

Applying Citizen Science to Freshwater Ecosystem Restoration – Fact Sheet

Linking lake restoration with end users for positive environmental outcomes



What is Citizen Science?

Citizen science describes the diverse ways in which the public participates in scientific investigations. Participation covers a spectrum from sending observations to a project coordinator to designing, implementing protocols, analysing and sharing findings. The popularity of citizen science both for educational and scientific purposes has grown in recent decades. Community volunteers now participate in diverse programmes that investigate the effects of climate change on biota, evolutionary processes, invasive species ecology, and changes in water and air quality (Figure 1).



Figure 1. Community group riparian restoration project, Lake Cameron, Waikato, New Zealand. Despite increasing community interest in water quality, programmes to support lake-based citizen science have not yet been developed. Photo: NZ Landcare Trust .

Functions

Data generated by volunteers may alert authorities of the need to carry out more detailed monitoring, contribute data for scientific publications, as well as inform environmental management and policy. Volunteer engagement in citizen science can raise public awareness of environmental issues, while encouraging stewardship and enhancing ecological knowledge. Globally, interest in citizen science is growing as environmental degradation continues and information needs for underpinning environmental management increase. Additionally, citizen science can both reinvigorate and strengthen the relationship between science and society.

Data Quality

In the United States, hundreds of thousands of community volunteers currently monitor streams, rivers and lakes in order to understand trends and identify issues. Despite the widespread use of volunteer data and the longevity of water quality monitoring programmes, the quality of data collected by non-scientists is frequently questioned. An increasing number of studies comparing data collected by volunteers to professionally collected data show that high standards can be reached.

Monitoring Lake Water Quality

Standardised protocols used by government agencies and science organisations for measuring lake water quality in New Zealand (total nitrogen, total phosphorus, chlorophyll *a* and Secchi depth) have neither been promoted to, nor adopted by community volunteers (Figure 2). The potential of community volunteers to greatly enhance agencies' capacity to collect useful data has as yet, not been widely considered. However, the shifting focus of water management in New Zealand from agency only to multi-stakeholder collaborations has created a political environment amenable to an expanded role for community volunteers (Figure 3).

The Future

Citizen science is continuously evolving. Advances in web-based technology have dramatically redefined how data are captured, used and shared. Wireless sensor networks and smartphones are emerging as powerful tools for data collection. Large-scale citizen science programmes have flourished due to simplified data collection and management ease of communication and automated quality control measures.

With citizen science rapidly gaining currency in New Zealand, both leadership and strategic direction are required to achieve outcomes that benefit society and the environment.



Figure 2. Florida LAKEWATCH volunteers processing samples collected at Lake Henderson. Citrus County, Florida, USA. Photo: LAKEWATCH



Figure 3. Enthusiastic citizen: Terry Beckett has developed a valuable long-term (multi-year) dataset of water quality for tributaries of Lake Tarawera.