World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:16, No:10, 2022

Cumulative Pressure Hotspot Assessment in the Red Sea and Arabian Gulf

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Abstract : Formulating a strategy for sustainable development of the Kingdom of Saudi Arabia's coastal and marine environment is at the core of the "Marine and Coastal Protection Assessment Study for the Kingdom of Saudi Arabia Coastline (MCEP)"; that was set up in the context of the Vision 2030 by the Saudi Arabian government and aimed at providing a first comprehensive 'Status Quo Assessment' of the Kingdom's marine environment to inform a sustainable development strategy and serve as a baseline assessment for future monitoring activities. This baseline assessment relied on scientific evidence of the drivers, pressures and their impact on the environments of the Red Sea and Arabian Gulf. A key element of the assessment was the cumulative pressure hotspot analysis developed for both national waters of the Kingdom following the principles of the Driver-Pressure-State-Impact-Response (DPSIR) framework and using the cumulative pressure and impact assessment methodology. The ultimate goals of the analysis were to map and assess the main hotspots of environmental pressures, and identify priority areas for further field surveillance and for urgent management actions. The study identified maritime transport, fisheries, aquaculture, oil, gas, energy, coastal industry, coastal and maritime tourism, and urban development as the main drivers of pollution in the Saudi Arabian marine waters. For each of these drivers, pressure indicators were defined to spatially assess the potential influence of the drivers on the coastal and marine environment. A list of hotspots of 90 locations could be identified based on the assessment. Spatially grouped the list could be reduced to come up with of 10 hotspot areas, two in the Arabian Gulf, 8 in the Red Sea. The hotspot mapping revealed clear spatial patterns of drivers, pressures and hotspots within the marine environment of waters under KSA's maritime jurisdiction in the Red Sea and Arabian Gulf. The cascading assessment approach based on the DPSIR framework ensured that the root causes of the hotspot patterns, i.e. the human activities and other drivers, can be identified. The adapted CPIA methodology allowed for the combination of the available data to spatially assess the cumulative pressure in a consistent manner, and to identify the most critical hotspots by determining the overlap of cumulative pressure with areas of sensitive biodiversity. Further improvements are expected by enhancing the data sources of drivers and pressure indicators, fine-tuning the decay factors and distances of the pressure indicators, as well as including trans-boundary pressures across the regional seas.

Keywords : Arabian Gulf, DPSIR, hotspot, red sea
Conference Title : ICWWM 2022 : International Conference on Wastewater and Water Management
Conference Location : London, United Kingdom
Conference Dates : October 13-14, 2022