

# AI for Earth Grantee Profile

iNaturalist

A community for naturalists to help protect biodiversity

## Summary

iNaturalist is a social media platform for nature and wildlife enthusiasts that encourages engagement and stewardship while supporting species identification and the collection of biodiversity data. Azure has enabled the platform to evolve to include artificial intelligence (AI)-based species identification and better scalability to meet seasonal and ad-hoc bumps in usage.

## Creating an online community of citizen scientists to help protect species

All the natural services we depend on, such as pollination, food growth, and clean water, are based on the interactions of millions of species in ecosystems around the world. With so many species, it can be difficult to know the exact role each plays, or how critical that role is in maintaining the ecosystem. Nearly [1.8 million species](#), out of an estimated [8.7 million](#) (or upwards of [1 trillion](#) when including bacteria), have been documented in the past few hundred years. Of those documented species, [just shy of 100,000](#) have been assessed for their conservation status, whether healthy or endangered—and those assessments are happening only every five years or so.

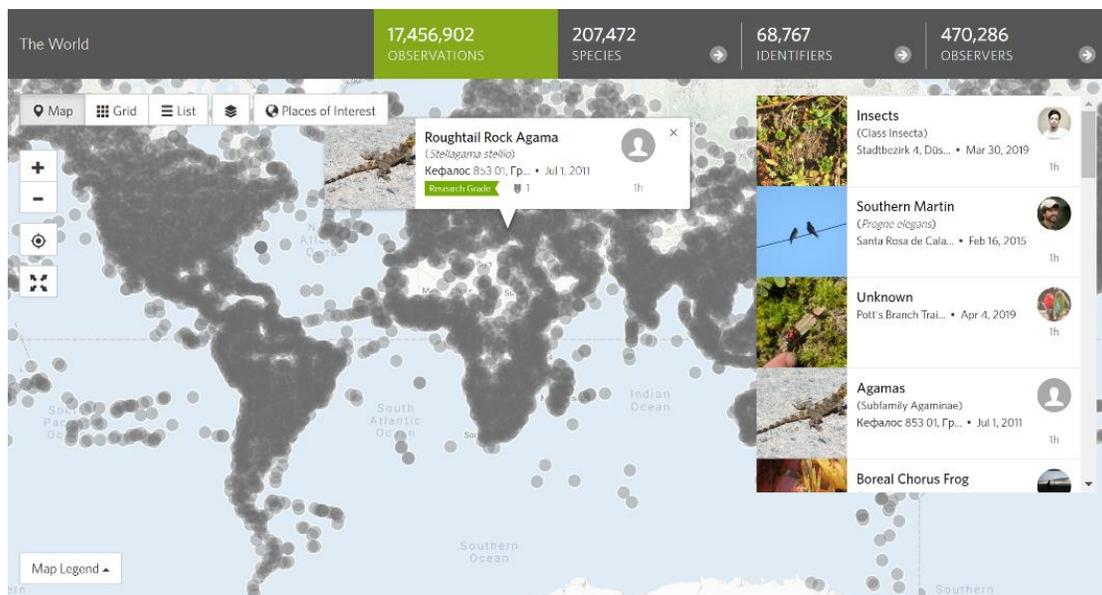
Of the estimated 10 to 12 million species in the world, humans have only discovered about 1.8 million and have only assessed about 90,000.

On top of that, species extinction has accelerated and become more widespread in modern times—in large part driven by human activities—with [species going extinct about 1,000 times faster](#) than the normal rate. In fact, according to a [July 2017 meta-study](#), a “sixth mass extinction,” signaled by the high rate of population loss in vertebrates, is currently underway and indeed far more advanced than previous estimates.

The challenge is not only to prevent the extinction of individual species by collecting biodiversity data in different ecosystems, but also to extend public awareness, environmental monitoring, and stewardship from tens of high-profile species, such as panda bears, to the millions of other species around the world.

## Using social media to record and identify observed species

[iNaturalist](#) (iNat) is an online social network of people sharing biodiversity information to help each other learn about nature. It's also a crowdsourced species identification system and an organism occurrence recording tool. Although iNat aims to generate scientifically valuable biodiversity data and use that data to better direct scarce conservation resources, this is its secondary goal. Its primary goal is to engage people with nature and create a sense of stewardship. Both goals depend on continually growing the community of involved people, and both can be aided by enabling rapid identification of observed species. iNaturalist has over one million registered users, who are contributing daily to a growing global repository of more than [17.8 million](#) observations.

