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GlacierMap: a citizen science mapping tool for evaluating glacier change and contributing to climate literacy

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Glacier retreat provides clear, visual evidence of environmental change in response to warming temperatures around the world. In the tropical Andes of Peru, glaciers act as critical buffers to water supply essential to water, food, and energy security downstream, especially during the dry season. The direct and indirect impacts of glacier change are an important part of the global sustainability challenge within the context of both climate change and increased pressures on resources. Public understanding around glacier-fed water supplies, and subsequent threats to this for millions of people due to climate change, is an important component of climate literacy.

In this context, we have developed a web-based interdisciplinary citizen science glacier mapping tool (GlacierMap) to help to raise awareness of these issues, particularly amongst UK high school pupils, and to contribute to increased public support for mitigating and adapting to the impacts of climate change. Users of GlacierMap undertake an interactive learning experience by mapping a glacier from two different periods (1984 and 2018) from freely available Landsat data, resulting in a visual demonstration of glacier retreat within Peru's Cordillera Blanca, while learning more about the impacts of this retreat from information provided by the project.

During the first four months of data collection we integrated pre- and post-mapping questionnaires into the GlacierMap app to evaluate the extent to which participation in mapping impacted understanding of glacier change and concern regarding the associated impacts. We also assessed the value of 'crowd-sourcing' glacier mapping for the purposes of glacier monitoring and data generation through comparison of mapping conducted by the general public and that of a control group with previous education and/or work experience in glaciology. In doing so, we have identified a number of challenges and opportunities with regards to the use of a citizen science-based educational activity for climate learning. Challenges relate to recruitment of participants, evaluation, and ethics (particularly when working with children and young people), while opportunities were identified in terms of increasing public awareness, the provision of alternative forms of learning, and global reach.