The Power of Maps to Guide the Future of Biodiversity

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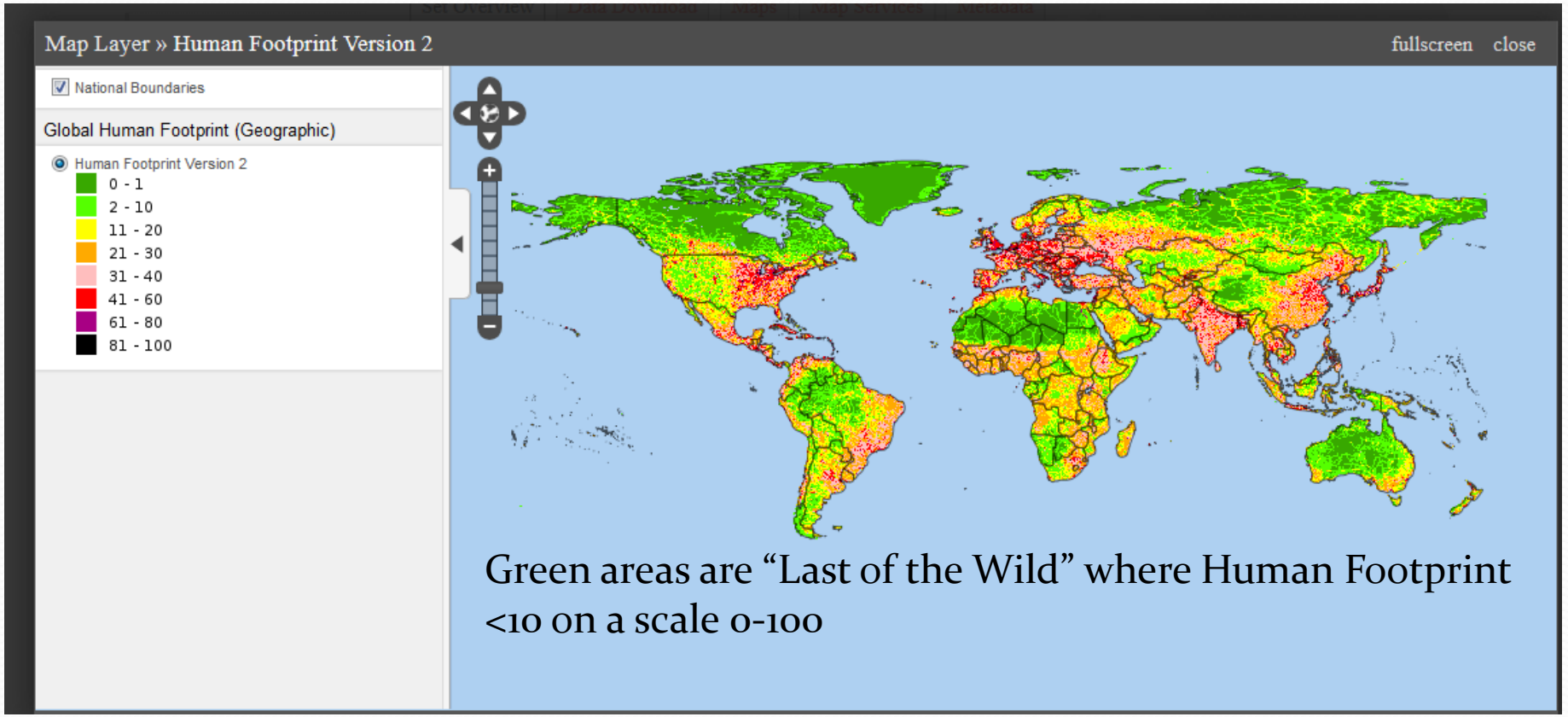
Humans are causing the 6th mega extinction on the planet and the best way to slow it down is identify and protect the last, best habitats

The easiest way to use GIS to protect habitat is to show where people aren't



Green areas are "Last of the Wild" where Human Footprint <10 on a scale 0-100

It’s more complicated than that, and we need to understand where are the best places for specific species given other, competing demands (cost)

