Using Gap Analysis of Long-term Biodiversity Protection to Inform Conservation Priorities: The Five Valleys Land Trust

Lisa Duarte
National Gap Analysis Program, University of Idaho, Moscow, Idaho

In preparation for the Northwest Regional Land Trust Alliance annual meeting in May, 2010, GAP initiated a project with the Five Valleys Land Trust (FVLT) to demonstrate the application of GAP data to the land trust's conservation activities. FVLT is a widely-known and well-respected community-based land trust with a leadership role in local and regional land protection initiatives in western Montana. The trust has helped conserve 50,922 acres of Western Montana.

Faced with the challenge of efficiently allocating its financial resources among available conservation opportunities, the trust needed to find a mechanism to identify high priority areas for conservation in their large service area. The FVLT maintains a spatial database of their easement holdings and service area boundary in a Geographic Information System (GIS). GAP was able to use this data to characterize land ownership and vegetation cover types within FVLT conservation easements and to assess the long-term conservation of biodiversity in the nearly eight-million-acre FVLT service area. Ultimately GAP provided FVLT with a summary of the land cover types protected by their holdings as well as a summary of the land cover in their entire service area. GAP supported the assessment with newly released land cover and protected areas data.

Figure 1: The Five Valleys Land Trust's Service Area encompasses much of southwestern Montana.

Methods

GAP conducted analyses with the Protected Areas Database of the United States (PAD-US) version 1.1 and GAP National Land Cover (version 1) within FVLT conservation easements and their overall service area boundary (provided by FVLT) in ArcGIS, a Geographic Information System. We provided FVLT with a list of land cover types, stratified by area, that are currently protected by their easements. To provide context, we also mapped land ownership and land cover within the area serviced by the trust. Using GAP status codes (Crist 2000), a measure of management intent to protect biodiversity, GAP was able to assess the conservation status of each ecological system in the FVLT Service Area by comparing the amount of each system that occurred on already-protected land to the total amount of that system in the FVLT service area.

Results and Discussion

The area managed by each land owner (e.g. US Forest Service, Bureau of Land Management, State Fish and Wildlife, The Nature Conservancy) in relation to FVLT easements in their service area were summarized in ArcGIS (Figure 2). We conducted land cover assessments at coarse- and fine-scales. Fine-scale land cover data described the

