The benefits of savanna fire management in Africa

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Credit: Luke Hunter

Many savanna-dependent species in Africa, including large herbivores and apex predators, are at increasing risk of extinction. Estimated costs of achieving effective management of protected areas in Africa where lions live could reach $2 billion (USD) annually. Researchers have now

explored the potential for fire management-based carbon-financing programs to fill this funding gap and benefit degrading savanna ecosystems.

The scientific paper "Savanna fire management can generate enough carbon revenue to help restore Africa's rangelands and fill Protected Area funding gaps," published in the December issue of the journal *One Earth*, builds on a history of collaborative and independent research by the Biodiversity Research Institute, The Nature Conservancy (TNC), Soils for the Future, the Wildlife Conservation Society (WCS), and the Wildlife Conservation Network (WCN), and quantifies the benefits of savanna fire management in Africa.

"It is critical to raise awareness about the untapped potential for carbon revenues that would support management of protected areas in Africa," says Tim Tear, Ph.D., director of BRI's Climate Change Program and lead author on the paper. "This study provides the first credible estimates built on sound data and proven methodologies that clearly show the significant potential for substantial long-term economic and ecological benefits. Given the positive social and biodiversity impacts that come along for the ride, we can only hope that with greater understanding, more public and private investment will follow."

Co-authors of this work have published related papers and their research is integrated in this new paper.

"These discussions started in 2012, and it's exciting to see how good ideas can take hold and build momentum," says Geoffrey Lipsett-Moore, Ph.D., carbon areas specialist for TNC Australia, co-author on this study. He is also lead author of the related study titled "Emissions mitigation opportunities for savanna countries from early dry season fire management."

"The many years of savanna fire management in northern Australia that has directly benefitted the Aboriginal communities provide a clear proof-of-concept that fire management-based carbon projects can work. We are hopeful that similar benefits may soon be possible in Africa," says Lipsett-Moore.

Of the 256 protected areas with lions reviewed in this study, 198 had potential for GHG reduction from fire management, encompassing a total area of nearly 1.1 million square kilometers. "Many protected areas in Africa are degraded or are at high risk of degrading in the very near future due to intense pressures from expanding human populations and resource extraction by local and international corporations," says Peter Lindsey, Ph.D., director of WCN's Lion Recovery Fund, co-author on this study, and lead author of the related study, More than $1 billion needed annually to secure Africa's protected areas with lions.

"If we do not act quickly to address this growing threat, the years of investment to establish protected areas will be rapidly lost. If we allow protected areas to be lost and converted to alternative land uses, the carbon release could be catastrophic, not to mention the loss of biodiversity Investing in smarter carbon projects that create direct benefits to protected areas and the people who live around them is critical to the future for not only lions, but for all biodiversity in Africa."

The results of this collaborative work demonstrate that savanna burning methodologies could generate carbon revenues for many protected areas in Africa, and when they are combined with soil and woody carbon pools the potential is significantly greater. "Most carbon projects do not consider that they could be getting additional credits by adding in activities of other methodologies, like managing fire, that remove greenhouse gases to different carbon pools. These possibilities represent missed opportunities to increase the value of land from a carbon credit perspective," says Mark Ritchie, Ph.D., co-author on this study, founder

of Soils for the Future, and author of one of the carbon methodologies highlighted in this paper.

"African savannas are rarely thought of in terms of their carbon value, but it is time they should be," says Luke Hunter, Ph.D., a co-author and executive director of the WCS Big Cats Program. "The simple step of shifting when savanna fires are set triggers a chain reaction of positive, self-reinforcing impacts—healthier, richer landscapes, more lions and their prey, and less carbon released to the atmosphere. If rich countries pay for locking away that carbon, we could generate the essential financing that would help protect these magnificent places and support the communities that live in and around them."

This study demonstrates how introducing early dry-season fire management programs could produce potential carbon revenues from either a single carbon-financing method (avoided emissions) or from multiple sequestration methods. Potential carbon revenues for savanna protected areas range from USD $1.5–$44.4 million annually per protected area.

Beyond the financial revenues from carbon credits, another important value of this work is the potential to reduce greenhouse gas (GHG) emissions. "If it were possible to implement fire management programs in all of the protected areas that would benefit from this approach, the total annual carbon equivalents estimated is approximately 12 million metric tons from GHG alone," says senior TNC scientist Nicholas Wolff, Ph.D. "This is equivalent to the amount of carbon dioxide captured by nearly half a billion trees each year, or the equivalent of Tanzania's annual fossil fuel emissions. If we also consider the carbon sequestration potential from fire management, this number jumps to 131 million metric tons, approximately 40 percent of the UK's annual fossil fuel emissions, or the annual emissions from nearly 30 million cars."

In 2021, the United Nations announced its Decade of Ecological Restoration with the goal of preventing, halting, and reversing the degradation of ecosystems worldwide. "We encourage investing in fire management programs to jump-start the UN's Decade of Ecological Restoration," says Dr. Tear. "Worldwide attention and cooperation are needed to help restore degraded African savannas and conserve imperiled keystone herbivores and apex predators."

More information: Timothy H. Tear et al, Savanna fire management can generate enough carbon revenue to help restore Africa's rangelands and fill protected area funding gaps, *One Earth* (2021). DOI: 10.1016/j.oneear.2021.11.013

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