

SOIL CRC

Performance through collaboration



About this project

The two-year Visualising Australasia's Soils project, funded by the Soil CRC, will create a data federation and web portal to access shared public and private soil datasets.

Read more about the project at the [Soil CRC website](#).

Visualising Australasia's Soils Project Newsletter December 2019

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Pilot data portal launched!

Season's greetings to all project participants, stakeholders and followers. While it has been a busy year, we have managed to meet our project milestones with the launch of the Visualising Australasia's Soils portal and delivery of the governance and data stewardship discussion paper.

Over the Festive Season break you might find time to explore the VAS portal... have a play at: data.soilcra.com.au

Please keep in mind that the VAS portal is a work in progress and in many respects a taster of what is yet to come. There is still quite a bit to do, including co-designing and developing tools and visualisations with end-users. At the moment, almost all the data shown is public sector data and is generally brought in on-the-fly. Enjoy!



Meetings with project participants

The VAS project has 16 industry participants – 14 farmer groups and two catchment management authorities. We have now visited all but two partners, Liebe and Nutrien (formerly Landmark). It has been fantastic to meet project partners in their workplaces and landscapes.

The take-home message from our point of view was the incredible diversity of the organisations - in geography, services and resources. Unsurprisingly, the soil issues and constraints varied across the spectrum of farming systems, climates, terrains and soils. We learned a great deal and thank VAS project participants for their time in meeting with us.



Clockwise from top left: visits with Herbert Cane Productivity Services Limited in Ingham, Burdekin Productivity Services in Ayr, MacKillop Farm Management Group in Narracoorte, Gillamii Centre in Cranbrook, Central West Farming Systems in Condobolin, West Australian No Till Farmers Association in Floreat, and West Midlands Group in Dandaragan.

Finding the Value Proposition

In our meetings with each of the project participants, we have generally heard the following value cases for their participation in the project.

1. Free access to a trusted, supported, web-based spatial soil data management system to:
 - store and retrieve soil data for the organisation (data management), including tools to easily enter data, or link to the organisation's database, and extract data in various formats
 - filter data, graph data and present data via the web and/or email (pdf) for members of the farmer groups or CMA stakeholders
 - improve management, quality and value of organisational data, by adding metadata and/or data standards in a supported way
 - be able to monitor trends in soil properties over time
 - be able to benchmark farms and local areas against each other
 - combine organisational soil data with all the other available soil data to examine trends and/or soil properties at a chosen location or area
 - store, catalogue and retrieve non-spatial data such as documents, images, videos, etc.
 - store, catalogue and retrieve trial data and on-farm experimentation data (i.e. non-soil data, but related to soils management)
 - easily find soil data or information to assist in member or stakeholder queries

2. Having access to locally relevant data for enhancing industry productivity and as an evidential basis to:
 - identify research gaps for funding proposals
 - know who is accessing an organisation's data and for what purpose, perhaps leading to new funded collaborations
 - save time and effort in reporting to funding bodies and investors
 - access monitoring, evaluation, reporting and improvement (MERI) metrics on demand

3. Support the organisation's members or communities by offering services via the VAS data portal and tools such as:
 - online educational materials or training courses to offer members (i.e. region specific)
 - pest and disease reporting and alerts
 - early warning of climate and biohazard events
 - view more extensive data such as groundwater levels, seasonal forecasts, terrain/drainage, soil moisture trends, etc.
 - individual farm logins to include the ability to store, retrieve and visualise soil data and other agricultural data, such as paddock management records, yield maps, NDVI maps, FOO, etc.
 - independent (i.e. non-commercial) soil additive calculators, variable rate application calculators, response curves, etc. for production analysis and decision support
 - farm management decision support tools (unspecified) to assist farmers in practical actions to deal with soil constraints (e.g. sodicity, salinity, non-wetting soils, organic matter, etc.)
 - farm-scale carbon-budget calculator and farm-scale water-budget calculator, and evidence of best practice metrics for social licence to operate