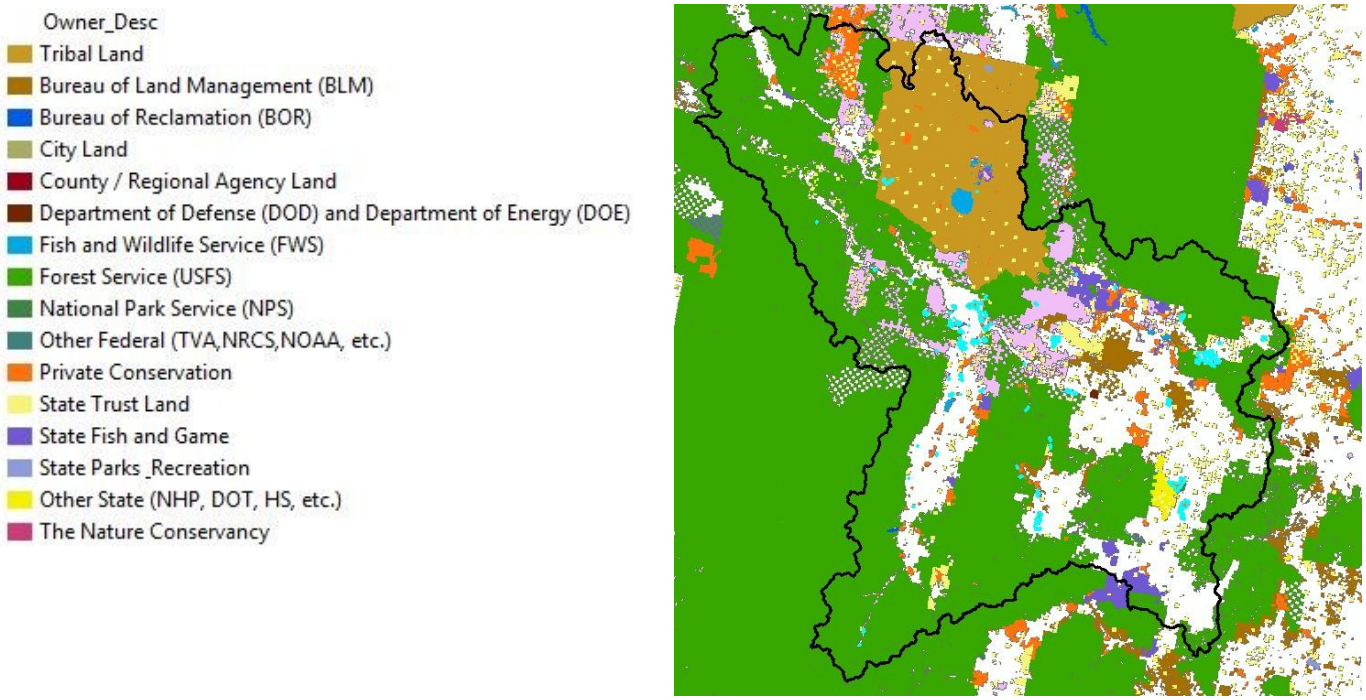

Figure 2. Land owners in the Five Valley Land Trust Service Area with FVLT parcels highlighted in blue.

natural ecological system (Comer et al. 2003) or developed land use class (e.g. cultivated crops, pasture, harvested forest) present on each 30 m^2 area in FVLT holdings and their service area. To facilitate interpretation, this information was also presented as simplified, coarser groups (level 1) such as: forest and woodland systems, shrubland, steppe and savanna systems, grassland systems, riparian and wetland systems, and human land use.

Once the percent of all land cover types protected in perpetuity were determined (Figure 3), the analysis was refined to map the location and extent of under-protected (defined as less than 40% protected) ecological systems in the service area (Figure 4). FVLT easements primarily protect grassland (39%) and shrubland, steppe or savanna systems (31%); however, 19% preserve working farmland. The dominant land cover types in the FVLT service area (Figure 5) are forest and woodland systems (58%) that are largely federally protected (Figure 4).

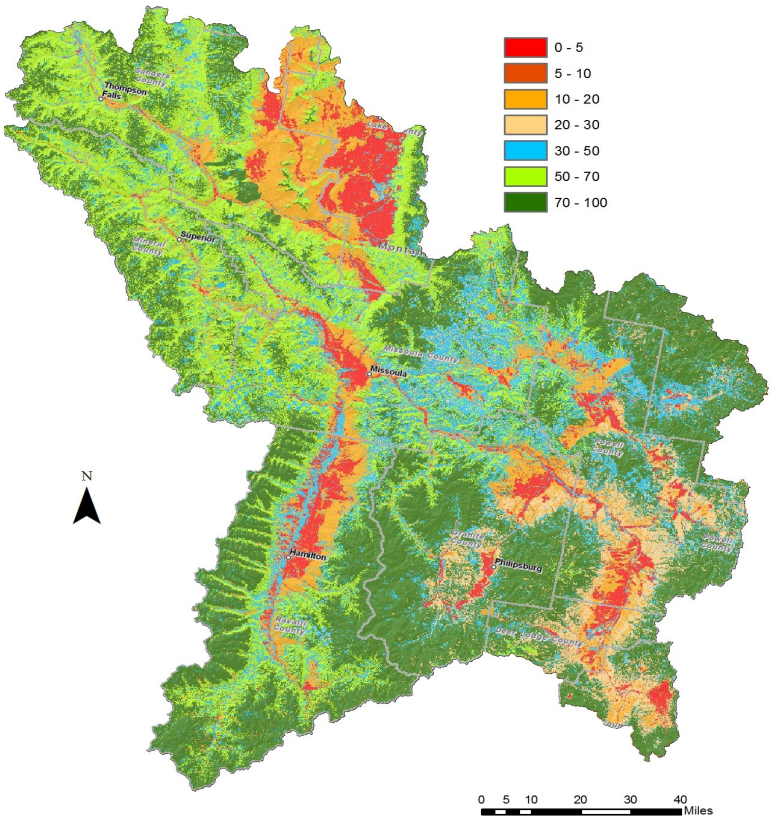

Figure 3. Percent of Land cover (level 1) protected in the FVLT Service Area . GAP status 1,2, and 3 lands are included.

