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The future is bright for environmental citizen science

A review of a decade of environmental citizen science – where the general public are involved in science as researchers – concludes that its benefits to science and society far outweigh concerns over data quality. Challenges can be overcome through volunteer training and should not be used to devalue citizen science programmes, say the researchers.

Community-Based Monitoring (CBM) schemes have increased in popularity worldwide over the last decade. The two main types are: (i.) *population* monitoring, where non-expert citizens collect species data on birds, fish, amphibians and plants, or (ii.) *ecosystem* monitoring, where they monitor processes, such as water and air pollution.

In the new study, scientists carried out an extensive review of published scientific research, official websites and non-academic literature to assess the contribution of CBM programmes to environmental programmes in the last decade.

CBM schemes can be a valuable way of collecting data more rapidly and over a larger area than could be achieved by scientists alone. For example, close monitoring of water pollution or habitat loss can serve as 'early-warning systems' for environmental degradation, which can then be investigated more thoroughly by scientific experts.

Outstanding examples include the 'Bucket Brigade' in the United States, whose campaigning has increased enforcement in environmental pollution laws. The Global Community Monitor (GCM) also trains citizens worldwide in pollution science, allowing them to monitor the health of their neighbourhoods.

The growth in CBM activity is partly attributed to public concern for human-induced environmental change. CBM schemes promote public engagement with science by making global issues accessible to local communities. Participation also helps citizens feel more involved in management issues, which scientists call 'environmental democracy'.

Although anecdotal evidence was common, the research found very little documentation of CBM data in peer-reviewed journals. This is largely due to concerns over the credibility of the data. For example, many scientists may be wary that amateur bird-watchers are likely to visit particular sites to see a species of interest rather than report the more common species. Different observers will also have different abilities in spotting and identifying birds.

Enhancing links between CBM programmes and academic institutions to offer volunteer training could easily overcome these issues. Advice on using simple, scientifically robust methods will increase the likelihood of CBM data being used by scientists. Independent studies to validate CBM data will also help build confidence in the role of CBM programmes in scientific research.

Another factor in the success of a CBM programme may be the involvement of a wide range of stakeholders in managing the programme. The researchers found that most CBM schemes with a positive influence on conservation were governed by a board, which represented all interested parties (i.e. citizens, businesses, NGOs), even though this type tended to have no government or private sector funding.

In general, 'top-down' schemes that are directed by a central scientific body are less likely to serve the interests of the community and may be difficult to sustain. 'Bottom up' or 'grass root' schemes, which are independent of government and formed solely of local citizens, tend to suffer from lack of financial capital. However, there is no clear rule for success.

Source: Conrad, C.C & Hilchey, K. G. (2011). A review of citizen science and community-based environmental monitoring: issues and opportunities. *Environmental Monitoring Assessment*. 176: 273-291.
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