An ocean of soil data

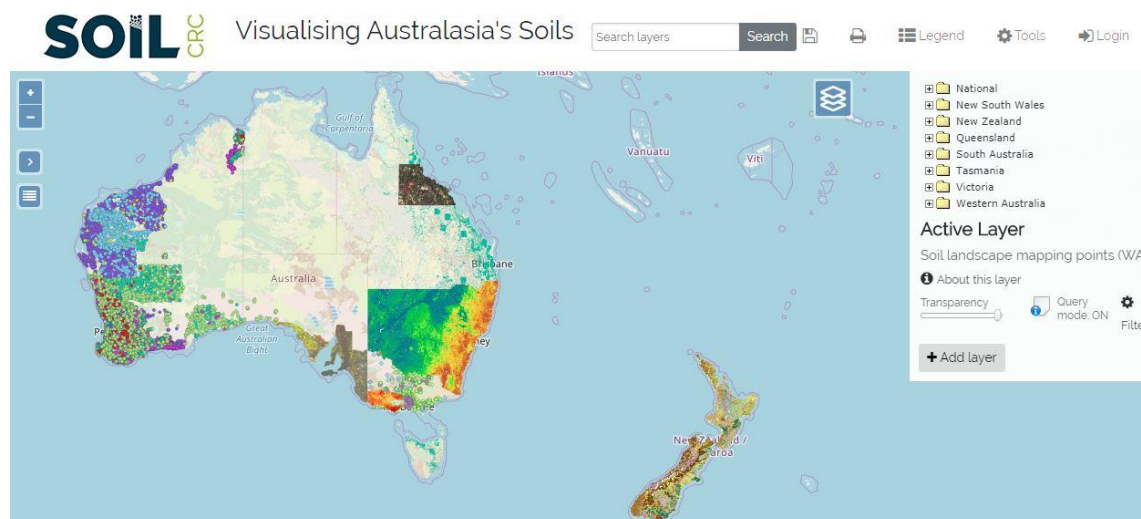
PUBLICLY FINDABLE SOILS DATA

In the current federal, state, research and university sector open data repositories, there are at least 23,000 soil data sets available.

Table of data sets found using the search keyword "soil"

Source	number	Website
Commonwealth Government	17,843	data.gov.au
CSIRO	190	data.csiro.au/collections
Geoscience Australia	114	services.ga.gov.au
ACT Government	5	www.data.act.gov.au
NSW Government	214	data.nsw.gov.au
NT Government	2	data.nt.gov.au
Qld Government	28	www.data.qld.gov.au
	254	qldspatial.information.qld.gov.au/catalogue
Tas Government	73	www.thelist.tas.gov.au/app/content/data
Vic Government	33	data.vic.gov.au
WA Government	530	data.wa.gov.au
Research Data Australia	2,890	researchdata.andis.org.au
Terrestrial Ecosystems Research Network	453	tern.org.au
National Library of Australia	634	www.nla.gov.au
Total	23,263	

Work is currently underway to ascertain the content of these data, identify duplicates, their geographic extents and their formats, availability, interoperability and reusability. A significant challenge for the project is how to show the soil data that is of most use to the end-users, as varied as they are!



An example of a few of the publicly available soil data sets (soil sites, maps and grids).

PARTICIPANT SOIL DATA

All project participants we have visited have agreed to trial some soils data in the VAS project. In all cases, initial data will not be publicly available until the VAS participants and research team have used these data to co-develop the self-serve input system with controls for data access, as well as visualisation and filtering tools to explore the data. It is clear from the discussions with the VAS participants that the soil data federation has some exciting potential, but also some challenges.

Chief among the challenges are implementing access controls to allow a VAS participant to expose data such that it can be viewed or accessed in different ways by different end-users. These different end users are generally: public open access (i.e. anyone, anywhere), the 'club administrators' (i.e. trusted users, e.g. farmer group staff or CMA staff), and individuals (i.e. data owners or custodians, e.g. farmers, landholders, agronomists). The VAS participants are being supported to improve their data management practices so that data can be provisioned according to the rules they set. The controls will make it possible for example, to show data to the public as deidentified, aggregated data over a region, or only show data that might not be so sensitive (e.g. legacy data). A conservative default is to only provide access to a description of the dataset (i.e. the metadata) and the contact details of the data custodian so that access to the data can be negotiated on a case-by-case basis (i.e. bespoke licensing).

