Mangrove crabs distribution in a disturbed area: consequences of wastewater release

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Eutrophication is one of the major anthropic threat in coastal ecosystems, and mangroves are no exception. However, numerous studies have demonstrated that mangroves can be used for wastewater processing, acting as buffer against eutrophication of coastal marine waters. Indeed, mangrove trees benefit from this nutrient load and mangrove soil shows a high denitrification potential. Nevertheless, the impact of such wastewater releases on mangrove crabs, which are key engineer species, is unclear. In Mayotte (Comoros archipelago), a pilot study started in 2007 with daily discharges of domestic effluent following primary treatment. In December 2015, the setting of the discharge area was modified in order to study the resilience of the ecosystem. The impact of this discharge was assessed at a spatial and temporal scale by recording salinity levels and crab burrow density as a proxy of crab density between 2015 and 2017. Total ammonia NH4-N was assessed in impacted and control areas but only in 2017. Results shows that burrow density decreased in the disturbed area and didn't recover within the resilience time. Salinity mapping gave a description of the effluent dispersion which is clearly modified after modification of the discharge area. Salinity arose as a determining factor explaining burrow density in 2015, but its influence decayed during resilience time (2016 and 2017), likely due to remaining pollution in the impacted area. NH4-N in the control area didn't exceed 0.89 mg/L while for the impacted site values showed high variability (0.23 to 75.08 mg/L) due to differential effluent dispersion. We demonstrate here that domestic effluents severely impacts the density of crab burrows, and that resilience time exceeds 3 years. This study provides a novel insight highlighting that assessments of the health status of mangroves affected by sewage pollution should also consider macrofauna with key-engineering roles in these ecosystems.