

# Mapping acidity changes in acid sulfate soils following remediation, East Trinity, Cairns

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A soil survey was carried out in 2001 to understand the scope of the acid sulfate soil problems at the 748 ha East Trinity site opposite Cairns, North Queensland. The tidal wetlands soils acidified following their conversion to cane lands in the 1970's. The Queensland Government purchased the site in 2000 when significant acid loads entering the Great Barrier Reef lagoon were identified.

The remediation strategy (Lime Assisted Tidal Exchange or LATE) developed by Queensland Government scientists relies on natural wetland microbial functions associated with the daily tidal flush augmented by the addition of hydrated lime. The addition of lime kick starts by the biogeochemical processes for reducing pyrite.

To quantify the post-LATE environment and changes a repeat soil survey was undertaken to analyse soil chemical attributes, e.g. pH and Total Actual Acidity. To successfully compare the results in a complex environment, the equal-area spline method (Bishop et al 1999) was used. The spline had been used in the digital soil mapping arena (Malone et al 2009) but we used the harmonisation intent to analyse temporally distinct data from East Trinity. The equal-area spline allowed the comparison of chemical attributes across soil profiles and time. We identified the depth to the current reduced horizon and could calculate the average changes in pH and acidity which were then by applied to mapping units.

The use of the equal-area spline shows that under LATE treatment the East Trinity pH increased by 2.5 units (4.0 to 6.5) and reduced total actual acidity by 89%. This data coupled with information about birds, fish and vegetation leads to the conclusion the site is no longer severely degraded and is moving towards a stable and functioning wetland system.

## References

Bishop TFA, McBratney AB, Laslett GM (1999). Modelling soil attribute depth functions with equal-area quadratic smoothing splines. *Geoderma*, 91, 27-45.

Malone BP, McBratney AB, Minasny B, Laslett GM (2009). Mapping continuous depth functions of soil carbon storage and available water capacity. *Geoderma*, 154, 138-152.