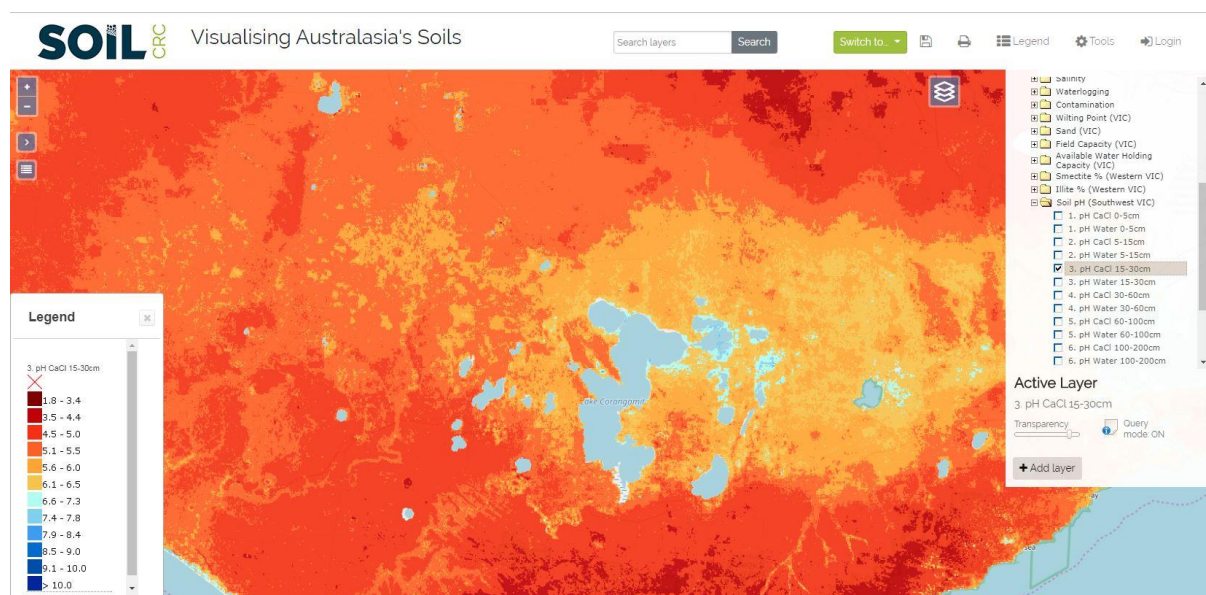
As an example, an individual farmer might be willing to expose some of their soil data to their farmer group but does not want those data to be seen by the public, especially if they believe that it might disadvantage them in some way. However, the same farmer might be willing to expose their data to an automated process that deidentifies and combines all available data to create a new public data set that shows, for example, the soil pH over a broad area.

So far, the pilot data sets include more than 200 million soil moisture observations, and tens of thousands of soil observations from thousands of sites samples over the past 25 years.

SOIL CRC AND UNIVERSITY RESEARCH SOIL DATA

Another challenge in the project is to provide access to the data that will be collected in the research projects being undertaken by the Soil CRC. A priority in the current funding call includes a project to ensure reliable and secure data management for Soil CRC project data, including data standards. The intention is to include these data in the VAS soil data federation.

Universities also are custodians of considerable volumes of high-quality soil data (e.g. below).

