UNH research uses satellite observation to track avian flu

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An international, interdisciplinary team of researchers led by professor Xiangming Xiao of the University of New Hampshire is taking a novel scientific approach in an attempt to understand the ecology of the avian influenza, develop better methods of predicting its spread, and provide an accurate early warning system.

Xiao and colleagues were recently awarded $1.55 million for a four-year project funded by the U.S. National Institutes for Health (NIH) as part of the Ecology of Infectious Diseases (EID) Program jointly sponsored with the U.S. National Science Foundation. The EID program supports research projects that develop quantitative analysis and modeling capacity for better understanding the relationship between man-made environmental change and transmission of infectious agents.

The UNH project will use environmental remote sensing data from Earth observing satellites in combination with research in epidemiology, ornithology, and agriculture to provide a better picture of how the Highly Pathogenic Avian Influenza survives and gets transmitted among poultry and wild birds. The work focuses on China, where outbreaks of the virus have been prominent.

Xiao, of the UNH Institute for the Study of Earth, Oceans, and Space (EOS) Complex Systems Research Center (CSRC), is the principal investigator for a team that includes scientists from the United Nations Food and Agriculture Organization and research institutes in Belgium and China. CSRC scientist Rob Braswell is also a co-investigator.

The ecology of the avian influenza involves a complex web of factors, including environmental settings, agricultural practices of rice production and harvesting, poultry production involving huge populations of free-grazing ducks, and the migratory behavior of wild bird populations. Depending on how all of these risk factors intermingle over time, the virus can be spread through the environment by infected wild birds or domestic poultry.

Says Xiao, “The strength of our group, and of this proposal, is that over the last few years we’ve been able to pull a lot of information out of satellite observations that can help unravel the complex risk factors involved in avian flu ecology.”

For example, using imagery of varying resolution from different types of satellites, the team can map and track the spatial-temporal dynamics of crop cultivations (when planted, harvested, etc.) and wetlands. Used in conjunction with other geospatial data of environment, bird migration, and poultry production, dynamic maps of “hot spots” and “hot times” for viral transmission can be developed in near-real-time mode and will aid the public, researchers, business, and decision-makers in preparing for a potential pandemic crisis.

Xiao notes that the four-year project represents a shift for EOS and CSRC in terms of their traditional areas of focus.

“The Institute as a whole and the center in particular have focused more on remote sensing in the areas of the carbon cycle, the water cycle, biogeochemical cycles and climate change, and this is really the first time we’ve gotten into human and animal health.”

Of this new direction EOS director Berrien Moore says, “We are very proud of Xiangming Xiao and his colleagues. Exploiting new multidisciplinary approaches to complex problems is at the heart of

research at EOS. His work will not only contribute to successful strategies for mitigating a serious health threat, it will also introduce our students to new ways of attacking important and difficult challenges."

Source: University of New Hampshire