Review on the use of remote sensing for urban forest monitoring

ABSTRACT

Urban forests are vital in urban areas because they clean the air, absorb water, and protect the environment from intense heat. Destruction of the urban forest by increased urbanization is a considerable threat to the ecosystem. Hence, urban planners must obtain and manage information about urban forests, but the complexity of urban areas has made these tasks difficult. With developments in remote-sensing technologies, the monitoring and detection of urban forests can be achieved without performing any field measurements. In this study, different remote-sensing imageries and various methods are evaluated to obtain urban forest information. This review demonstrates that very high resolution (VHR) satellite imagery, such as from WorldView-2, is the most efficient data that can be used to obtain urban forest information. The use of the combination of LiDAR data with VHR imagery increases the accuracy of information, particularly about tree crown delineation. Traditional pixel-based classification methods are not effectively applicable to obtain urban tree information because of significant spectral variability in urban areas. An object-based classification technique, which uses spatial, textural, and color information, can be a potential method to detect urban forest and tree species discrimination. The new VHR imaging method, which uses the object-based technique, is recommended to overcome limitations of collecting urban forest information.