Big data reveals we're running out of time to save environment and ourselves

April 24 2020

Earth Day this year was not just about the decline of the environment - it was also about the threat of a pandemic. Credit: Global Forest Watch

The use of big data can help scientists chart not only the degradation of the environment but can be part of the solution to achieve sustainability, according to a new commentary paper.

The paper, "Opportunities for big data in conservation and sustainability," published today in *Nature Communications*, said increased computing speeds and data storage had grown the volume of big data in the last 40 years, but the planet was still facing serious decline.

Lead author Dr. Rebecca Runting from the University of Melbourne's School of Geography says that while we currently have an unprecedented ability to generate, store, access and analyse data about the environment, these technological advances will not help the world unless they lead to action.

"Big data analyses must be closely linked to environmental policy and management," Dr. Runting said. "For example, many large companies already possess the methodological, technical, and computational capacity to develop solutions, so it is paramount that new developments and resources are shared timely with government, and in the spirit of 'open data.'"

Commentators noted that 2.3 million km^2 of forest was lost over the years 2000 to 2012 and that dynamic marine and coastal ecosystems have revealed similar declines. An analysis of over 700,000 satellite images shows that Earth has lost more than 20,000 km^2 of tidal flats since 1984.

"In light of the COVID-19 pandemic, we are currently seeing governments making rapid (health) decisions based on fairly sophisticated data analysis," Dr. Runting said. "There may be opportunities to learn from this and achieve a similarly tight coupling of

analysis and decision-making in the environmental sector."

Co-author Professor James Watson from the University of Queensland said with platforms like Google Earth Engine and the capacity of satellites to track and send information quickly to computers, big data was capable of identifying eco-health risks globally.

"What the big data revolution has helped us understand is the environment is often doing worse than what we thought it was. The more we map and analyse, the more we find the state of the environment, albeit Antarctic ice sheets, wetlands, or forests, is dire. Big data tells us we are running out of time," Professor Watson said.

"The good news is the big data revolution can help us better understand risk. For example, we can use data to better understand where future ecosystem degradation will take place and where these interact with wildlife trade, so as to map pandemic risk."

Dr. Runting said big data has been pivotal in quantifying alarming spatial and temporal trends across Earth. For example, an automated vessel tracking and monitoring system is being used to predict illegal fishing activity in real-time.

"This has allowed governments quickly investigate particular vessels that may be undertaking illegal fishing activity within their jurisdiction, including within Australian waters," she said. Similarly, Queensland's Statewide Landcover and Trees Study uses satellite imagery to monitor woody vegetation clearing, including the detection of illegal clearing.

Professor Watson cited a similar example. "Global forest watch has been a game change for monitoring the state of the world forests in near real time. This can help identify illegal activities and informed active enforcement of forest conservation around the world," Professor Watson

said.

The paper also noted positive environmental changes due to human intervention such as greening seen in large expanses in China, which was driven by large scale national policies, including forest conservation and payments for restoration.

More information: Rebecca K. Runting et al, Opportunities for big data in conservation and sustainability, *Nature Communications* (2020). DOI: 10.1038/s41467-020-15870-0

Provided by University of Melbourne