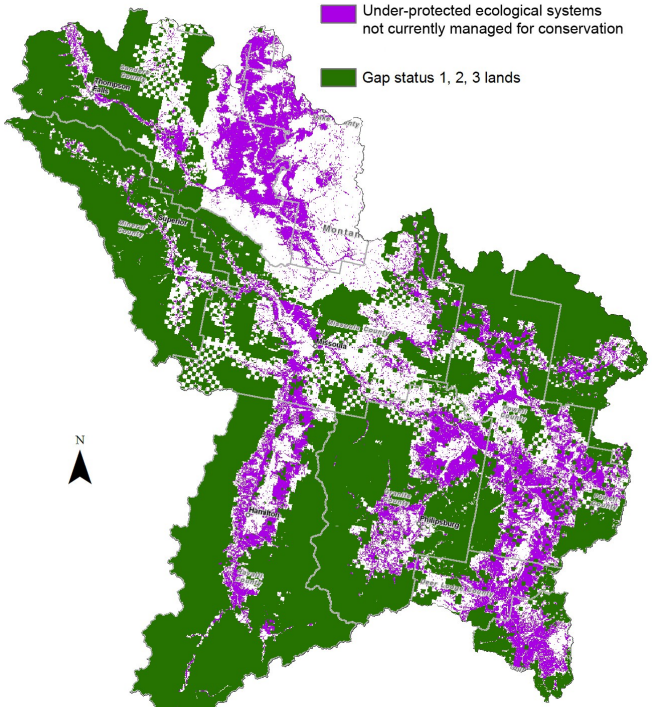

Figure 4. Location of under-protected ecological systems in the FVLT service area that are not currently protected as GAP Status 1, 2 or 3.

The FVLT plans to review these identified conservation priorities in relation to other conservation drivers (e.g. presence of wetlands, habitat for species of greatest conservation need, wildlife corridor connectivity, proximity to public lands or existing easements) to establish future objectives. The assessment provided valuable information to the FVLT during the development of its strategic plan. Other land trusts could do similar kinds of analyses of the land cover types and species that occupy their easements to ensure that they are maximizing the conservation impact of their purchases.

PAD-US (version 1.1) and GAP's National Land Cover data can be downloaded from: http://www.gapanalysis.nbii.gov . GAP is working to improve and update these data sets. For more information contact Lisa Duarte regarding PAD-US (lduarte@uidaho.edu) or Anne Davidson regarding land cover (adavidson@uidaho.edu).

Literature Cited

Comer et al. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems.

Crist, P. J. 2000. Mapping and Categorizing Land Stewardship, in A Handbook for Gap Analysis. Version 2.1.0.

