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TITLE: Addressing uncertainty in modelling cumulative impacts within maritime spatial planning in the Adriatic and Ionian region

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ABSTRACT:

Maritime spatial planning (MSP) is envisaged as a tool to apply an ecosystem-based approach to the marine and coastal realms, aiming at ensuring that the collective pressure of human activities is kept within acceptable limits. Cumulative impacts (CI) assessment can support science-based MSP, in order to understand the existing and potential impacts of human uses on the marine environment. A CI assessment includes several sources of uncertainty that can hinder the correct interpretation of its results if not explicitly incorporated in the decision-making process. This study proposes a three-level methodology to perform a general uncertainty analysis integrated with the CI assessment for MSP, applied to the Adriatic and Ionian Region (AIR). We describe the nature and level of uncertainty with the help of expert judgement and elicitation to include all of the possible sources of uncertainty related to the CI model with assumptions and gaps related to the case-based MSP process in the AIR. Next, we use the results to tailor the global uncertainty analysis to spatially describe the uncertainty distribution and variations of the CI scores dependent on the CI model factors. The results show the variability of the uncertainty in the AIR, with only limited portions robustly identified as the most or the least impacted areas under multiple model factors hypothesis. The results are discussed for the level and type of reliable information and insights they provide to decision-making. The most significant uncertainty factors are identified to facilitate the adaptive MSP process and to establish research priorities to fill knowledge gaps for subsequent planning cycles. The method aims to depict the potential CI effects, as well as the extent and spatial variation of the data and scientific uncertainty; therefore, this method constitutes a suitable tool to inform the potential establishment of the precautionary principle in MSP.

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