Nature in Peril: A United States wide assessment of ecosystem conversion, alteration, and risk

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Background/Question/Methods

Ecologists spend a great deal of effort understanding and describing how ecosystems function and evaluating their status. Here we present a national-scale, data-driven analysis of how the ecosystems of the United States are faring. Our goal was to highlight the ecosystems that have high conversion rates to agriculture or urban land use and/or are in poor ecological condition compared to a set of baseline reference conditions. As part of the LANDFIRE project, reference conditions were described and modeled for the ecosystems of the United States (over 1,200 unique systems). These descriptions represent the species composition and structure and biophysical settings for the ecosystems and their succession classes. Using Vegetation Dynamics Development Tool, we modeled how much of each succession class would have occurred on the landscape under natural disturbance regimes (pre-European settlement reference conditions). The current amount of each succession class was compared to reference amounts to generate vegetation departure, which is mapped to 30m nationally. We used LANDFIRE Biophysical Settings and Succession Class data to assess how much of an ecosystem’s original extent has been converted to agriculture or urban land uses.

Results/Conclusions

Preliminary results for broad categories from the central United States point to 5 main results. 1) roughly 35% of the central US has been converted to agricultural or urban land use. This compares to previously published estimates of 29% for the entire country (Swaty et al. 2011). 2) Grassland ecosystems are the most converted with a 45% conversion rate, followed by hardwood ecosystems with a 32% conversion rate. Conifer ecosystems have the lowest conversion rate at 7%. 3) We considered “High Departure” to be vegetation departure values of >66 (on a scale of 0-100). 60% of the Hardwood-Conifer ecosystems had high vegetation departure followed by savanna at 58%. Riparian ecosystems (including wetlands) had the lowest amount of high vegetation departure with 23%. 4) Cumulatively across all ecosystems 68% are converted or highly departed, leaving less than 1/3rd of our ecosystems in a naturally vegetated low departure condition. 5) Our savanna ecosystems are at highest risk with roughly 15% unconverted and with low or moderate departure. This assessment highlights ecosystems at highest risk for degradation and points to places in most urgent need of conservation action. We now challenge scientists to work with land management agencies to develop implementable conservation plans.

spatial analysis and gis

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