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Evolution of Tidal Flats in the Northern Part of the Po Delta (Italy): A Strategy for Future Buiding-with-Nature Management

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In the period 1950s-60s, the Po river Delta (Northern Italy) was hit by several floods. Agricultural fields were covered by water and many of them remained submerged since. As a consequence of the massive sediment injection into the system, this lead to the birth of new tidal flats around the tip of the Delta. The evolution of these environments over 50 years was studied, as they may be taken as an example for future reconstruction of intertidal areas. The sediment distribution and the morphological evolution of a young tidal flat of about 10 ha located in the Northern part of the Po della Pila branch were studied by undertaking fieldwork since October 2018, including detailed topographic surveys using a UAV, sedimentological analyses, and a study of sediment deposition rates. An extended crevasse splay covers the central part of the flat. The granulometry is predominately fine (Silty clay and Clayey silt), except for the central area, where the sand percentage increases (Loam and Silty sand). This surface distribution is uniform down to ~10 cm; the sand percentage increases instead within the sediment column from ~10 to 25 cm next to the mouths of the channels. The tidal flat experienced a positive sediment budget and it was characterized by higher rates of accretion after the Po river floods. These observations suggest that the tidal channels are fed by sediment from the Po River branch. Orthophotos from the 1950s show that the tidal flat is about 17 - 20 years old and its formation was influenced by human intervention and river floods. The work aims at finally comparing this case study with other tidal flats and salt marshes worldwide characterized by similar and different tidal regimes, to identify the optimal elevation for vegetation to establish and flourish, to support the future restoration of these environments.