



## Questions & Answers Part 3

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Amber McCullum ([amberjean.mccullum@nasa.gov](mailto:amberjean.mccullum@nasa.gov)), Juan Torres-Perez ([juan.l.torresperez@nasa.gov](mailto:juan.l.torresperez@nasa.gov)), or Britnay Beaudry ([britnay.beaudry@nasa.gov](mailto:britnay.beaudry@nasa.gov)).

### **Question 1: Can you share any research that has investigated the impacts of participation in a citizen science project on the citizen volunteers?**

Answer 1: Fischer, H., Cho, H. and Storksdieck, M., 2021. Going Beyond Hooked Participants: The Nibble-and- Drop Framework for Classifying Citizen Science Participation. *Citizen Science: Theory and Practice*, 6(1), p.10. DOI: <http://doi.org/10.5334/cstp.350>

We have had some work on this with Snapshot Wisconsin, led by Christine Anhalt-Depies. Christine's dissertation was "Public Engagement in Citizen Science for Wildlife Monitoring" in 2020 at UW-Madison and here are two publications from her dissertation:

Anhalt-Depies, C., Stenglein, J.L., Zuckerberg, B., Townsend, P.A. and Rissman, A.R., 2019. Tradeoffs and tools for data quality, privacy, transparency, and trust in citizen science. *Biological Conservation*, 238, p.108195.

Anhalt-Depies, C., Berland, M., Rickenbach, M.G., Bemowski, R. and Rissman, A.R., 2022. Use of latent profile analysis to characterise patterns of participation in crowdsourcing. *Behaviour & Information Technology*, pp.1-9.

The National Academies released a report that highlights the efforts of Citizen Science as well.

URL:

<https://www.nationalacademies.org/our-work/designing-citizen-science-to-support-science-learning>



**Question 2: What platform is Wisconsin's dashboard using?**

Answer 2: RShiny - DataDashboard.SnapshotWisconsin.org

**Question 3: In the GLOBE app, which Land Cover Classification System is used?**

Thanks!

Answer 3: Since The GLOBE Program has been tracking land cover for nearly 25 years, the GLOBE app teaches and uses a 'Modified UNESCO Code' classification and is further described here:

<https://www.globe.gov/documents/355050/355097/MUC+Field+Guide/5a2ab7cc-2fdc-41dc-b7a3-59e3b110e25f>. These particular classification is similar to the IGBP

classification provided with the MODIS-based

<https://modis.gsfc.nasa.gov/data/dataproduct/mod12.php>. At the top level, citizen scientists are asked to identify the presence and an estimate of the amount of categories like 1) Trees, 2) Shrubs, 3) Herbaceous, 4) Barren, 5) Open Water, 6) Wetlands, 7) Cultivated, and 8) Urban.

We provide a 'field notes' opportunity which can be used for particular project based notation (e.g. #FreshEyesOnIce) if this classification scheme does not work for your project. You can learn more here:

<https://observer.globe.gov/do-globe-observer/land-cover>

**Question 4: Hello Peder, Are there any results or insights on how / where in-situ LC assessments have varied from MODIS 30m res LC data from all the measurements on Globe Observer?**

Answer 4: Yes, we saw that most of our observations/photos were coming from 'Trees', 'Urban', and 'water' categories when we looked across our initial data challenge described below. In particular, we saw great variation when looking at urban mapped class since those areas tend to be made up of a mix of land cover objects (fractions). So a particular challenge is getting examples of rare classes like snow/ice or wetlands that are present in smaller quantities and are not reflected at this MODIS scale. Identifying the sub-pixel fractions of land cover types and how a single class might not accurately reflect a community is definitely an on-going research question (which will be a focus of our upcoming data challenge so stay tuned and help out!). This is why I am really excited about some of the higher resolution land cover maps that have become available in just the past 2 years.