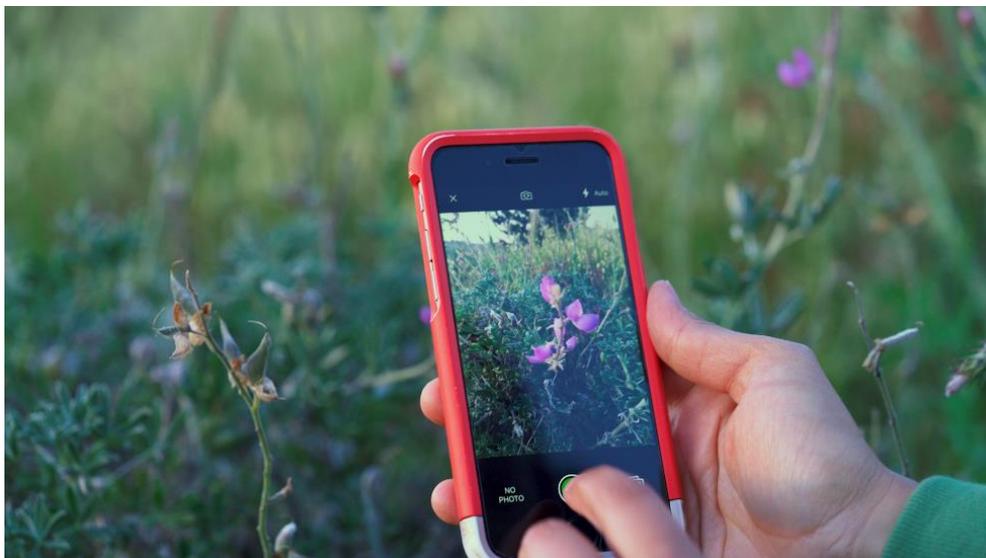


*iNaturalist's online observation [map](#) in April 2019.*

Working through an app (also called iNaturalist) for Android and iOS, iNat enables people to record and document the plants and animals they encounter and share those observations with others, either to learn more about them or simply for the fun of collecting, sharing, and engaging in a community. Additionally, the collected data about what species were observed, when, and where is shared with scientific data repositories such as the [Global Biodiversity Information Facility](#) to help scientists find and use that valuable data in important research.

One of the technical challenges facing the iNat team is that usage patterns fluctuate sometimes significantly based on seasons and special events. iNaturalist has grown steadily, doubling membership every year and adding about 1,000 new members a day. The majority of users are in the Northern Hemisphere, and their use of the site typically slows from autumn into winter and then increases rapidly from spring into summer. Special events can put an additional strain on the platform infrastructure. For example, the [City Nature Challenge](#), an annual week-long event held in April/May, grew from 2 cities and 1,000 participants in 2016 to 69 cities around the world in 2018, bringing many thousands of new members and hundreds of thousands of new observations in a very short time.

One other challenge for iNat is that, although the social networking format of the app is part of its appeal for many users, for some it is a barrier. For example, children under 13 cannot use the app in some places given privacy legislation. Other potential users may be put off by wanting instant identification of their posts rather than having to wait for someone to respond. Overcoming these barriers could help iNat make even more progress against its primary goal of engaging people to create a sense of stewardship.



*Credit: iNaturalist*

## Enabling faster identification and broader access to the platform with better scalability

With the AI for Earth grant and the Microsoft Azure platform, iNaturalist has been able to address these issues. Azure allows for rapid scaling of computing resources, handling not only seasonal changes in usage but also unusual bumps in traffic caused by events such as the City Nature Challenge. In addition, the AI and data analytics capabilities in Azure have enabled the team to create and deploy a computer vision model that can recognize and identify different species effectively instantly. iNaturalist recently launched a new app called Seek, which uses this AI-based image recognition feature to help people identify wildlife, even if they can't, or

prefer not to, use social media. This means that Seek can attract a broader audience to explore the outdoors and engage as naturalists.

Azure also provides a confluence of scalable platform and AI/advanced analytics: the AI needs the crowdsourced expertise for the model to develop, while the scalable platform means the social network can sustain the growth being fed by the AI-based photo recognition, in turn helping that feature to improve. Collectively, Azure services help make iNaturalist a better tool for conservation.

Finally, with the development of the AI image-recognition model, not only does iNaturalist have a new way to engage more people, but it can also develop a real-time detector of anomalies in the environment and help form a global picture of ecosystem processes. By running the data through predictive AI models, iNaturalist can grow from passively collecting ecosystem data to actively mobilizing scientists and the community to investigate unusual situations and take steps to protect the ecosystems.

