

LSGI Distinguished Lecture Series

“Evaluating Lyme disease risk in Eastern Ontario, Canada using GIS, remotely sensed data and tick population modeling”

Overview

It was our pleasure to invite Dr. Dongmei Chen, full professor at Department of Geography and Planning, Queen’s University in Kinston, Canada, to deliver a seminar of the LSGI Distinguished Lecture Series on 4 May 2017.



Dr. Dongmei Chen



Dr. Dongmei Chen received her BA in geography from Peking University, China, and her M.Sc in GIS and remote sensing application from the Institute of Remote Sensing Application, Chinese Academic of Science. She got her Ph.D in Geography from the joint doctoral program of San Diego State University and University of California at Santa Barbara, USA. She had worked in Environmental Systems Research Institute (ESRI), California as a GIS product specialist for two years. Her research interests mainly focus on the understanding and modeling of interactions between human activities and physical environment by using geographic information science, remote sensing, spatial analysis and modeling technologies. She has lead and participated on more than thirty funded research projects supported by various government agencies and industry. Dr. Chen has edited three books and published over 100 journal articles, book chapters and conference proceeding papers. Her IP on image segmentation and evaluation has been used by the leading industry in Canada. She was a recipient of several research awards including John I. Davidson President’s Award from American Society for Photogrammetry and Remote Sensing, Canada Foundation of Innovation leaders opportunity award, Wan Kuancheng research award from Chinese Academy of Science and Shangdong Soft Science Achievement award.

Abstract

The number of Lyme disease cases in Ontario has increased significantly in the last decade. It is unknown whether the increase in Lyme disease cases in eastern Ontario has been due to climate change, changes in host abundance, host and vector migration, or a combination of these factors. The objective of this research is to analyze and model the impact of climate change on Lyme tick habitat and its main host (deer) habitat suitability. This study first determined areas of warming due to climate change using remotely sensed temperature data within Ontario, then analyzed spatial-temporal changes in Lyme disease risk in eastern Ontario from 2000 to 2013 due to climate. A basic reproductive tick population model was used for Lyme disease risk. The outputs of the model were validated using tick surveillance data supplied by Public Health Ontario from 2007 to 2012. Both methods identified areas in Ontario where Lyme disease risk has changed from unsuitable to suitable for sustaining a black-legged tick population, particularly in 2006, 2007 and 2011 - 2013. This study shows that climate has allowed black-legged tick populations to sustainably move northward in the past decade. This analysis supports climate change models that indicate Lyme disease risk will continue to move northward and also provides risk maps for better awareness of possible Lyme disease cases.