



Ecological Restoration Institute



Fact Sheet: Economic Value of Selling Carbon Credits January 2011

The Economic Value of Selling Carbon Credits by Restoring the Navajo Nation's Tribal Forests

Arizona is home to 21 federally recognized tribes and more than 250,000 Native Americans. Reservations and tribal communities comprise more than a quarter of Arizona's land base. The majority of tribal forests are located within the Navajo Nation and the White Mountain Apache Tribe reservations, and are managed in cooperation with the Bureau of Indian Affairs. Research about the financial feasibility of carbon (C) sequestration on American Indian forests is critical, but unprecedented until this study by Dr. Ching-Hsun Huang and Christopher Sorensen of the NAU School of Forestry.

The Navajo Nation (or Dine Bikeyah) extends across the states of Arizona, New Mexico and Utah, encompassing 27,000 square miles (Figure 1). However, much of its land base is very remote and isolated. The Navajo Forest refers to the timbered lands of the Defiance Plateau and Chuska Mountains. This 428,000-acre commercial timberland includes 372,566 acres of ponderosa pine forest, which was the focus of this study. While these forests provide income to the Navajo Nation from timber sales, there is also the possibility, if not now then in the future, that they may be able to provide additional income through the sale of carbon credits. With that thought in mind, the goals of this study were to 1) perform project analysis to quantify C emission reduction resulting from conducting forest restoration treatments to control fire hazard, 2) perform discounted cash flow analysis to determine the net present worth of fuel reduction programs, and 3) examine the financial feasibility of trading C sequestered in the Navajo Nation forests. This theoretical study was done using data from the Navajo Nation Tribal Forest.

Research Findings

- Eighty-three percent (307,667 acres), of the Navajo Forest's ponderosa pine timberland were in the very low fire hazard risk level. However, 4,807 acres of the Navajo Nation timberland were in the medium-high fire hazard risk level and classified as out-of-condition. This indicates that restoring these fire-prone timberlands to a very low risk level would likely be the priority of the Navajo Nation's forest management.
- Treatments would stimulate the timber growth of the residual stands. During the 50-yr period of this study, an additional 121.6, 208.0, and 327.2 tons of C/acre would be stored under the three restoration treatments (BA 100, BA 70, BA 40), respectively. In terms of aboveground live tree C storage, the three treatment options outperformed the no treatment option throughout the study period.
- When both timber production and C sequestration were marketable outputs, the net present worth (NPWs) were higher compared to NPWs derived from timber revenues only.

Management Implications

- The current poor to nonexistent timber market in northern Arizona has not provided the needed financial incentives to entice land managers to conduct necessary restoration treatments to reduce fuel buildup and prevent catastrophic wildfires. The inclusion of C revenues in forest management could play a key role in the profitability of forest management (Table 1).
- The amount and trend of future C prices will affect the financial gains associated with C emissions reduction. Based on assumptions made in this study, a target basal area (BA) 40 would generate the highest NPWs under all nine C price scenarios. (over)

The Ecological Restoration Institute is dedicated to reversing declines in the condition of forested communities throughout the Intermountain West, particularly those affected by severe wildfires and insect outbreaks. Our efforts focus on science-based research of ecological and socio-economic matters related to restoration as well as support for on-the-ground treatments, outreach, and education.

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Management Implications (cont'd)

- Restoration treatments will enhance long-term C storage, and the target BA of the treatments will affect the magnitude of this increase. The results of this study indicate that target BA 40 is most efficient with additional 327.2 tons/acre of C storage during the 50-yr projected period, equivalent to an additional 6.5 tons of C storage per year. At the end of the project period, this increase is 189% higher than that of the no-treatment option.
- As the demand for C credits increases, it is critical to advance societal awareness of carbon in forest ecosystems and, consequently, the impacts of management strategies on long-term C storage. Land managers need to be aware of changes in C prices and their stand fire hazard risk levels, and adjust their management practices accordingly to minimize catastrophic wildfires and maximize their revenues from the management of timber production and C sequestration.

Figure 1. Defiance Plateau/Chuska Mountains, site of the Navajo Nation Tribal Forest.

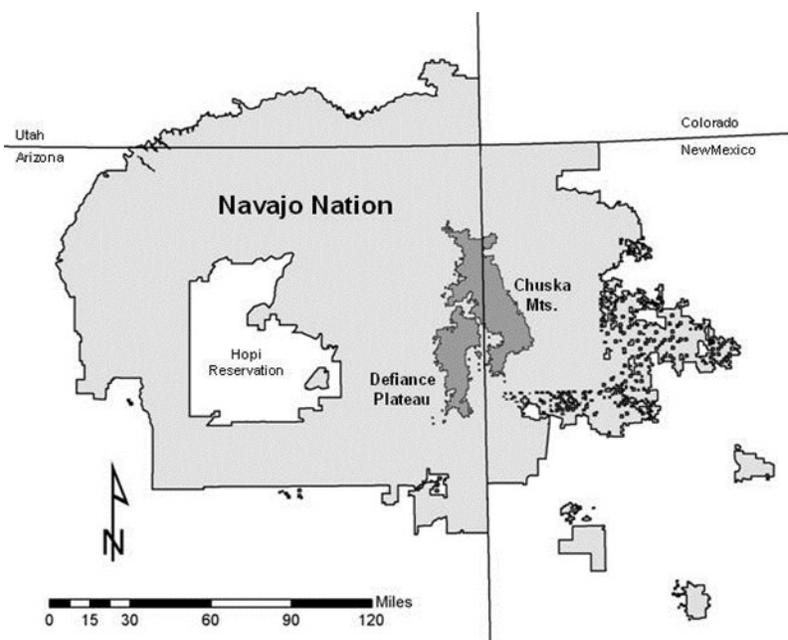


Table 1. Break-even C prices (\$/ton) for various treatment levels and a range of real alternative rates of return under two C accounting approaches for out-of-condition acres of ponderosa pine on the Navajo Nation timberland, 2009.

Treatment level	Real alternative rates of return			
	2%	4%	6%	10%
1 st accounting approach: reduced buffer pool under the CAR protocol				
BA 40	14.46	16.96	18.51	19.87
BA 70	61.82	72.10	78.78	85.20
BA 100	318.66	408.97	483.85	582.36
2 nd accounting approach: increased C stocks based on with and without analysis				
BA 40	0.84	1.39	2.10	3.90
BA 70	2.39	3.82	5.67	10.41
BA 100	4.70	7.44	11.03	20.72