Forest Finance Unlocks Opportunities for Rural Communities: Exploring the Triple Bottom Line Impacts of the Forest Resilience Bond Model

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The Forest Resilience Bond (FRB) is a financial tool that enables private investment in forest enhancements on public land. The FRB promises to accelerate the pace and scale at which critical work to restore the health and functioning of the nation's forested landscapes is undertaken. It does so by engaging private capital to cover the upfront cost of activities to improve forest health and by bringing together stakeholders that benefit from this work to share in the cost of reimbursing investors over time. These beneficiaries sign contracts that jointly cover the project cost plus a modest return to investors, meaning that no one stakeholder shoulders the burden of repayment alone. The result is a collaborative finance model that yields clear ecological, social, and financial returns.

While perhaps less obvious, the FRB model also unlocks opportunities for positive social impact in rural communities across the country. In addition to the direct impact of job creation, FRB projects can catalyze infusions of capital into rural areas by sending signals to the market that there is a steady supply of raw material to fuel forest-based industries. Against a backdrop of declining rural prosperity, this article envisions how the FRB could play a role in assisting rural areas—especially those with historically forest-based economies—transition to a more resilient ecological and economic future.[1]

Threats to Forests and Communities

Healthy forests maintain clean and abundant water for human consumption, irrigation, industry, and power generation. They also control flooding, sequester carbon, support biological diversity, sustain rural economies, and provide opportunities for recreation. And yet, forests across the U.S. face an array of challenges that put at-risk the ecological and economic benefits these landscapes provide.

The impacts of wildfire, drought, flooding, and insect and disease disturbance are increasingly severe as the impacts of a changing climate and growing development pressures leave forested landscapes vulnerable. This combination of hazards has prompted increasing rates

1 Davidson, J.L. et al. "Interrogating resilience: toward a typology to improve its operationalization," *Ecology and Society*, 21(2) (2016), p. 27. doi: 10.5751/ES-08450-210227

of tree mortality in western forests,[2] with a 2017 U.S. Department of Agriculture (USDA) study estimating the state of California alone to have 129 million standing dead trees.[3] Decades of forest policy focused on suppressing fire at all costs have also prompted forests nationwide to become unnaturally overgrown and thereby susceptible to pests, disease, and fire.

While the FRB funds ecological interventions that mitigate all of these threats, its primary intent is to reduce risks associated with one growing, high-visibility hazard–large-scale wildfires. In western states, the frequency, scale, and severity of wildfire is increasing: nine of the ten worst fire seasons on record have occurred since 2000 and close to 47,000 fires burned more than seven million acres of forest in 2017 alone.[4] In 2017, U.S. Forest Service (USFS) spending on fire suppression exceeded $2 billion[5] for the first time and over the last five years wildfire has prompted more than $5 billion in property loss.[6]

Forest conditions and human development patterns suggest these alarming trends will continue. In 2017, USFS identified 58 million acres of National Forest lands as at risk of severe wildfire.[7] Climate change models show temperatures rising three-to-four degrees and precipitation declining up to 20 percent in western states by the end of the century–shifts that would intensify fire risk.[8] In addition, development along the wildland-urban interface continues to put people, homes, and infrastructure in harm's way. Approximately 40 percent of recent development in the American West has occurred in areas at high risk of forest fire.[9]

Rural communities are dealing first-hand with the impacts of environmental threats like wildfire, as well as an array of other challenges. Across the nation poverty rates in rural locales exceed those in metro areas.[10] Many communities have watched local working-class jobs in manufacturing, timber, and agriculture gradually disappear, without parallel opportunities for employment arising. Low access to jobs, health care and education services, and transit

2 van Mantgem, P.J. et al. "Widespread Increase of Tree Mortality Rates in the Western United States," *Science*, 323 (5913) (2009), pp. 521-524.

3 U.S. Department of Agriculture. "Record 129 Million Dead Trees in California" (2017), available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd566303.pdf.

4 National Interagency Fire Center. "Fire Information" (2018), available at https://www.nifc.gov/fireInfo/nfn.htm.

5 U.S. Department of Agriculture. "Forest Service Wildland Fire Suppression Costs Exceed $2 Billion" (2017), available at https://www.usda.gov/media/press-releases/2017/09/14/forest-service-wildland-fire-suppression-costs-exceed-2-billion.

6 Insurance Information Institute. "Facts + Statistics: Wildfires" (2018), available at https://www.iii.org/fact-statistic/facts-statistics-wildfires.

7 U.S. Forest Service. "Fiscal Year 2017 Budget Overview," U.S. Department of Agriculture (2016), available at https://www.fs.fed.us/sites/default/files/fy-2017-fs-budget-overview.pdf.

8 Melillo, J.M., Richmond, T.C., and Yohe, G.W. (eds.). "Climate Change Impacts in the United States: The Third National Climate Assessment; Highlights: Future Climate," U.S. Global Change Research Program (2014), available at https://nca2014.globalchange.gov/highlights/report-findings/future-climate. doi: 10.7930/J0Z31WJ2

9 Glickman, D. and Sherman, H. "Paying for the Forest Fire Next Time," *The New York Times* (June 17, 2014), available at https://www.nytimes.com/2014/06/18/opinion/paying-for-the-forest-fire-next-time.html.