Clemson scientists are running a project for the Appalachian mountains to decide where to protect habitats given climate change, land use change, “cost”, and multiple conservation “targets”

Appalachians are one of the top biodiversity conservation priorities, based on species richness, and restricted range endemism

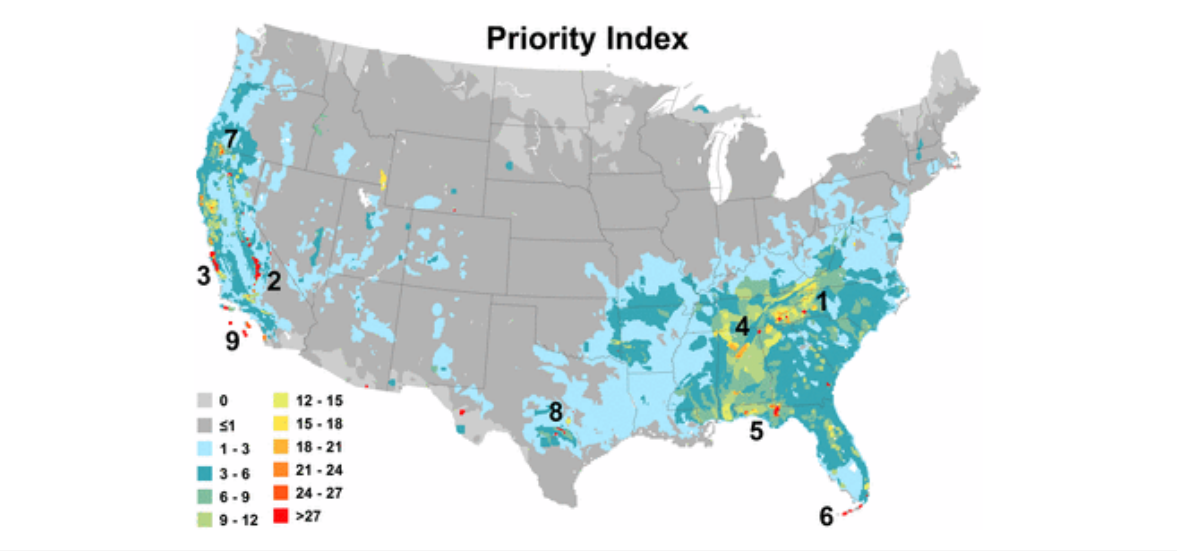


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Fig. 4.

Summed priority scores across all taxa and recommended priority areas to expand conservation: 1, Middle to southern Blue Ridge Mountains; 2, Sierra Nevada Mountains, particularly the southern section; 3, California Coast Ranges; 4, Tennessee, Alabama, and northern Georgia watersheds; 5, Florida panhandle; 6, Florida Keys; 7, Klamath Mountains, primarily along the border of Oregon and California; 8) South-Central Texas around Austin and San Antonio; 9, Channel Islands of California.

Jenkins et al. PNAS 2015

We use complex algorithms running across 600,000 10km^2 hexagons that optimize ecological targets given costs (human development) to find best, last places