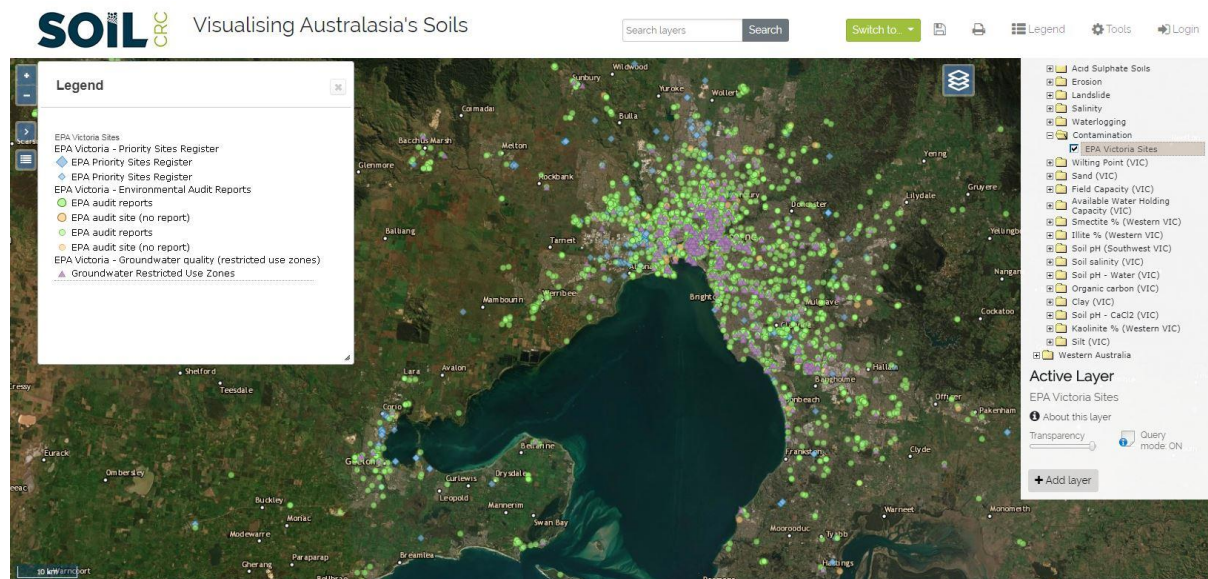


This digital soil map of pH_{CaCl} 15-30cm depth across south west Victoria was generated as an output from PhD research at Federation University (Dr Nathan Robinson, 2016).

Empowering universities with the capability to serve data to the soil data federation is considered equally important in the project. While there are challenges around intellectual property (IP) and data curation, many of these data sets are already publicly available through the Australian Digital Theses repositories. The challenge may be in making these data interoperable and reusable.

SOIL DATA FROM OTHER SOURCES

Other soil data sources include environmental audits of contaminated sites, geotechnical investigations, geochemical surveys for mineral exploration and agricultural soils data from sources outside of the Soils CRC. Many of these are also included in the VAS data federation, as they are publicly available, or shown with data custodian consent.



Audits of contaminated sites around Port Phillip Bay (EPA Victoria data, 2019)

What is next

The main task for 2020 will be working alongside VAS project participants to co-develop and fine-tune the self-serve data entry tools as well as the tools for data retrieval, filtering, graphing and presentation for members and investors. Testing the access control rules and data security will be another task.

Also on the agenda for 2020 is building data quantity and quality, particularly through adding research data from Soil CRC projects and university research. This is seen as a critical component to build trust within the soil data federation and to ensure that the benefits and rewards of the VAS project flow both ways between the research and the industry participants.

Two milestones are due in November 2020, the first is online educational materials that flow from the project and the second being the launching of new tools for data management.

On behalf of the VAS project team, I wish you all the best for the festive season and hope that the New Year brings peace and prosperity. We look forward to continuing engaging with you in the VAS project during 2020.

Project in a nutshell

Project Aim

Establish a soil research data federation, based on agreed data stewardship and governance frameworks, that allows Australasian soils data from all sources (private and public), to be discoverable to all Soil CRC participants through an intuitive-to-use internet portal.

Project Partners

Federation University Australia	Nutrien (formerly Landmark)
Manaaki Whenua Landcare Research	Liebe Group
University of Southern Queensland	MacKillop Farm Management Group
University of Tasmania	Mallee Sustainable Farming
Birchip Cropping Group	North Central Catchment Management Authority
Burdekin Productivity Services	Riverine Plains Inc.
Central West Farming Systems Inc.	Southern Farming Systems
Gillamii Centre	Western Australia No Till Farmers Association
Herbert Cane Productivity Services Ltd	West Midlands Group
Holbrook Landcare Network	Wimmera Catchment Management Authority

Steering Committee

- Project Leader – A/Prof Peter Dahlhaus, FedUni
- Soil CRC Program Coordinator – Dr Richard Doyle, UTas
- Technical expert – Alistair Ritchie, MWLR
- Broadacre farming group – Dr David Minkey, WA No Till Farmers Association
- Cane grower group – Rob Milla, Burdekin Productivity Services
- Mixed farming group – Jane McInnes, Riverine Plains Inc.
- Government/agency – Warwick Dougherty, NSW DPI
- Global initiatives – Dr Peter Wilson, CSIRO.

Timeline

- ✓ February 2019 Project start
- ✓ December 2019 Publish the data stewardship and governance frameworks
- ✓ December 2019 Launch the Visualising Australasia's Soils portal
- November 2020 Deliver online educational materials
- November 2020 Launch web-based tools for data management
- April 2021 Final reports with all accompanying deliverables and outputs

Project details

<https://soilcrc.com.au/projects-2/>

Project videos

www.youtube.com/watch?v=n1qnEtoSy5s

www.youtube.com/watch?v=p0tqV3bH1qU

www.youtube.com/watch?v=ibWGIABkSeg