed and applied to the site remediation of a mega-size former iron-steel manufacturing facility in China.

Material and methods

An Integrated Approach for the Sustainability Evaluation of Remedial Alternatives



Results



- No Action alternative exhibited the poorest performance across all three aspects and in the overall evaluation.
- On-site/Off-site Treatment alternative excelled in the environmental and economic aspects, as well as in the overall assessment.
- On-site/Off-site Treatment alternative demonstrated the best performance in SDGs, with respective proportions of 39.0%, 19.0%, and 18.2% for No Action, Off-site Processing, and On-site/Off-site Treatment.

Fig. 1 Assessment scores of five remedial alternatives for Tier-1 (a) environmental, (b) economic, (c) social aspects, and Tier-2 (d) remedial duration (Note that a lower score suggests better performance). (e) Evaluation results of integrated evaluation performances (scores) and (f) influence of weighting factors on assessment scores of the four ex situ remedial alternatives (y-axis represents the percentage of variation from the average score of weighted and unweighted scenarios).

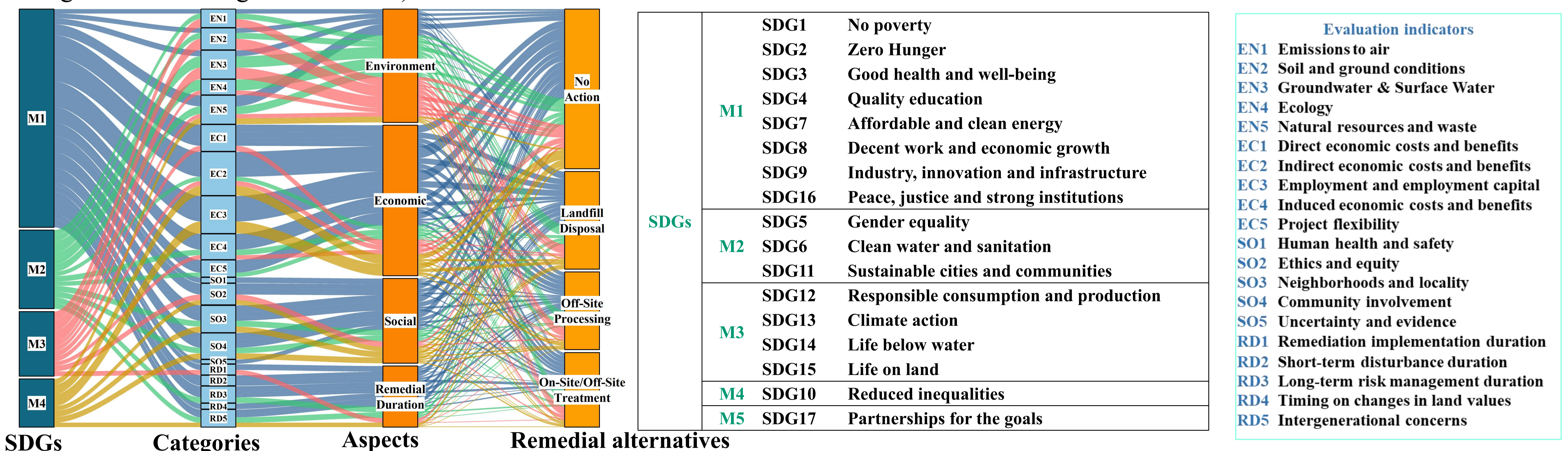


Fig. 2 The quantitative interactions between remedial alternatives with the module composition of the middle SDG Index level.

Conclusions: The On-site/Off-site Treatment alternative exhibited the strongest performance across sustainability assessments compared to other alternatives. This alternative emerged as the most favorable remedial action within the middle SDG Index level, indicating alignment with business imperatives driving sustainable practices and remediation efforts.

Acknowledgement:

This work was supported by grants from the National Natural Science Foundation of China (32061133001) and the CSCEC Eco-Environmental Engineering Research Center (Soil Remediation Technology and Equipment) (CSCEC-PT-009). We acknowledge the cooperation between China and the EU through the EiCLaR project (European Union's Horizon 2020, N°965945).

