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Building Resilience and Reducing Vulnerability to Tsunami Affected Paddy Fields in Nagapattinam District, India

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Seawater inundation and deposition of marine sediment during the 2004 Indian Ocean tsunami caused salinization of soil and groundwater in coastal agricultural areas. These areas are sensitive to natural hazards like tsunamis; therefore, building resilience and reducing vulnerability are needed to minimize damage from unexpected disasters and aid recovery. To examine the engineering resilience of agricultural fields, we analyzed post-tsunami recovery of the soil?groundwater system and vegetation in the Nagappatinam district, Tamil Nadu, India, from 2004 to 2007, and we examined linkages among resilience, vulnerability, and hydrological regimes. Salinity measurements and monitoring using NDVI vegetation index data derived from satellite observations showed that the fields recovered from salinization to pre-tsunami levels within one and a half years. This rapid desalinization was due to the northeast monsoon rainfall leaching salt from the highly permeable soils in the area. From these results, engineering resilience of the ecosystem, expressed as recovery time, can be estimated at one and a half years. Although this region suffered from the 2004 tsunami, agricultural fields in the area can be characterized as highly resilient to tsunamis because monsoon rainfall enables rapid recovery from the salinization caused by seawater inundation. The same factors that make this coastal area highly vulnerable to damage from flood operate favorably in the case of tsunamis. The results of our study imply that the region's hydrological regime must be considered as a factor maintaining and building resilience to disasters like the 2004 tsunami.

Keywords: Indian Ocean Tsunami, Paddy Fields, Resilience, Vulnerability, Salinization