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Unmanned aerial systems for forest reclamation monitoring: throwing balloons in the air

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Wildfires are a recurrent phenomenon in Mediterranean landscapes, deteriorating environment and ecosystems, calling out for adequate land management. Monitoring burned areas enhances our abilities to reclaim them. Remote sensing has become an increasingly important tool for environmental assessment and land management. It is fast, non-intrusive, and provides continuous spatial coverage. This paper reviews remote sensing methods, based on space-borne, airborne or ground-based multispectral imagery, for monitoring the biophysical properties of forest areas for site specific management. The usage of satellite imagery for land use management has been frequent in the last decades, it is of great use to determine plants health and crop conditions, allowing a synergy between the complexity of environment, anthropogenic landscapes and multi-temporal understanding of spatial dynamics. Aerial photography increments on spatial resolution, nevertheless it is heavily dependent on airborne availability as well as cost. Both these methods are required for wide areas management and policy planning. Comprising an active and high resolution imagery source, that can be brought at a specific instance, reducing cost while maintaining locational flexibility is of utmost importance for local management. In this sense, unmanned aerial vehicles provide maximum flexibility with image collection, they can incorporate thermal and multispectral sensors, however payload and engine operation time limit flight time. Balloon remote sensing is becoming increasingly sought after for site specific management, catering rapid digital analysis, permitting greater control of the spatial resolution as well as of datasets collection in a given time. Different wavelength sensors may be used to map spectral variations in plant growth, monitor water and nutrient stress, assess yield and plant vitality during different stages of development. Proximity could be an asset when monitoring forest plants vitality. Early predictions of re-vegetation success facilitate precise and timely diagnosis of stress, thus remedial actions can be taken at localized detail.