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Post-fire Vegetation Regeneration Dynamics to Topography and Burn Severity in two contrasting ecosystems: the Case of the Montane Cordillera Ecozones of Western Canada & that of a Typical Mediterranean site in Greece

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Altering land cover dynamics is currently regarded as the single most important variable of global change affecting ecological systems. Wildfires are an integral part of many terrestrial ecosystems and are considered to dramatically affect land cover dynamics at a variety of spatial and temporal scales. In this context, knowledge of the spatio-temporal distribution of post-fire vegetation recovery dynamics is of key importance.
In this study, we explore the relationships between vegetation recovery dynamics to topography and burn severity for two different ecosystems using a chronosequence of Landsat TM data images analysis. One of our experimental sites is the Okanagan Mountain Park, located in the Montane Cordillera Ecozones of western Canada at which a fire occurred in 2003. The other is Mt. Parnitha, located in Greece, representing a typical Mediterranean setting.
The spatio-temporal patterns of regrowth for 8 years following the fire events were quantified based on the analysis of 2 widely used indices, the Normalized Difference Vegetation Index (NDVI) and the Regeneration Index (RI). Burn severity was derived from the differenced Normalized Burn Ratio (dNBR) index computed from the Landsat TM images. Topographical information for the studied area was obtained from the ASTER global operational product. Relationships of vegetation regrowth to both topography and burn severity was quantified using a series of additional statistical metrics.
In overall, results indicated noticeable differences in the recovery rates of both ecosystems to the pre-fire patterns. Re-growth rates appeared to be somewhat higher in north-facing slopes in comparison to south facing ones for both experimental sites, in common with other similar studies in different ecosystems. Lastly, areas of lower burn severity exhibited a higher recovery rate compared to areas of high severity burns. Results are presented in detail and an explanation of the main observation trends is also attempted to be provided.
To our knowledge, this study is one of the few attempting to explore the relationships between post-fire vegetation regrowth and topography or burn severity, particularly so in such a comparative and systematic manner between two contrasting ecosystem types. It corroborates the significance of EO technology as a successful and cost-effective solution in providing information related to post-fire regeneration assessment.

Keywords: post-fire vegetation regeneration, topography, burn severity, Landsat, remote sensing, Cordillera Ecozones, Canada, Mt. Parnitha, Greece