Submission
2016 National Research Infrastructure Roadmap
Capability Issues Paper

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Dear Sir/Madam,

I would like to argue for a continued and increased support for **large scale environmental genomics datasets** and associated **physical collections of archived DNA**.

In particular I would like to refer to Questions 18 and 33 in the NRI Capability Issues Paper:

Environment and Natural Resource Management

Question 18: Are the identified emerging directions and research infrastructure capabilities for Environment and Natural Resource Management right? Are there any missing or additional needed?

Microbiology is entirely omitted from this chapter. In particular the paper states "We need to continuously improve our understanding of the plants, animals and mineral resources that underpin..." Microbiology is the major link between biogeochemistry (mineral resources) and primary productivity in both terrestrial and aqueous systems. Better understanding the function of the microbial community is a key information to predictability of environmental response, stress tolerance, resilience, etc.

Genomics methods are also entirely omitted in this chapter, and only mentioned under medical research. Environmental genomics is an emerging field, opening a new window onto the state and health of the environment from the perspective of its biology.

Data for Research and Discoverability

Question 33 Are the identified emerging directions and research infrastructure capabilities for Data for Research and Discoverability right? Are there any missing or additional needed?

Large scale environmental genomics datasets are an essential infrastructure enabling:

- Putting environmental genomics observations from individual, focused research projects into context

- Environmental status assessment from environmental genomics observations

- Building environmental models to predict the capacity of the environment to cope with future scenarios – illustrated by a few selected examples below

- As land use follows environmental change, how will the estuaries cope with the changing organic load from agricultural run-off?

- How will different coastal areas cope with increasing aquaculture use?

- How will water catchment areas be affected by a changing climate AND changing land use in the area?

Large scale environmental genomics datasets support and strengthen research towards a better understanding of the status and health of the environment and ecosystem services, which in turn a range of Australia's industries rely on. The state of the environment also has profound effects on the medical and mental health of society.

The samples in these environmental genomics databases need to be embedded in a rich set of contextual observations (physics, chemistry, biology of the environment) to maximise their values.

These datasets are already being generated by Bioplatforms Australia, with sampling and contextual observations support from IMOS and TERN.

As genomics is a rapidly evolving technical field, it is important to maintain physical collections of archived aliquots of the environmental DNA used. This will in the future enable us to revisit those samples extracting further information out of them with the latest genomics methods.