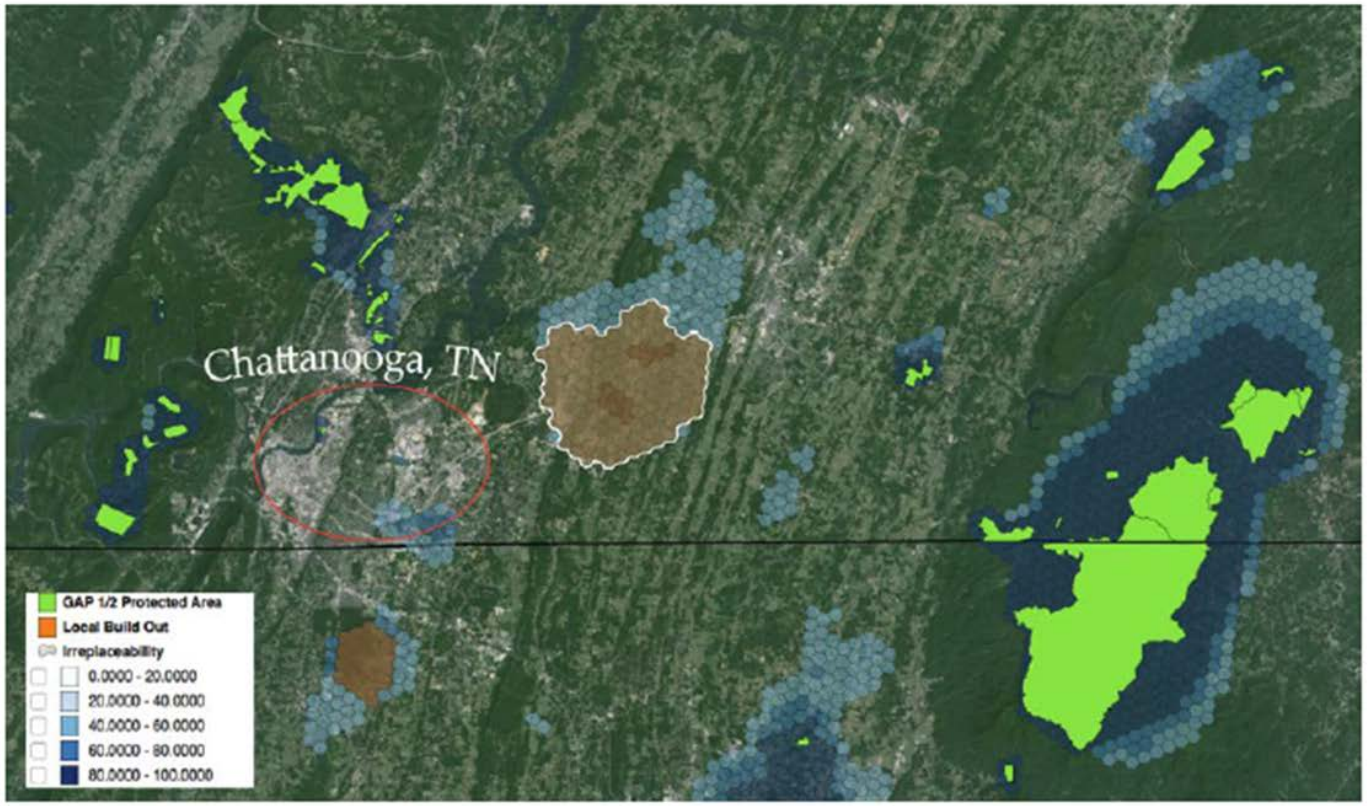


Figure 6. Local build outs surrounding Chattanooga, TN examined for conservation significance and connectivity.

We include large-extent, fine-grain habitat connectivity for gene flow in wildlife populations and to do this harness the Palmetto Cluster

