

Accounting for nature: a regional soil condition assessment

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Understanding the direction of condition changes in environmental assets broadly, can improve soil management by supporting society to take informed practical action. Across the Queensland Murray-Darling Basin we have highly prized agricultural regions abundant natural assets and relatively rich data sets. The Wentworth Group's Accounting for Nature model (2008) provided a framework to construct a soil condition account to test the operational aspects and institutional arrangements necessary for carrying out ongoing national environmental accounts.

The account synthesised data from a range of data sources including historical maps, satellite imagery, field studies and modelling. Where possible empirical measures from undisturbed sites were used to determine reference condition, this was supplemented by modelled data or expert opinion inferred from data.

Multiple indicator condition scores (ICS) for each year (1879-2015) were based on a distance-to-reference approach whereby a measured indicator was compared with its reference benchmark to produce a score out of 100 for each soil map unit, for each time period. A score of 100 suggests current state is the same as benchmark (A rating), and a score less than 50 % of benchmark suggests significant modification (F rating). Indicators were aggregated (minimum limiting scores) to create the common currency. This allowed identification of the limiting factor affecting soil condition for each Soil Landscape unit. In 120 of 186 'soil landscape' units this was erosion, followed by carbon (60), salinity (2) and pH (0).

Standard accounting practices were used to convert each indicator in to the common metric, or Econd for the 'Soil Asset', which was 83 for the QMDB. Econd's for individual soil units ranged from 33 to 100. The 2015 results for our region were:

- 100 Soil acidification (Measure: pH units in poorly buffered soil with acidifying land uses)
- 95 Water Erosion (Measure: Depth to Bedrock, Reference Benchmark: dynamic, modelled USLE)
- 90 Salinity-Secondary (Measure: affected area, Reference Benchmark: No area affected).
- 87 Carbon (Measure: Percent carbon content, Reference Benchmark: Percent carbon content of undisturbed, paired sites)

The model substantially improved our understanding of the condition of our soil assets through new information and the development of the Econd (the name given to a composite index of environmental asset condition). We've realigned the collection of existing information (to improve efficiency, effectiveness and collaboration) and how we communicate results. It provided an opportunity to test novel elements (account created using ~100m raster); although it was challenged by data paucity, which will require further collaboration and investments in new technologies.

The trial as a whole made important contribution to the development of the international SEEA, adopted by the UN Statistics Division in 2002. At a regional level it has meant that we've improved collaboration by building on existing expertise and exchange of datasets. We've developed a number of communication products (including maps and apps) to assist in land management and sub-catchment planning.