Improving Conservation Planning for the Congaree Biosphere Reserve

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Background

The Congaree Biosphere Reserve (CBR), which is located near Columbia, SC, was recognized in 1983 by UNESCO's Man and the Biosphere Programme for its extraordinary biodiversity [1]. Intended to demonstrate a balanced relationship between people and nature, biosphere reserves endeavor to conserve the landscape and ensure the success of the species within, promote sustainable practices in the surrounding communities, and educate the public on the importance of conservation and sustainable development [2]. The CBR Advisory Council was formed in 2017 to direct and manage conservation efforts in the region. High spatial variation in land cover, habitat type, and protected status complicates coordinated management efforts in the CBR. This project pursues the development of targeted management strategies for the CBR, guided by spatial analysis of landscape properties and the expertise of local conservation managers.

Data and Methods

Land Use / Land Cover Data: Our analyses utilize Land Use and Land Cover (LULC) data from the 2016 National Land Cover Database [3]. The primary land cover categories were aggregated into five classes: developed, forest, shrubland, agriculture, and wetland. Open water and barren land were classified as 'other'. The software tool REDCAP [4] was then used to divide the CBR into six subregions with comparatively homogeneous land cover types. By reducing data complexity, regionalization assists in the visualization and analysis of landscape pattern and serves as a means for quantifying and monitoring landscape patterns.

After partitioning the CBR, we used ArcGIS and the GUIDOS Toolbox v. 2.9 [5] to calculate various metrics of landscape composition and configuration for each subregion. These metrics have been incorporated into the subregion profiles.

Expert Survey: We next developed a survey to identify conservation management opportunities and potential barriers to improvement within each of the six subregions. Respondents were presented with maps and brief descriptions of each subregion and asked to assess various conservation strategies. The survey was distributed to 33 local conservation experts with extensive knowledge of the CBR using SurveyMonkey. We received 20 responses from people representing a variety of different professional affiliations (30% Public Sector, 25% Education, 25% NGO, 10% Private Sector, 5% Interested Citizen, 5% Other). The three highest ranked management goals were identified for each subregion, as were rankings of existing benefits and written descriptions of unique features, suggested management opportunities, and barriers to improvement for each subregion.

Results and Future Directions

CBR partners include federal, state, and local agencies, the Department of Defense, businesses, industry, agriculture, economic development entities, NGO's, universities, and civic organizations. Because this research was conducted with the cooperation of the CBR's Advisory Council, our detailed subregional profiles provide relevant information that can be used immediately for guiding future conservation management endeavors. That information includes: 1) data on the unique features and benefits of each subregion, 2) shared management priorities from local conservation experts who know the area best, and 3) valuable insights on barriers to conservation management which can be used to pinpoint areas of concern to which additional resources may be allocated.

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References

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Columbia

Consisting largely of developed lands (65.1%), the Columbia Subregion is comprised of neighborhoods east of I-77 and several small recreation areas. The northern portion of this region is within Fort Jackson's borders, accounting for most of the overall percentage of protected area (30.1%). Road density in the Columbia subregion is significantly higher than all other subregions (12.13 km/ km^2).

Highest Ranked Existing Benefits:
1. Sustainable economic development
2. Ecotourism and outdoor recreation

Highest Ranked Management Goals:
1. Adding green infrastructure
2. Developing public and private partnerships
3. Addressing sources of industrial pollution

Cowasee Rivers and Floodplain

As the largest subregion of the CBR, the Cowasee Rivers and Floodplains region contains the geographic area adjacent to the Congaree and Wateree River as they converge into the Santee. This riparian landscape consists largely of wetland (73.3%) but lies alongside forested areas (13.7%) with limited intervening developed land (2.3%). Congaree National Park serves as the core of this subregion.

