



Research News

## Researchers develop predictive tools to tackle childhood disease outbreaks in Botswana

Scientists find links between environment and human health



Botswana's Chobe River is the subject of an NSF-funded study on childhood disease outbreaks.

[Credit and Larger Version \(/discoveries/disc\\_images.jsp?cntn\\_id=299816&org=NSF\)](#)

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In 2006, more than 400 children under the age of 5 died during an outbreak of diarrheal disease in Botswana. In what was a 25-fold increase in disease mortality for this age group, citizens of the country were devastated.

For more than 10 years, Kathleen Alexander, a scientist at [Virginia Tech \(/cgi-bin/good-bye?https://vtnews.vt.edu/articles/2020/01/FLSI-Alexander-ENSO-Diarrheal-Disease.html\)](#), has been researching similar diarrheal disease outbreaks across Botswana to determine if there are correlations among atmospheric conditions, local environmental variables, and disease rates.

Along with Jeffrey Shaman of Columbia University and Alexandra Heaney of UC-Berkeley, Alexander discovered a critical link between environmental dynamics and human health. With this knowledge, the [NSF-funded <https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1518486&HistoricalAwards=false>](#) researchers have the capacity to begin to predict when such disease outbreaks will occur.

The findings were published in the journal [Nature Communications \(/cgi-bin/good-bye?https://www.nature.com/articles/s41467-019-13584-6\)](#).

Botswana is a dry country with only three sources of surface water. Alexander and her collaborators focused their work in the Chobe District, which is home to the Chobe River, the only permanent surface water within 12,000 square kilometers (about 4,600 square miles). The river is also the only source of drinking water for 8 villages, making it a critical region to study the influence of surface water on disease.

Diarrheal disease remains a critical threat to children under 5 years of age across Africa but particularly in the Chobe District. With cases peaking annually in the wet season and again in the dry season, the researchers determined that certain meteorological conditions are responsible for these outbreaks.

"Human health is intimately connected to the landscape and the environmental conditions that prevail -- connections that cross scales from local hydrometeorology and water quality dynamics to global atmospheric conditions," said Alexander.

Added Richard Yuretich, a director of NSF's Dynamics of Integrated Socio-Environmental Systems program, "Wildlife, climate, landscapes, human health and decision-making -- this project emphasizes the essence of coupled natural and human systems. Most importantly, it is providing valuable information to help improve the quality of life for people and wildlife that has repercussions beyond the study region."

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