

Using—and sharing—new technologies is key for conservation

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Scientists estimate that we are losing species at 1,000-times the natural background rate.

While new technologies are improving conservation efforts by making it easier, faster and cheaper to monitor threatened species, these technologies alone cannot conserve biodiversity, a new multi-institutional study finds.

"The challenge is to use technology more wisely, connect different technologies and get appropriate technologies into the hands of those than can use them more effectively," said Stuart Pimm, Doris Duke Professor of Conservation Ecology at Duke University, who is lead author of the study.

In a paper published this month in the journal *Trends in Ecology and Evolution*, Pimm and his colleagues from Duke, SAS Institute, the North Carolina Zoological Park and other conservation organizations and companies review current technologies for identifying, tracking and monitoring species. They also document the challenges associated with new technologies, including the limitations of certain methods, how to get new technologies into the right hands and how best to manage large datasets.

Many advancements have been made in recent years in non-invasive tracking techniques. One new tracking technology is Footprint Identification Technique (FIT), which digitizes photographs of

footprints of large cats and other mammals to identify individuals.

"Our work and that of others has shown that invasive techniques, relying on capture and immobilization for marking or tagging, can negatively impact species in a variety of ways," said Zoe Jewell, adjunct associate professor at Duke's Nicholas School of the Environment. "Now, with the advent of new, non-invasive technologies, we can be more confident that the data we collect truly represent an 'undisturbed' population."

Other non-invasive techniques for monitoring wildlife populations include vocalization identification, drones, DNA analysis and camera-trapping, added Jewell, who founded the nonprofit WildTrack for developing non-invasive monitoring techniques.

Crowd-sourced data collection through online platforms has become another valuable resource for researchers and conservationists. Apps such as eBird and iNaturalist enable amateur observers to record animals they see. The recorded sightings are added to an open-access online database to further research efforts.

"One key to the success of these ventures will be engaging groups currently marginalized from the processes of conservation: indigenous people," noted Jewell. "Their traditional ecological knowledge can make a huge contribution to local [conservation efforts](#)."

Infrastructure is essential to the effective implementation of new technologies, Jewell said. For example, a smartphone app that allows a user to record data to an online database is only useful if the user first has a smartphone, reliable Internet connection and electricity.

"These limitations will pose fewer challenges as widespread Internet access becomes available, but they must be taken into consideration in the implementation of every technology," Jewell said.

New technologies may be especially useful in preventing poaching by allowing rangers and other authorities in protected areas to record and access data about species of interest via smartphones and other portable devices, according to the study. Drones might also be used to collect data on poachers, animals, and habitats, but robust and effective drones are still often prohibitively expensive for conservation work in the remote areas where they are needed most, the researchers said.

Assessing habitat loss is another area of conservation in which new technologies might be put to use. Remote sensing, which uses satellites or aircraft to scan large areas of land, can be used to monitor changes in land cover that result in habitat loss, such as deforestation.

"New technologies offer enormous potential in wildlife conservation," Jewell said. "But we face a broad challenge in harnessing these technologies. We must increase the global pool of data collectors, find better ways of managing the resulting huge increase in data generated and use interdisciplinary approaches to develop creative solutions to meet anticipated future challenges."

Pimm stressed the importance of working with a variety of actors. "If we are to stem the current massive loss of species and ecosystems across the land and the oceans, we need to be much smarter and to engage many others to develop new approaches to the problems."

More information: "The Technologies to Conserve Biodiversity," Stuard L. Pimm, Sky Alibhai, Richard Bergl, Alex Dehgan, Chandra Giri, Zoe Jewell, Lucas Joppa, Roland Kays, Scott Loarie, Oct. 1, 2015, *Trends in Ecology and Evolution*. [DOI: 10.1016/j.tree.2015.08.008](https://doi.org/10.1016/j.tree.2015.08.008)

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