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Special Section Guest Editorial: Advances in Remote Sensing Applications for Locust Habitat Monitoring and Management

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Locusts (*Orthoptera: Acrididae*) are a threat to food security worldwide and to the livelihoods of farmers in many countries. According to the United Nations Food and Agricultural Organization (FAO), the locust plague that started in April 2012 is threatening "the livelihoods of 13 million people in Madagascar."[1] Locust outbreaks occur when environmental conditions, which are influenced by meteorological events, become suitable. Hence periodic monitoring of their habitats is essential for forecasting and managing locust populations. However, the distribution ranges of several locust species extend across many countries, and in some instances even continents, making the task of periodic monitoring daunting. Large areas of their habitats are also not easily accessible, and mobilizing the resources required for periodic monitoring puts tremendous strain on the economies of many locust-affected countries. Despite these challenges FAO and several national agencies around the world continue to monitor, forecast and manage locust populations, and this requires current information about the conditions of locust habitats. Up-to-date information would enable locust managers to identify areas for field visits and forecast threats associated with locusts.

The combination of vast geographic extent, changing environmental conditions that require periodic monitoring, and restricted access to sites would make the task of habitat monitoring suitable for the application of remotely sensed (RS) technology. Numerous studies have shown the value of remotely sensed data collected by Earth Observation Satellites (EOS) for monitoring land cover and the changes that are occurring in them. RS data are commonly used for monitoring and quantifying land cover changes from plot- to global-scales. However, RS data are routinely used for monitoring the habitats of only a few locust species. FAO and several locust-affected countries in Africa and Asia have invested in RS data and allied geospatial technologies for monitoring Desert locust (*Schistocerca gregaria*) populations, a species that impacts the livelihoods of several million people in these two continents. The Australian Plague Locust Commission (APLC) routinely uses RS data for monitoring and managing its locust population. However, RS data and allied geospatial technologies are rarely used for routine monitoring of other locust habitats. Nevertheless, teams of researchers continue to make progress in applying RS, geographic information systems, and global positioning systems data for monitoring the habitats of other locust species. Information generated from these advancements is critical for managing those locust populations.

The primary goal of this special section of the *Journal of Applied Remote Sensing* is to highlight the advancements that are being made for monitoring the locust habitats using RS data and allied geospatial technology. Papers in this special section are published in two volumes: 7 (2013) and 8 (2014). Advances in the applications of RS data for monitoring and managing the habitats of several locust species, including the Desert and Australian plague locusts, are described. RS data collected by passive and active sensors have been used for developing products that can provide critical information for managing these locust populations.

However, much more work remains to be done. Techniques developed for monitoring the habitat of one locust species in a country or region have to be tested in other countries or regions. Similarly, researchers could apply the methods developed for one locust species to other species. We hope this special section will motivate more remote sensing scientists to develop new

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algorithms and products that will help FAO and other agencies tasked with managing locust threat.

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1. United Nations Food and Agricultural Organization, http://www.fao.org/emergencies/crisis/madagascar-locust/intro/en/

Ramesh Sivanpillai is a senior research scientist–remote sensing in the Botany Department at the University of Wyoming. His academic credentials include a B.Sc. (physics), M.Sc. (environmental studies), M.Phil. (environmental sciences), M.S. (environmental sciences and policy) and PhD (forestry) and has more than 25 years of experience in the applications of remote sensing science and technology for monitoring and mapping land cover changes. Currently he is serving as an associate editor of JARS.

Alexandre V. Latchininsky received his BS and MS in entomology at St. Petersburg State University in Russia and a PhD in entomology at the University of Wyoming, USA. He currently works as associate professor/Extension entomologist in the Department of Ecosystem Science and Management at the University of Wyoming. He is the author of over 30 peer-reviewed papers and 7 books and book chapters on biology, ecology, and management of grasshoppers and locusts. He is president of the U.S. National Grasshopper Management Board and an international consultant–locust expert at the Food and Agriculture Organization of the United Nations (FAO). He has been featured on Discovery Channel and History Channel shows on locusts.