

Understanding and classifying spatial patterns of global eco-environmental vulnerability

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Anthropogenic processes cause profound changes to natural systems and result in a consistent decline in the quality of eco-environment. In this paper, a framework that aims to qualify eco-environmental vulnerability levels over the global scale has been presented for decision making. The global map of eco-environmental vulnerability was generated by using easily accessible datasets. The vulnerability is classified into six levels consisting of *potential*, *light*, *slight*, *medium*, *heavy*, and *very heavy*. Eco-environmental vulnerability tends to be high and very high in Asia and Africa with leading countries China, India and Ethiopia. Spatial patterns of eco-environmental vulnerability are driven by human and natural disturbances including socioeconomic, natural hazards, hydrometeorology, topography and land resources, among which population growth and natural hazards are the key drivers. PM_{2.5} that can be considered as a hazardous substance in the human environment and an anthropogenic disturbance associated with nature and human-made influence was selected to validate the global eco-environmental vulnerability map. It is demonstrated that global eco-environmental vulnerability map has high correlation with PM_{2.5} distribution patterns with correlation coefficient approximately 0.82 based on 100 validating points. Outcomes of this study include the mapping of global eco-environmental vulnerability and eco-protection zones that provide key hotspots of eco-environmental vulnerability at global scale for informing the decision makers and the people to take actions to lessen the disturbances and achieve environmental sustainability

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