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Project Abstract

Vulnerability of US National Parks to Land Use and Climate Change and Variability 2

The US National Park Service (NPS) faces the challenge of maintaining ecosystem function and biodiversity within National Parks in the face of climate and land use change. New satellite and other technologies have increasingly allowed reconstruction for past decades of climate and land use at fine spatial scales and consequences for ecosystem processes such as NPP and fire risk. These reconstructions reveal high levels of spatial heterogeneity across the US in directions and magnitude of change in climate, NPP, fire risk, and stream flows. This study will harness these new data sets to better inform the NPS about threats to National Parks. The goal of this study is to assess park vulnerability to current and near-term future climate and land use based on detailed reconstructions and analyses of change and ecological response over the past 50-100 years. Specific objectives are:

1. Quantify change from 1900 to present in land use and climate (mean and variability), ecosystem response and biodiversity (representation of native species guilds, exotic species, species richness).
2. Evaluate statistical patterns of association between land use and climate, ecosystem function, and biodiversity during this time period as a means of validating vulnerability indices.
3. Evaluate the vulnerability of parks to current and near-term future land use and climate based on past change and ecosystem and biodiversity response.
4. Derive guidelines for mitigating the primary vulnerabilities of each park.

The study will include the 70 National Parks in the US that are relatively large in area (>35000 ha). The study will define and include the larger ecosystem surrounding each park. Potential drivers (climate and land use), ecosystem response NPP, stream flow, fire risk, habitat area, and biodiversity response (representation of native species guilds, exotic species, species richness) will be quantified across the 70 national parks during the 1900s using NASA and other imagery, data, and models. Statistical patterns of association will used to evaluate the plausibility of cause and effect relationships between the potential drivers and response variables. The vulnerability of each of the parks to current and near term future climate and land use change will be assessed based on the RAPPAM methodology. The results will be used to suggest to the NPS which parks are high priority for mitigation, and the primary issues that threaten the parks, and mitigation strategies.