Highest Ranked Existing Benefits:
1. Scientific research and scholarship
2. Habitat conservation and protection

Highest Ranked Management Goals:
1. Promoting ecotourism and outdoor recreation
2. Improving habitat quality and connectivity
3. Promoting knowledge of community sites

South Congaree Bluff

The South Congaree Bluff Subregion is composed of a mosaic of forests interspersed with small creeks and farm ponds. Development is limited (7.5%), while predominant land cover types include forest (35.6%) and agriculture (25.1%). Overall, the level of forest and wetland connectivity is moderate for the CBR, as is the amount of core forest habitat. The area is almost entirely in private ownership, with little area under some form of protection (1.2%)

Highest Ranked Existing Benefits:
1. Good water quality
2. Habitat conservation and protection

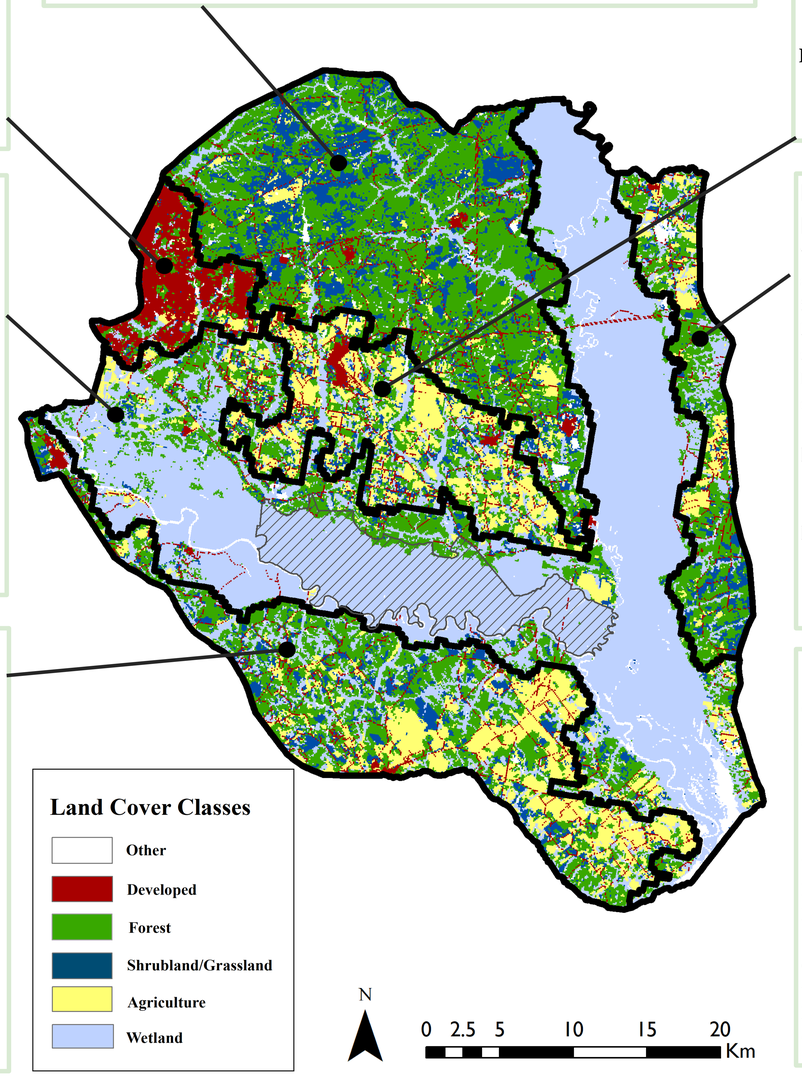
Highest Ranked Management Goals:
1. Improving habitat quality and connectivity
2. Developing public and private partnerships
3. Protecting additional greenspace

Fort Jackson and Rural East Richland

This subregion contains most of Fort Jackson and the adjacent area in rural east Richland County and consists largely of forest (57.8%) and shrubland (20.9%). Nearly half of this subregion is protected through Fort Jackson, part of McEntire Joint National Guard Base, and small conservation easements. Development in this subregion is sparse, making up just 6.4% of the land cover.