15-State Central and Southern Appalachian Region

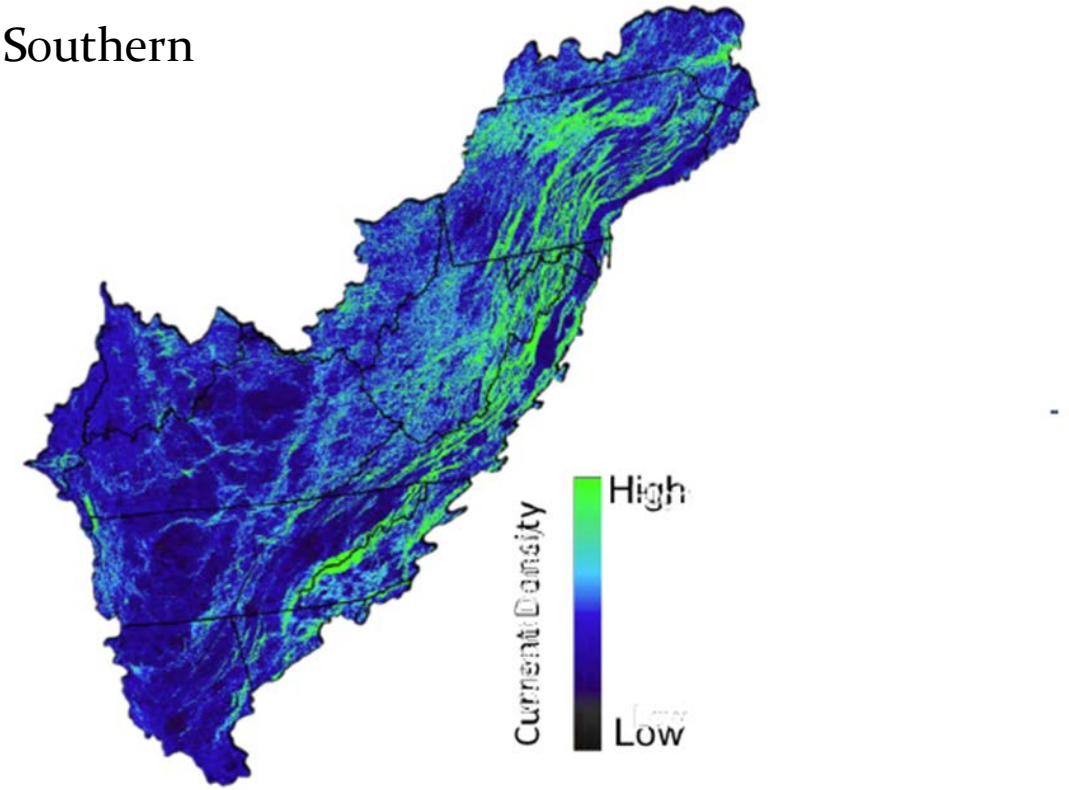
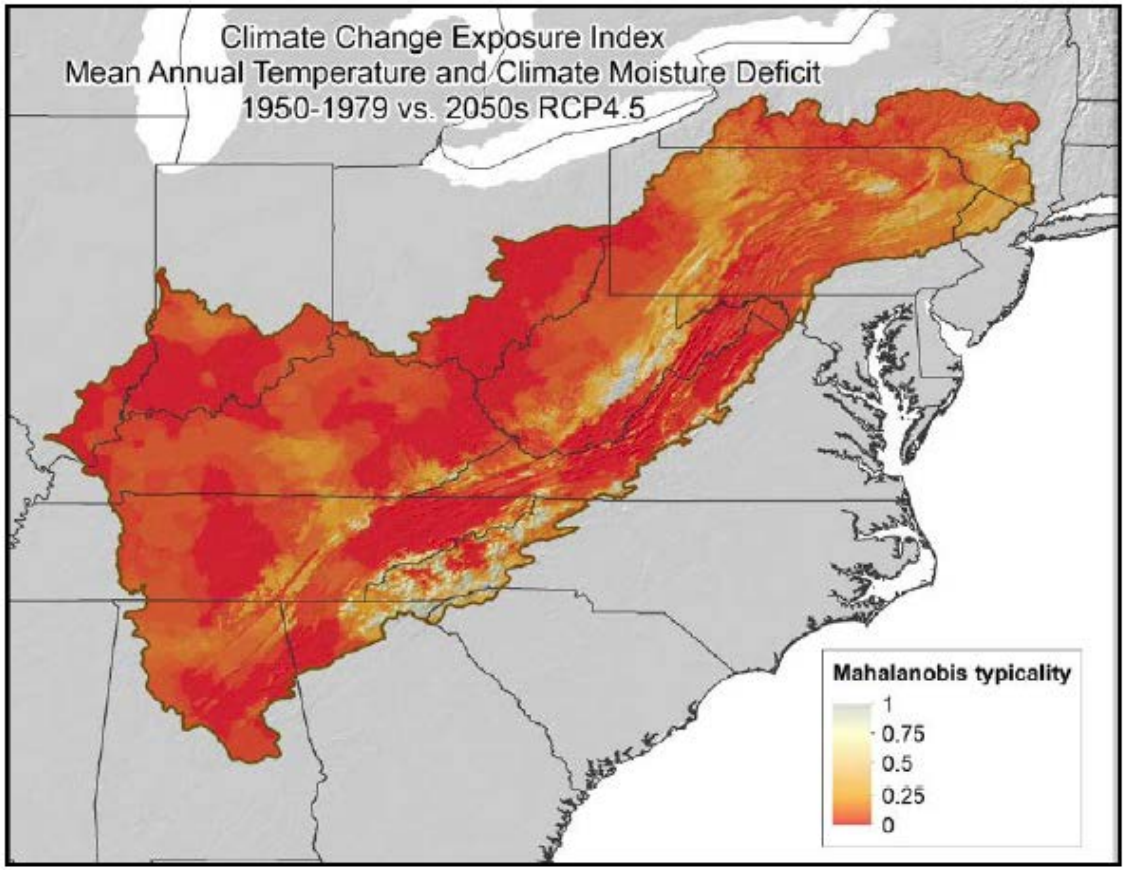


