

A global delta map informed by machine learning

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Deltas have long been hotspots of human civilisation due to its fertile lands, courtesy of riverine sediment that accumulate on the delta plain (Anthony et al. (2025)). Despite significant research interest in deltas, their global extent remains poorly mapped. Is the Netherlands a delta? And if so, where does it start and where does it end? Existing maps are often either localised and areally sporadic or are overly generalised (Tessler et al. (2015); Caldwell et al. (2019)). The objective of our study is to create a scientifically informed global dataset of delta plain areas. To that end, we applied a random forest classification based on global datasets of elevation, lithology, land cover, river networks, and features derived from such datasets. Training data for the classification model comes from a collection of existing delta maps. We apply our model along the world's coastal areas, forming probability maps of delta existence and extent, and to identify distinct deltas. We find relatively high F1 skills scores, and notable heterogeneity in the retrieved feature importance, with elevation, lithology, and fluvial proximity constituting the primary determinants of delta area. Our methodology thus enabled systematic delineation of delta plains worldwide, yielding a global dataset that integrates geomorphological principles with data-driven classification.

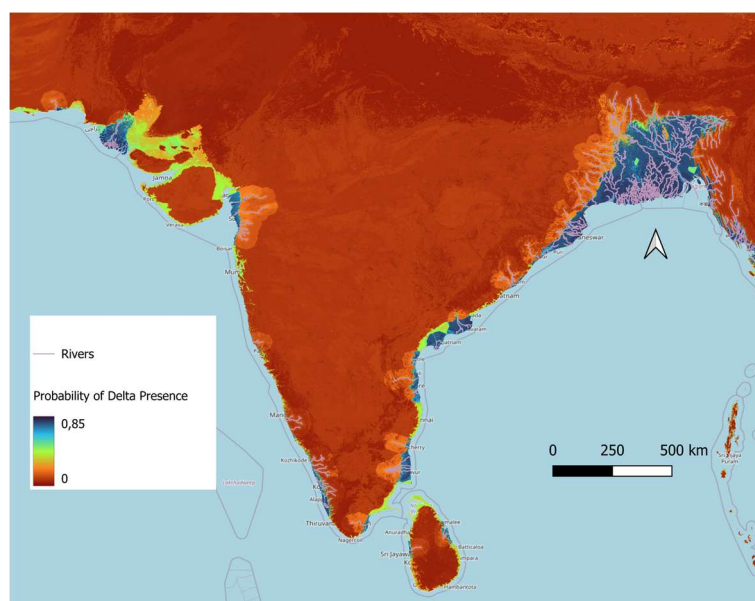


Figure 1: Probability map of delta presence in the Indian region

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