## **GLOBE Observer and the GO on a Trail Data Challenge: A Citizen Science Approach to Generating a Global Land Cover Land Use Reference Dataset**

Kohl H.A., Nelson P.V., Pring J., Weaver K.L., Wiley D.M., Danielson A.B., Cooper R.M., Mortimer H., Overoye D., Burdick A., Taylor S., Haley M., Haley S., Lange J. and Lindblad M.E. (2021). GLOBE Observer and the GO on a Trail Data Challenge: A Citizen Science Approach to Generating a Global Land Cover Land Use Reference Dataset. *Frontiers in Climate*, 3:620497 <https://doi.org/10.3389/fclim.2021.620497>

**Question 5: As a child, I often used "Field Guides" to ID plants and animals. I always wondered how they got "range maps" for an organism. Is anyone using these techniques (presented) to "fine-tune" [expand/contract] old range maps?**

Answer 5: Mosquito Habitat Mapper also collects species information, they use this information to create species distribution maps Many of the older distribution maps were created by using specimen collection data. There are new tools such as iNaturalist (<https://www.inaturalist.org/>) and Map of Life (<https://mol.org/>) that use citizen science data for species range.

Expanding science and the creation of these databases beyond a few people and resources is what this is all about. Using citizen science helps to fill in these gaps that were a part of past research.

**Question 6: Has any other state done what Wisconsin Snapshot with wildlife? I see Arkansas as a prime place that would have hunters that have extensive game cameras already in use.**

Answer 6: Snapshot Wisconsin is unique in the fact that it is a state/provincial wide program and we are not aware of any other states executing a program such as this on the same level. There are other large scale programs out there as well.

**Question 7: If we want to map mosquito habitats then what steps should we follow and for our area?**

Answer 7: Download the GLOBE Observer app and register. After doing so, then follow the steps, which are similar to a scientific protocol. The app is a tool without a project, it is research question agnostic. Using that data in addition with formal data will help with mapping mosquito habitats.



**Question 8: I came across Bluebucks (Nilgai) in India. I presume that the tool won't be available everywhere. Is there any method that you would suggest to escape/skip spots in a place which might be dangerous; in terms of scale of mapping; if you narrow it down from big to small?**

Answer 8: Using the example of Wisconsin, surveys are used in addition to trail camera data. Danger can be a factor in data collection and it is acknowledged that we cannot collect data for every location. Cultural and legal factors also play a role as well. Land use also changes over time, which may render historical data unreliable. The various surveys give us additional data to include.

Safety of volunteers is a very important aspect of citizen science that all the project teams take seriously.

**Question 9: In the Land Cover, is it possible to compare data from today with years ago?**

Answer 9: Not directly in the app but we are working on making that more visible through some websites. We have quite a few citizen scientists who are taking repeat photos at the same location which would definitely allow anyone to compare the changes over time. Also, in my slides you will see an example of how I compared ground photos today with the land cover over time. I recommend watching this ARSET training and apply it to a location with photos from GLOBE Observer:

<https://appliedsciences.nasa.gov/join-mission/training/advanced-webinar-investigating-time-series-satellite-imagery>

**Question 10: When you say you will be switching to flexible classification, does that mean fuzzy classification and how do you think fuzzy classification would be better?**

Answer 10: Yes, we are thinking of fuzzy classification with GLOBE Observer because of our confidence in both the positional accuracy (where the photo and notes were made) and also a recognition that many locations are a mix of land cover objects, especially at the human scale on the ground. By taking this fundamental approach, an end-user could recombine the labels based on their particular needs. In the GLOBE database you will find a thematic field containing a land cover classification label but you can also see a different field that includes a land cover type and amount estimate for each of the photos provided by a citizen scientist. Then a wildlife biologist might search for locations with 'tree cover of 60% or greater' rather than all areas or photos



Connecting Citizen Science with Remote Sensing  
January 24-31, 2023

with 'trees' . So rather than simply providing a thematic classification of “this area is tree covered because it has a certain percentage”, it can be helpful to start with the building blocks...e.g. Fractional cover of each land cover class.

This article is really helpful in describing the reasons and approach: Saah et al (2020). Primitives as building blocks for constructing land cover maps, International Journal of Applied Earth Observation and Geoinformation,

<https://doi.org/10.1016/j.jag.2019.101979>

Also: Michael A. Wulder, Nicholas C. Coops, David P. Roy, Joanne C. White & Txomin Hermosilla (2018) Land cover 2.0, International Journal of Remote Sensing, 39:12, 4254-4284, DOI: [10.1080/01431161.2018.1452075](https://doi.org/10.1080/01431161.2018.1452075)