Combining Conservation & Community Empowerment to Protect Grauer's Gorillas

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In the Sud-Kivu province of the Democratic Republic of Congo (DRC), agriculture and infrastructure development have fragmented wildlife habitat between two critical biodiversity hotspots, Kahuzi-Biega National Park and Itombwe Nature Reserve. Separated by over 40 km, these protected areas contain two of the remaining sub-populations of the critically endangered Grauer's gorilla. Natural resources from the unprotected landscape between the parks are critical for the livelihoods of local community members. To establish wildlife connectivity across the landscape without infringing on local access rights, the DRC government passed legislation in 2014 to allow for the implementation of community-based forest management (CBFM). This strategy involves locals in forest management and governance[1,2]. We use a combination of connectivity, climate projection, and socioeconomic models to identify priority conservation and restoration areas within the Kahuzi-Biega-Itombwe corridor and understand community sentiments about forest management.

Connectivity

We identify locations where movement is constricted (pinch points) and barriers to movement between the two protected areas for Grauer's gorillas. Areas within the corridor that are easiest for gorillas to traverse are primarily located in the corridor's eastern section (Fig. 1). The small section of the proposed corridor that narrows between the respective northern and southern portions is the most vital to Grauer's gorilla connectivity. The loss of this area could restrict gorilla movement between the protected areas. The conservation of high connectivity areas and pinch points will protect and promote Grauer's gorilla movement within the Kahuzi-Biega-Itombwe corridor. Several barriers to gorilla movement are located within three of Strong Roots' proposed reforestation zones (Fig. 2). Impending restoration efforts in these zones are likely to reduce the difficulty of moving through the area and thus further promote Grauer's gorilla movement within the proposed corridor.
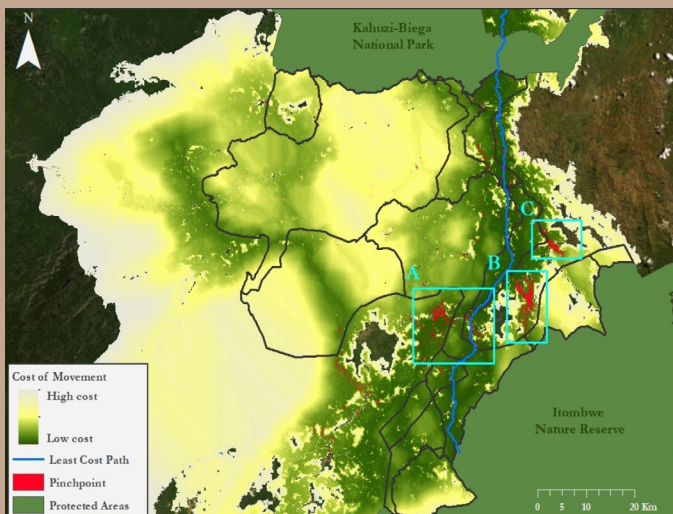

Figure 1. Grauer's Gorilla Connectivity. Green areas surrounding the least cost path (blue) represent the most efficient corridor pathway and movement pinch points, which are critical areas to conserve, are shown in red.
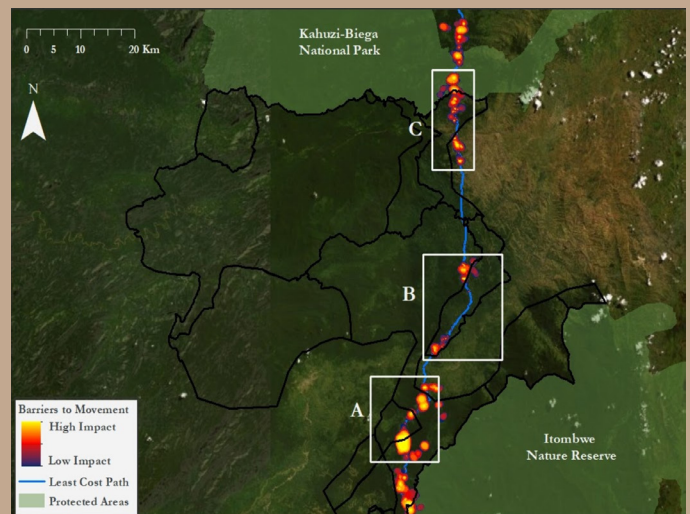

Figure 2. Grauer's Gorilla Barriers. Circles represent barriers that reduce connectivity (severity indicated by color and size). A, B, & C identify barriers most suitable for restoration that would enhance overall connectivity.