Highest Ranked Existing Benefits:
1. Carbon Sequestration
2. Presence of at-risk species

Highest Ranked Management Goals:
1. Developing public and private partnerships
2. Restoring lost ecosystems
3. Improving habitat quality and connectivity



Lower Richland

The Lower Richland Subregion is a fragmented mix of agricultural land (33.5%) and forest (27.1%). The region contains a significant network of roads and intervening wetland with a prominent patch of developed land in the northeast covering part of McEntire Joint National Guard Base. This subregion contains a relatively low percentage of protected land (5.4%), which is made up of small parks and the national guard base.

Highest Ranked Existing Benefits:
1. Cultural heritage tourism
2. Sustainable economic development

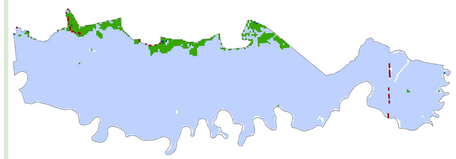
Highest Ranked Management Goals:
1. Developing public and private partnerships
2. Promoting knowledge of community sites
3. Protecting additional greenspace

Manchester State Forest and Horatio

The Manchester State Forest and Horatio Subregion is located along the eastern edge of the CBR bordering the Wateree River floodplain. Manchester State Forest and Poinsett State Park are located within this subregion, contributing to protected area that makes up 31.9% of the subregion. While the small community of Horatio is located within this subregion, developed lands make up just 7.5% of the land cover.

Highest Ranked Existing Benefits:
1. Habitat conservation and protection
2. Ecotourism and outdoor recreation

Highest Ranked Management Goals:
1. Promoting ecotourism and outdoor recreation
2. Improving habitat quality and connectivity
3. Promoting knowledge of community sites



Congaree National Park

Known for its biodiverse swath of old growth bottomland hardwood forest [6], Congaree National Park's 106 km^{2}consist of 93.6% wetland and 4.6% forest. Its Managed Use Area facilitates exchange between the protected landscape and the public through National Park Service amenities. It contains just over 60 km^2 of designated wilderness which is the only area in the Congaree Biosphere Reserve to fall under GAP 1 status.

Most Frequently Referenced Barriers to Conservation Management in Open-Ended Survey Questions

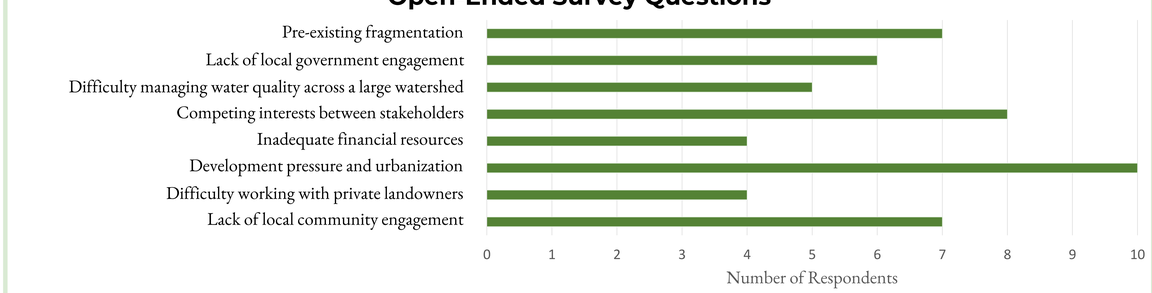
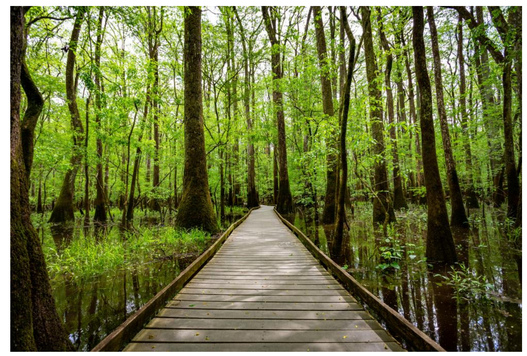


Figure 1: The graph above depicts recurring themes in survey responses regarding barriers to conservation management for the CBR. Respondents were asked to comment on what they considered to be the biggest threat to conservation management in each region.



Congaree National Park
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