Challenges and Solutions in Obtaining Robust Observational Data at National Scales from a (potentially) Untrained Public: The Case Study of Redmap Australia

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Today participants in citizen science projects have the capacity to record observations about their environment with high precision and accuracy. However, substantial difficulties remain in ensuring large-scale collection and verification of species data by the untrained public is a robust and useful long-term endeavour. Here we describe approaches taken to overcome challenges in creation and maintenance of a website-based national citizen science initiative where fishers, divers and other coastal users submit photographic observations of 'out-of-range' species - species spotted where they do not usually occur and may be useful as early indications of which species may be shifting where they live as our climate changes. Australia has a relatively small population but with a large coastline and many species to monitor, and thus key challenges involve effective communication over large spatial scales using limited budgets, and issues ensuring robust data from a largely untrained public. Semi-automated 'managed crowd-sourcing' of an Australia-wide network of scientists with taxonomic expertise is used to provide 'post-hoc' verification of every photographic observation, and together with efficient workflows, adds rigour to data submitted. Moreover, the easy involvement of participants and quality personal feedback has contributed to generating and maintaining ongoing interest. Capturing changes in our natural environment requires many observations spread over time and space, and identifying factors that support large-scale citizen science monitoring projects is increasingly critical.

Data Sharing and Visualization on Multiple Platforms: GLOBE Observer's Mobile Mosquito App

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The global health crisis posed by vector-borne diseases is so great in scope that it is clearly insurmountable without the active help of tens-or hundreds- of thousands of individuals, working to identify and eradicate risk in communities around the world. Mobile devices equipped with data collection capabilities and visualization opportunities are lowering the barrier for participation in data collection efforts. The GLOBE Observer (GO) Mosquito App provides citizen scientists with an easy to use mobile platform to identify and locate mosquito-breeding sites in their community. The app also supports the identification of vector taxa in the larvae development phase via a built-in key, which provides important information for scientists and public health officials tracking the rate of range expansion of invasive vector species and associated health threats. GO Mosquito is actively working with other citizen scientist programs worldwide to ensure interoperability of data through standardization of metadata fields specific to vector monitoring, and through the development of APIs that allow for data exchange and shared data display. We will share the successes and challenges to achieving interoperability in vector monitoring. Furthermore, we will report on NSF-funded research on the display of GLOBE Observer data on the Flyover Country App and share issues associated with mobile visualization of data from different data repositories. This presentation thus discusses various aspects of interoperability explored by GLOBE Observer as we work to make participation in citizen science compelling for participants, while ensuring that data is of greatest utility to the scientific community.
A-06: Data Collection: Reflecting on What Makes a Dataset Robust - ABSTRACTS

Tradeoffs Bridging Local and Global Scale Citizen-science - Lessons from iNaturalist

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One of the most exciting aspects of citizen-science is that it can orchestrate the collection of big-data at scales not possible for individual scientists to replicate. The eBird dataset exemplifies global citizen-science 'big-data'. Since many environmental threats are global, global scale analyses are often well suited towards confronting these challenges. However, local scale citizen-science projects can leverage certain advantages - such as tailoring the activities to regional needs and building tightly-knit communities based on physical interaction - that can be difficult to replicate on global scales. iNaturalist is somewhat unique as a citizen-science platform in that, like eBird, it has an emergent big-data global product. To date over 250,000 contributors have contributed over 3 million wildlife observations to iNaturalist making it one of the fastest growing sources of global biodiversity information. But iNaturalist, like sci-starter, zooiniverse and cit-sci.org, is also made up of over 5,000 individual local scale projects such as the University of Wisconsin Urban Coyote Watch project focusing on human-wildlife conflict. The iNaturalist vision is that these local scale projects can be loosely coupled enough to facilitate the advantages of local scale projects, but integrated enough to create globally biodiversity datasets suitable for global analyses of biodiversity change. But balancing these dual goals is not without tradeoffs. This talk will present insights drawn from the iNaturalist citizen-science platform into these tradeoffs as they relate to the quantity and quality of the data collected and also the make up and commitment of the individual citizen-scientists.


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The design and operation of a citizen science project is usually time and resource consuming. In order to plan a project as efficiently as possible and to ensure that the collected data is most useful for the planned analyses or subsequent modelling, it is beneficial to evaluate the requirements on the data beforehand. We present an approach for the assessment of the data requirements before planning a citizen science project to support the project design, the workflow and the estimation of potential uncertainties, errors and challenges. The idea is to use synthetic or modified measured data that represent the characteristics of the data that could be collected by citizen scientists. With these artificial datasets we can ask questions regarding the required accuracy and spatial or temporal resolution of the data. In this presentation, we demonstrate this approach for the use of crowdsourced streamflow and streamlevel observations in hydrological modelling. We start with data from the gauging station network of the Swiss Federal Office for the Environment and then extract subsets with a different temporal resolution based on characteristics of citizen science data from the literature and preliminary test studies. We further modify the data with random errors to represent typical errors for data collected by citizen scientists. These artificial datasets are then used for the calibration of a hydrological model to determine the minimum required accuracy and frequency of measurements to be still useful for model calibration.