

HARNESSING TECHNOLOGY TO SOLVE COMPLEX ENVIRONMENTAL PROBLEMS

Recent developments in smart technology and social media improve our ability to collect timely and high-quality data for environmental research. The next question facing the sector is how to fully harness this data.

Solving real world complexity demands multiple sources of evidence. Society's interaction with the environment can be understood as a complex set of causal relationships. These relationships can rarely be fully appreciated through analytical and investigative approaches that rely on single sources of evidence. Given the complexity, approaches that draw on multiple sources of evidence will be considerably more resilient and more likely to provide a robust evidence base upon which to draw conclusions and make decisions.

Such approaches have proven valuable in other research disciplines. Originally used in the medical field, and since adapted for human and ecological risk assessments, multiple lines and levels of evidence (MLLE) is a useful approach that helps researchers develop conclusions in situations where data limitations are present or variability in information may undermine confidence. The basic premise of MLLE being: the more lines (sources) and levels (quality) of evidence the increasing certainty in conclusions made.

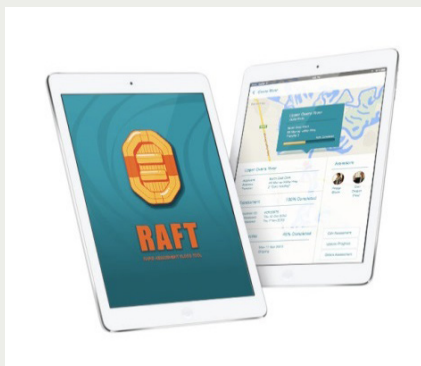
Robust citizen science increases sources of evidence. While the term citizen science is relatively new, the core concepts have been used by scientists and researchers for decades. Citizen science harnesses the general public's willingness to participate by actively engaging them to undertake basic research tasks (like data collection) under the direction of professional researchers.

Over the past decade there are numerous examples of highly successful approaches to using citizen science in research. However, some approaches have suffered from a lack of public participation and the collection of poor quality data.

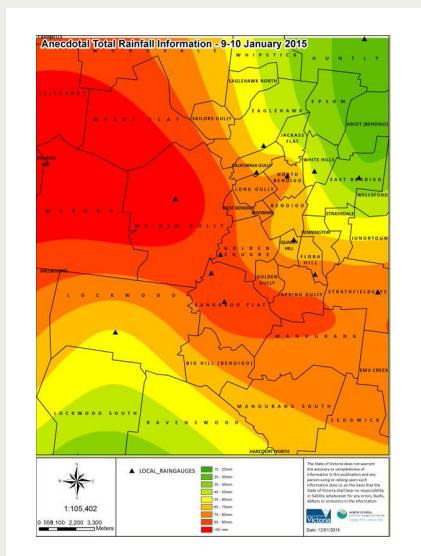
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Aither RAFT app



North Central CMA rainfall information

It has never been easier for the general public to contribute. With smartphone penetration in Australia now approximately 75 per cent of all mobile users, app-based platforms and social media allow the general public to contribute as citizen scientists in ways that traditional research methods simply do not allow. Examples of these types of approaches include Aither's own Rapid Assessment Flood Tool (RAFT) for assessing flood damage and compiling natural disaster funding claims, and the North Central Catchment Management Authority's use of social media to review the accuracy of the Bendigo Urban Flood Study.

Advancing technology enables higher quality data. The significant evolution of mobile telecommunications has transformed the traditional relationship between cost and quality of data collection. Most devices now come standard with internet access, cameras and GPS which enables low-cost, high-speed information flow.

Damian Wells (former CEO of North Central CMA) is passionate about the opportunities of combining smart devices and social media to allow members of the public to share information. A January 2015 flood event in Bendigo in central Victoria saw the crowd sourcing of rainfall totals from the general public via social media. Bendigo only has one Bureau of Meteorology (BoM) rainfall station

which has traditionally made it impossible to quickly understand events of this nature where rainfall totals across the city are highly variable. Using the #bgoflood hashtag in social media enabled the development of a suburb level rainfall distribution map for the event. The information generated ensures that flood, drainage and emergency response issues can now be considered with due regard for the true magnitude of the event.

In addition to direct data capture, there is an explosion in intelligent systems.

The Internet of Things, the interconnection of devices within the existing internet infrastructure, is expected to usher in automated data capture and smart actions in nearly all fields. Cisco, the multinational network and communications company, estimates that by 2020 the number of connected devices globally will exceed 50 billion.

The public are quickly adapting their lives to match advances in technology, so its use by participants in citizen science represents an evolution of the tools used, not wholesale change in the approach. Conversely, researchers and governments are only recently discovering the opportunities presented by these advances. It is now incumbent upon researchers and governments to revolutionise their approaches, or risk being made increasingly redundant.



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