PRIMATE PATHWAYS

Climate

Under all future climate scenarios, optimal Grauer's gorilla habitat is likely to experience shifts in range that will reduce the availability of submontane and montane forests in Kahuzi-Biega National Park (Fig. 3). Such extensive loss of habitat could be catastrophic for the long-term persistence of the species if they cannot disperse across the landscape. Ensuring that areas of future suitable habitat outside of the park are available for dispersal may be critical in preventing the extinction of this sub-population.
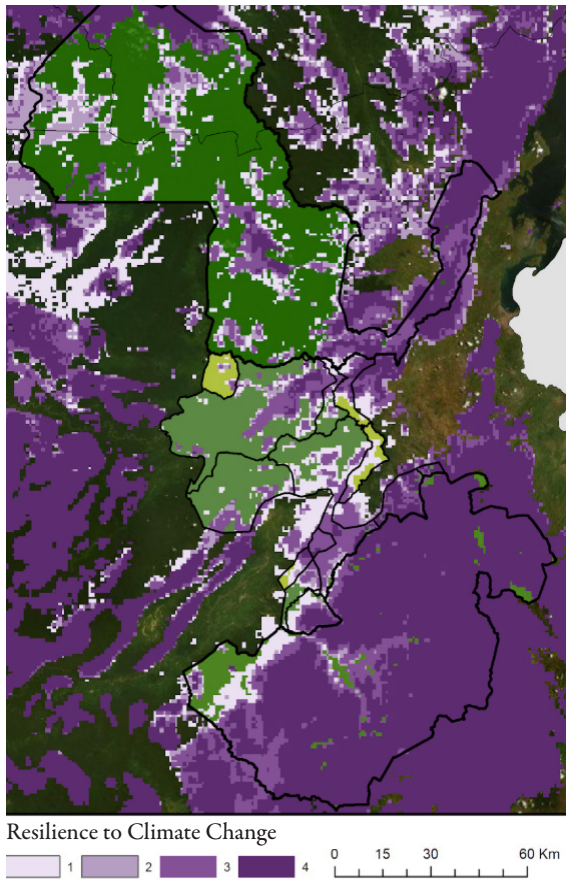
Community Sentiment Analysis

The socioeconomic model highlights variation in local community opinions based on proximity to protected areas and reveals that general disagreement with conservation initiatives increases with increased distance from protected areas (Fig. 4). Likewise, public sentiments near the pinch points identified in our connectivity analysis indicate that households located within 10 km of the pinch points were generally in slight agreement or slight disagreement with conservation plans. Widespread community opposition to conservation efforts could dampen the observable benefits from CBFM implementation. Strong Roots should continue to identify meaningful ways to engage with the local community to remedy community forestry specific criticisms and increase satisfaction and engagement patterns.
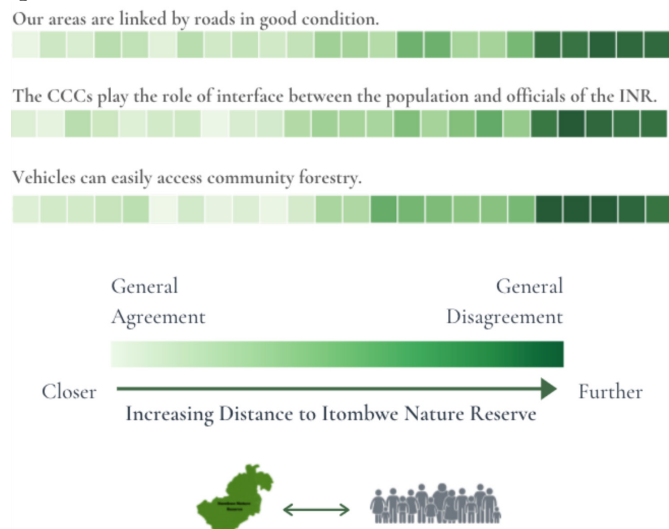

Resilience to Climate Change

1   2   3   4

0   15   30   60 Km

Figure 3. Areas of forest habitat predicted to be most resilient to climate change. The numbers in the legend indicate how resilient the area is to climate change, with darker purple being most resilient. Kahuzi-Biega and Itombwe are shown in dark green and the corridor is shown in light green.

Our areas are linked by roads in good condition.

The CCCs play the role of interface between the population and officials of the INR.

Vehicles can easily access community forestry.

General Agreement   General Disagreement

Closer   Further

Increasing Distance to Itombwe Nature Reserve

Figure 4. Sentiment heatmap on selected statements. Respondents further from Itombwe Nature Reserve generally disagreed with presented statements on protected area accessibility, governance, and resource use.

The models can be used to guide conservation planning to identify areas that should limit resource extraction and areas where sustainable development would least impact Grauer's gorillas. For the Kahuzi- Biega-Itombwe Corridor, these recommendations include using high connectivity areas and pinch points as key areas of conservation, prioritizing reforestation zones based on identified barriers, incorporating sentiment results into community outreach strategies, and considering the landscape climate resilience in planning conservation areas.

Strong Roots Congo is not alone in its mission to improve both biodiversity and community livelihoods throughout the DRC. This project contributes to the knowledge of current and future Grauer's gorilla habitat connectivity in the Sud-Kivu region and reveals potential obstacles from community opposition and the impending effects of climate change. In the coming years it will become increasingly important for adjacent community forest managers to come together and align conservation efforts to allow for the full connection of the remaining Grauer's gorilla populations. Moving forward, the Kahuzi-Biega-Itombwe Community Forest management plan can serve as a framework for developing spatial plans that incorporate community needs to ensure the long-term coexistence of local people with a connected habitat for Grauer's gorillas.

[1] Gilmour, D. (2016). Forty years of community-based forestry: A review of its extent and effectiveness. Food and Agriculture Organization of the United Nations. http://www.fao.org/3/i5415e/i5415e.pdf

[2] RECOFTC. (2013). People and forests for a greener future: Empowering local people to effectively and equitably engage in the sustainable management of forested landscapes. https://archive.recoftc.org/reports/recoftc-strategic-plan-2013-2018