## Going forward

The next stage of the iNaturalist project includes using computer vision together with species distribution modeling to make better species identification predictions. The current iNaturalist computer vision model often has trouble properly labeling observations of visually similar species. By incorporating spatiotemporal information, iNaturalist hopes to better distinguish visually similar species who do not overlap in space and time (for example, two species of squirrels that look similar, but are located in different parts of the United States).

In addition, the team at iNat also recently [released](#) a new and even more kid-friendly version of [Seek](#), designed especially for families with younger observers. Built on top of iNaturalist's core algorithms, Seek has the same species recognition power as the full iNat app, but with specialized security features to mask location and prevent the collection of sensitive information about children's use of the tool. While Seek doesn't record its users' observations, it now allows kids to earn badges and "level up" by finding different types of species—making for a fun and safe way to engage future generations of citizen scientists out in the wild.

## About iNaturalist

[iNaturalist](#) began as a website created as a master's final project by co-founder Ken-ichi Ueda and some other students at UC Berkeley's School of Information in 2008. After graduation, Ueda began working with Scott Loarie, and the pair organized as iNaturalist LLC and launched their first iPhone app in 2011. They also began expanding through numerous collaborations. Today Ueda and Loarie are co-directors of the company, which has since become a joint initiative of the California Academy of Sciences and the National Geographic Society.

# Resources

## Websites

[iNaturalist.org](https://www.inaturalist.org)

[City Nature Challenge](#)

[Global Biodiversity Information Facility](#)

[AI for Earth](#)

## Press

Christina Zdanowicz. "[A huge, strange-looking fish washed up on a California beach. Scientists say it's a first.](#)" CNN. March 4, 2019.

Nicola Twilley. "[With Bugs, You're Never Home Alone.](#)" The New York Times. October 29, 2018.

Emiliano Rodriguez Mega. "[The Green Big Apple: New Yorkers document the city's plants.](#)" AP News. August 4, 2018.

Susanna Ray. "[Like taking a whole scientific team with you on a walk: iNaturalist helps spawn a generation of citizen scientists.](#)" Microsoft News. April 19, 2018.

Asher Elbein. "[This New App Is Like Shazam for Your Nature Photos.](#)" Earther. March 21, 2018.

Marianne Bray. "[Conservation in Hong Kong: citizen scientists enlisted to record and safeguard city's amazing biodiversity.](#)" South China Morning Post. December 12, 2017.

Ferris Jabr. "[Letter of Recommendation: iNaturalist.](#)" The New York Times Magazine. December 6, 2017.

Lauren Silverman. "[The App That Aims To Gamify Biology Has Amateurs Discovering New Species.](#)" National Public Radio. July 2016.

Mike Gaworecki. "[Citizen science leads to snail rediscovery in Vietnam.](#)" Mongabay. July 2016.

## Documentation

Y. Roskov, L. Abucay, T. Orrell, D. Nicolson, N. Bailly, P. M. Kirk, T. Bourgoïn, R. E. DeWalt, W. Decock, A. De Wever, E. van Nieuwerkerken, J. Zarucchi, and L. Penev, eds. (2018). [Species 2000 & ITIS Catalogue of Life, 2018 Annual Checklist](#). Species 2000: Naturalis, Leiden, the Netherlands. ISSN 2405-884X.

Camilo Mora, Derek P. Tittensor, Sina Adl, Alastair G. B. Simpson, and Boris Worm. "[How Many Species Are There on Earth and in the Ocean?](#)" PLOS. August 23, 2011.

"[Researchers find that Earth may be home to 1 trillion species.](#)" National Science Foundation. May 2, 2016.

[The IUCN Red List of Threatened Species](#). IUCN. Retrieved November 21, 2018.

S. L. Pimm, C. N. Jenkins, R. Abell, T. M. Brooks, J. L. Gittleman, L. N. Joppa, P. H. Raven, C. M. Roberts, and J. O. Sexton. "[The biodiversity of species and their rates of extinction, distribution, and protection](#)." *Science*. May 30, 2014; 344 (6187). doi: 10.1126/science.1246752.

G. Ceballos, P. R. Ehrlich, and R. Dirzo. "[Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines](#)." *Proc Natl Acad Sci U S A*. July 25, 2017; 114 (30): pp. E6089-E6096. doi: 10.1073/pnas.1704949114. Epub July 10, 2017.