

The reliability of land cover information derived from satellite-based Earth observation can now be compared and validated with the help of the global community and a new Web tool:

## Geo-Wiki



Satellite-based Earth observation is an important source of baseline information when developing global models of land-use and land use change. The accuracy of these models and the outputs generated from them are coming under increasing scrutiny as nations commit to specific land cover related targets, such as those for food production, biodiversity protection, or carbon storage potential.

The past 10 years have seen a growth in the number and sophistication of satellite-based Earth observation tools designed specifically to classify land cover. Chief among these are GlobCover (European Space Agency), GLC-2000 (the Joint Research Center of the European Commission—JRC EC), and MODIS (NASA). However, while the amount of data collected has grown and the spatial resolution of the information has improved, when comparisons are made across these datasets there is a significant amount of “disagreement,” in either the individual land classes or in the spatial distribution of the land cover. These disagreements can be caused by the different methodologies used to classify land cover, the type of satellite sensors used, or geo-referencing errors.

One option for improving the accuracy of the data is through the use of crowd-sourcing—the collection of land cover information by people on the ground or through the internet, via a Web-based tool called Geo-Wiki.org. Developed by IIASA, the University of Applied Sciences Wiener Neustadt, and the University of Freiburg, Geo-Wiki.org uses Google Earth as the delivery platform and crowd-sourcing as

the mechanism for collecting and verifying land cover data. Crowd-sourcing leverages the immense power of Web technologies to capture data from a large and undefined group of people.

“In the case of Geo-Wiki, when a volunteer registers, information is collected on where they live, their local knowledge and education level. They are asked to review locations—or “hotspots”—where data are missing or where there is disagreement over the land cover,” explains IIASA’s Steffen Fritz, team leader of the Geo-Wiki project. “The data they input are then checked by the Geo-Wiki development team to ensure they meet certain standards. Volunteers can also submit photographs of the location to help in the validation of the land cover.”

“After a process of data validation the information recorded in Geo-Wiki.org is freely available for researchers, decision makers, or land managers anywhere in the world to access and create their own land cover maps.”

Geo-Wiki can also bring information from multiple sources together into one hybrid global land cover map, making it easier to compare information and enabling, for the first time, coordinated validation of land cover information. The result is more accurate land cover information than any current individual product can provide. The Geo-Wiki team estimates that the accuracy of land cover maps can be increased by up to 20 percent compared to current sources. Importantly, Geo-Wiki can be used to identify inconsistencies between satellite data and critical data such as those reported by member countries to the Food and Agriculture Organization of the United Nations.

### Application

- The JRC EC is using Geo-Wiki to produce maps of cropland in Africa.
- The National Oceanic and Atmospheric Administration are also encouraging the use of Geo-Wiki among school age groups by using the Globe network as a mechanism for learning about the environment.
- IIASA hosted a workshop in June 2011 with 60 technical experts from Africa using Geo-Wiki.org to visualize cropland maps in Africa and estimate uncertainties in the current data.

All validation points are freely available to the research community for use in the validation and calibration of their own data.

### Involving the community

Interest in Geo-Wiki.org is growing and the number of volunteers has grown, with over 12,000 validations now complete. To maximize the value of Geo-Wiki the developers are encouraging people to get involved, one novel approach is the development of games, or ‘gamification’ of Geo-Wiki, as undertaken by IIASA and the Technical University of Vienna.

In a similar way to the bird-watching “ebird project” which has some 48 million records of bird sightings across the globe, the value of Geo-Wiki will be realized through the involvement of the global community. ■

**Further information** Geo-Wiki Web site at [www.geo-wiki.org](http://www.geo-wiki.org) ■ The Globe Program and Geo-Wiki at [globe.gov/events/climate-land-cover](http://globe.gov/events/climate-land-cover)

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