Figure 4. Landscape Connectivity for the Appalachian LCC. The model was parameterized for the American Black Bear at 270 m spatial resolution.

Include map data input of both climate refugia/resilience and vulnerability



Little departure, little change much resilience (1)

vs

Massive departure from baseline; much change/vulnerability (0)

We identify large areas based on their conservation function

Cores: large areas that efficiently represent biodiversity targets in minimum space
Linkages: important habitat corridors between cores
Build outs: local, currently unprotected areas of high importance

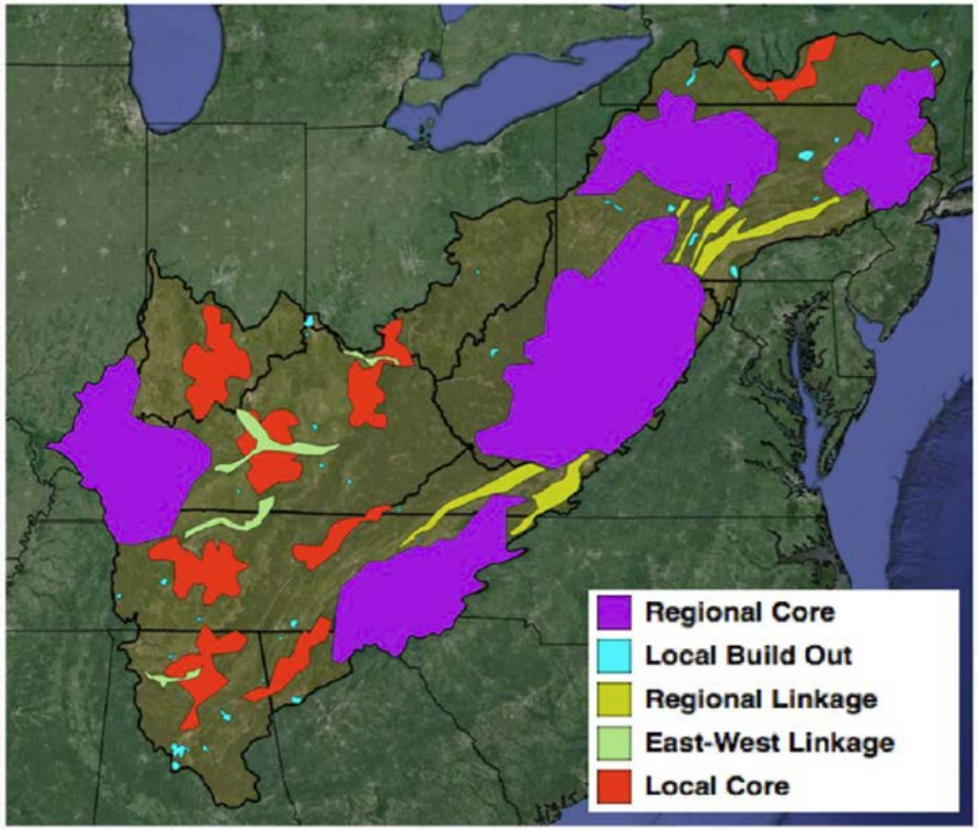


Figure 5. Coarse-scale depiction of conservation design for the Appalachian LCC with five design elements.

