



Australia leading a dirty endeavour with global significance

The continued well-being of humans is intrinsically linked with the very dirt that covers our earth. We rely on the soil to deliver the nutrients required by the plants and animals that support human existence. But soil is not merely a passive player, for it hosts microbial communities that are primary drivers of soil ecological processes, such as nutrient and carbon cycling, as well as being intimately involved in a range of symbiotic and pathogenic co-evolutionary relationships with plants. As such, the microbial communities play a critical but largely un-quantified role in determining broad-scale patterns of plant species abundance and community resilience.

As a catalyst to develop a nationwide collaboration and to acquire, manage and as appropriate annotate framework data, Bioplatforms Australia through the National Collaborative Research Infrastructure Strategy (NCRIS) has committed \$1.5 million towards the Biome of Australian Soil Environments (BASE) project. Partners in this collaboration include CSIRO, Commonwealth Department of Environment (SEWPAC), State Department of Primary Industries, Grains Research and Development Corporate, Meat Livestock Australia, a number of Australian universities and other parties. NCRIS capability in the forms of the Atlas of Living Australia and Terrestrial Ecosystems Research Network (TERN) will collect, measure, host and manage the biodiversity data.

We have an extraordinarily poor understanding of the species diversity, composition and abundance of soil microbial communities in Australia (and the world). Consequently, we do not understand the potential of our soils, their health, or their resilience. Nor do we understand the geospatial variability of these parameters. This lack of knowledge is largely due to the difficulties in obtaining meaningful data at appropriate scales using traditional microbiological techniques.

“Research efforts in the past have taken a rather small-scale, siloed approach. This project will facilitate improved land management strategies, by building upon existing data and knowledge with metagenomics measurements from across the Australian continent to build a reference map of Australian soil,” said Bioplatforms General Manager, Andrew Gilbert. “By using ‘omics technologies, we have the opportunity for an unprecedented scale and depth of analyses of diversity, pattern and process. There will be a greater integration of knowledge and understanding at an organismal, species, community and ecosystems level. We are creating the first comprehensive map of soil biodiversity at a continental scale.”

One important immediate application of the information in the map will be to inform integrated restoration of soil communities as part of ongoing broad-scale revegetation efforts currently underway in several Australian states.

The BASE project will further provide leadership to the conduct of the massive international Earth Microbiome Project (EMP). This multi-disciplinary, international collaboration aims to analyse soil microbial communities across the globe. Bioplatforms will exploit the functional genomics capacity developed over the past five years to undertake Australia’s contribution to the EMP.

“The knowledge gained through the BASE project will lead to a wide range of important research and industrial applications, many of them as yet imagined, and will be the catalyst for future collaborative activities,” said Gilbert.

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