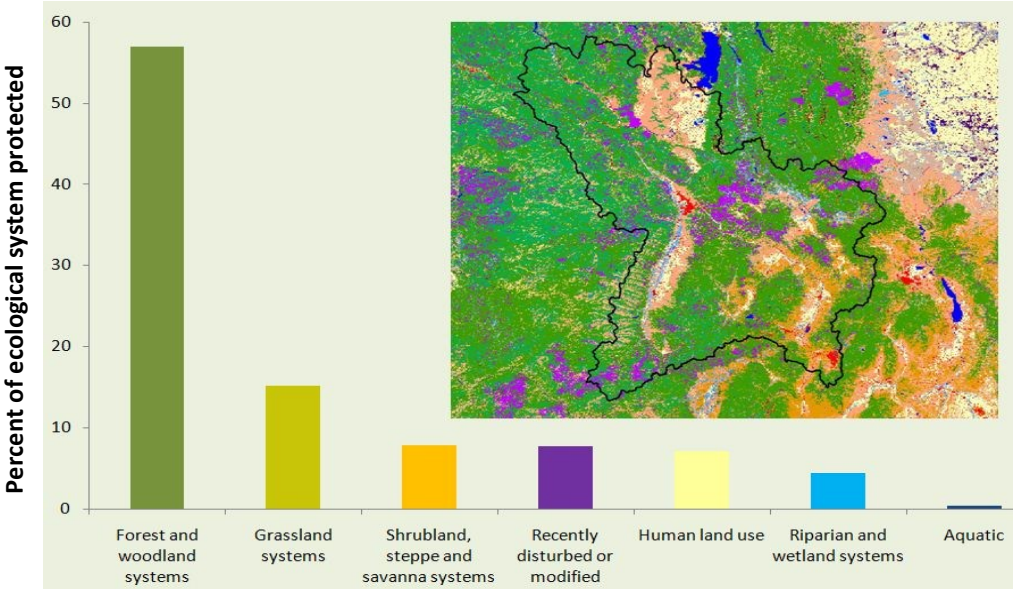

Figure 5: The dominant land cover types in the FVLT service area are forest and woodland systems (58%) and grassland systems (15%).

Modeling Vegetation Dynamics and Habitat Availability in the Southeastern U.S. Using GAP Data

Jen Costanza[1], Todd Earnhardt[1], Adam Terando[1], and Alexa McKerrow [1,2]
[1]North Carolina State University Department of Biology, Raleigh, NC
[2]USGS Core Science Systems, Raleigh, NC

Resource agencies are increasingly challenged to predict and respond to the potential effects of climate and land use change on the habitats they manage. Historically agencies have focused on managing individual public lands. Over time, the scale and extent of the potential impacts of these new threats will require that managers consider strategies across ownership boundaries and at a landscape scale. The Southeastern U.S. has experienced rapid land use change (Loveland and Acevedo 2006) with three primary drivers of change (timber management, regeneration of forests from farmland, and urbanization (Napton et al. 2010).

Given the need to make management decisions now without perfect knowledge, modeling provides a practical approach to studying the potential impacts of land use and climate change. Models can help identify sensitivities in a system that should guide future research, and they can serve as a meaningful tool for implementing an adaptive management strategy (Turner et al. 2001, Gardner et al.1999).

To help inform these management decisions we are leveraging existing data from the Southeast Gap Analysis Project to model vegetation dynamics across the region. The three core GAP datasets (land cover, stewardship and terrestrial vertebrate species models) were completed for the region in 2007. Those data have since been used in a variety of derivative projects and products, including the development of national datasets (i.e. the Public Areas Database and the National Gap Land Cover). In the Southeast, we have used the data to model future vegetation and habitat under two climate change scenarios as part of the Designing Sustainable Landscapes Project (DSL; http://www.basic.ncsu.edu/dsl), guided by the Atlantic Coast Joint Ventures Program. In the Southern Atlantic Migratory Bird Initiative (SAMBI), our objectives were to:

1. Project the effects of climate change on vegetation dynamics
2. Use the projected vegetation dynamics to model potential future habitat distribution for avian species

This article focuses on how the Gap Analysis datasets provided the foundation for our research. The outcome of this work will directly inform the development of optimal conservation strategies and decision support tools to guide conservation planning for the SAMBI.

Methods

Study area

The SAMBI area includes the coastal plain from Southern Virginia through Georgia and Northern Florida (Figure1). Within the area a variety of bird species and habitats have been identified as priority for conservation and management through a series of workshops led by the USFWS Joint Venture Program (Watson and McWilliams 2005). The Longleaf/Slash Pine Flatwoods and Savannahs and Longleaf Sandhills that occur throughout the region have been identified as important for the management of nine of the priority species including Red-cockaded Woodpecker, Northern Bobwhite, Loggerhead Shrike, Prairie Warbler, Bachman's Sparrow, Henslow's Sparrow, Brown-headed Nuthatch, American Kestrel and Red-headed Woodpecker. Conservation lands represent less than 10% of all lands in the SAMBI, with several larger managed lands scattered throughout (i.e. Apalchicola , Croatan, and Francis Marion National Forests; Camp LeJeune, Fort