We communicate areas of importance to decision makers, using mapped information

Professionals from The Nature Conservancy examining maps, using Live GIS

Future, new conservation lands can be prioritized based on our projects

Currently 7000 conservation easements on private lands in Appalachia

Future easements will be established using priority maps from projects like ours

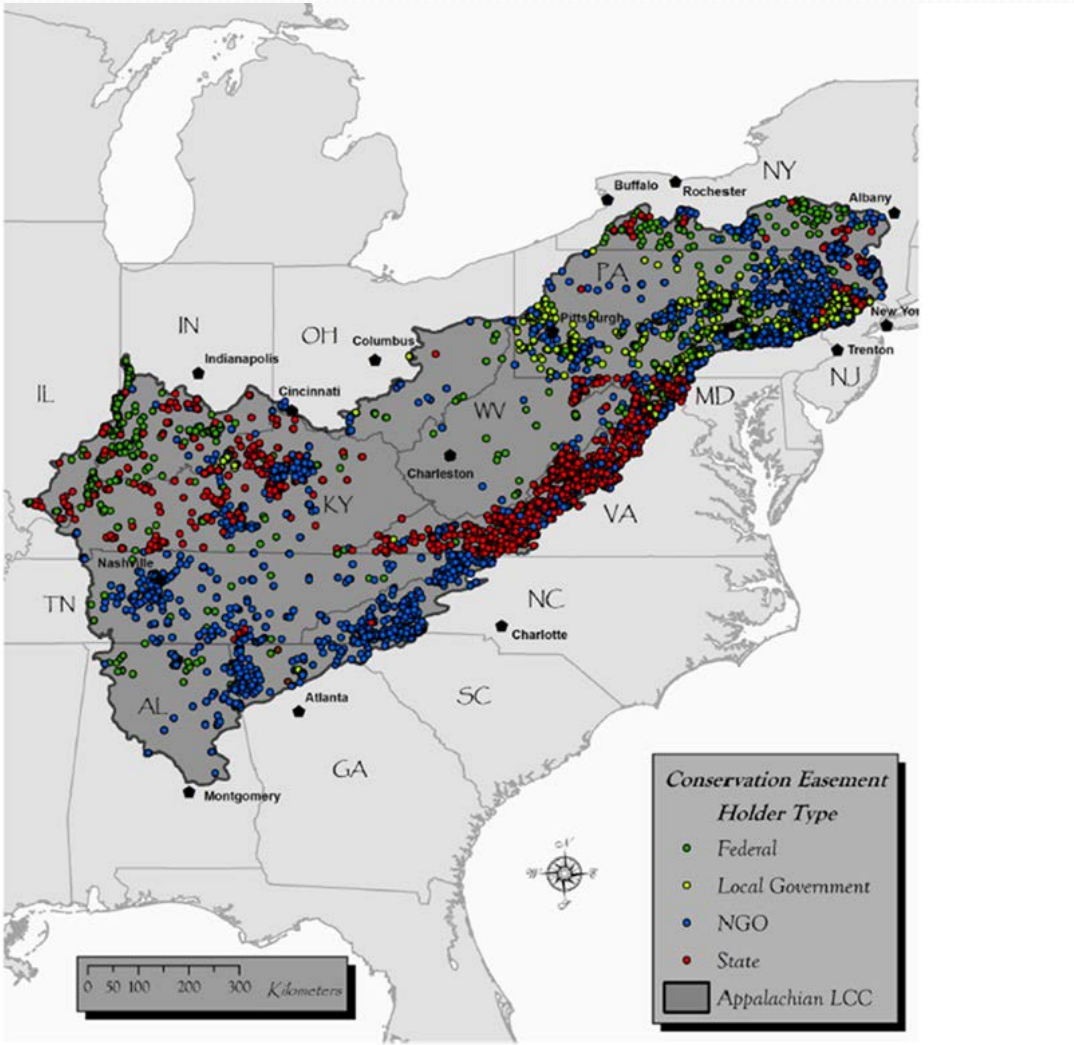
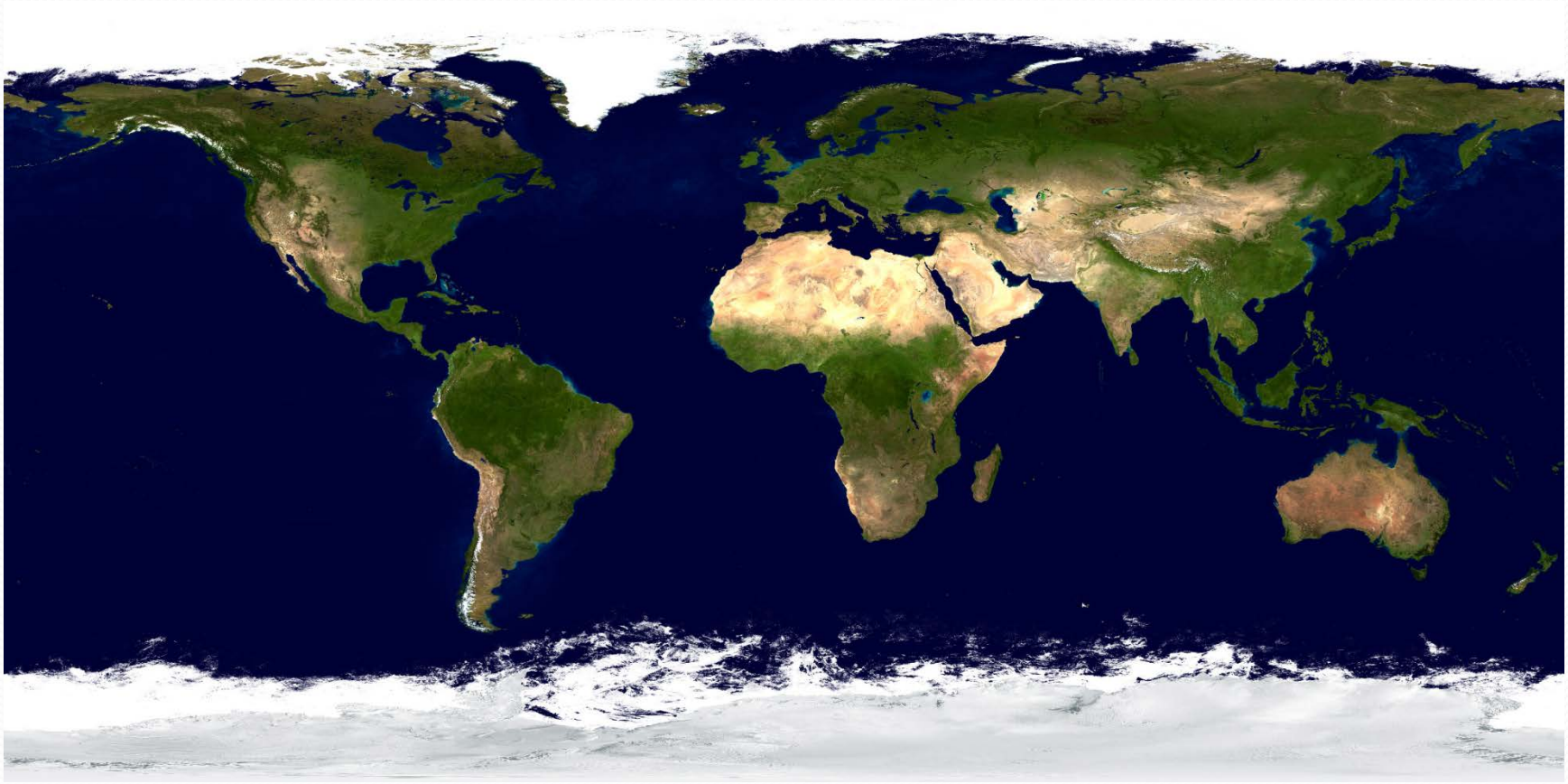


Fig 1. Spatial distribution of conservation easements within the study area (589,000 km^2). Easement locations are categorized by 4 holder types.

doi:10.1371/journal.pone.0140540.g001

We use GIS to help keep the web of life intact



Questions about using GIS to protect biodiversity?