10 Economic Research Service. "Rural Poverty & Well-being," U.S. Department of Agriculture (2018), available at https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being#geography.

and broadband infrastructure limit the ability of rural populations to advance community resilience and bounce back from economic downturns, transitions in industry, natural disasters, and other events outside of their control.

Most relevant to the FRB model are rural communities that have historically relied on the timber and wood products industries to sustain livelihoods, services, and infrastructure. Communities across the country, from northern New England to the Sierras in California, have dealt with the repercussions of declining timber harvests and mill closures for the last 25 to 50 years depending on the region. The decline of wood-based economies has stagnated economic growth, eliminating communities' primary source of employment and prompting population drop-offs. In addition, the industry-specific knowledge and skills required to rebuild struggling communities has been lost.

While a dominant narrative of rural decline persists in media and politics, the experience of residents across rural America is more varied. A 2015 survey of nearly 17,000 rural inhabitants showed that in addition to the poor and underserved communities most often highlighted in popular discourse, prosperous areas with ample infrastructure and growing populations (as well as zones in economic transition) also exist.[11] Researchers found that regions with a history of economic strength tend to be more equipped for transitions to new industries and ways of doing business, even if they have fallen on hard times.[12] Communities with robust legacies in the forest products sector could be well primed for economic transitions if they were able to access catalytic investment through a mechanism like the FRB.

Threats to ecological and community resilience nationwide are intertwined. Environmental disasters like wildfire, the risks of which are exacerbated by overcrowded forests, put rural lives and property at risk. High density forests are less equipped to provide the clean air and water that support populations across rural-urban gradients. At the same time, the decline of forest-based industries has left many communities in search of new pathways to economic revitalization.

The Ecological and Social Returns of Forest Restoration

Just as the threats to forested landscapes and rural communities are connected, so too are the opportunities to address them. The FRB addresses these threats by funding activities that improve the functioning of ecological processes associated with forest health, a field of work broadly termed "ecological restoration." In the context of overcrowded forests, restoration activities contribute to ecosystem resilience by reducing the threat of hazards like wildfire, insects, and disease.[13]

11 Ulrich-Schad, J.D. and Duncan, C.M. "People and places left behind: work, culture and politics in the rural United States," *The Journal of Peasant Studies*, 45 (1) (2018), pp. 59-79.

12 Ibid.

13 U.S. Department of Agriculture. "U.S. Forest Service Fiscal Year 2015 Budget Overview" (2014), available at https://www.fs.fed.us/aboutus/budget/2015/FY15-FS-Budget-Overview.pdf.

Mechanical thinning and prescribed burning are two commonly employed restoration strategies, or forest health treatments. These techniques return overgrown forests to natural densities by thinning out small diameter and dead trees, and eliminating woody debris that builds up on the forest floor. Restoration work reduces the risk of large fast-spreading wildfire by removing these hazardous fuels. These activities slow the spread of pests and disease by increasing the space between trees. In addition to the techniques most relevant to fire risk reduction, ecological restoration can include work to restore meadows and riparian ecosystems, decommission roads, remove culverts, eradicate invasive species, and reforest landscapes.

These restoration methods have proven results. By reducing fire risk, forest health treatments protect lives, property, and habitat from the devastation of large-scale burns, prevent carbon stored in tree biomass from being released into the atmosphere, and keep sediment from ash, debris and erosion from impacting water quality and heightening treatment costs. Thinning forests also frees up water consumed by overly-dense vegetation to flow downstream for drinking, irrigation, industry, and hydroelectric power generation.[14]

Along with restoration activities come jobs that fuel a burgeoning "restoration economy." Economic output from environmental restoration, restoration-related conservation, and mitigation actions, is a growing driver for rural communities across the country.[15] A 2015 study estimates that the domestic restoration economy employs approximately 126,000 and yields $9.5 billion in economic output nationwide, while supporting an additional 95,000 jobs and $15 billion in economic output through increased household spending and other indirect linkages.[16] The employment effects of individual restoration projects appear to exceed those of the oil and gas industry, with restoration projects supporting up to 33 jobs per $1 million invested compared to the 5.2 jobs generated by oil and gas projects.[17]

In addition to creating on-the-ground jobs to thin, burn, and otherwise restore forests, the restoration economy yields new opportunities for employment in industries that utilize small diameter timber, dead trees, and other residuals generated through ecological restoration. The most promising of these opportunities include bioenergy plants that generate heat and electricity from the biomass of woody debris, and facilities that produce mass timber products that take advantage of small diameter wood to create solid panels for construction.[18] Other nascent industrial uses of these materials include the production of carbon sequestering biochar and extraction of tree-based chemicals. Forest restoration

14 Ge, S., Caldwell P.V., and McNulty, S.G. "Modelling the potential role of forest thinning in maintaining water supplies under a changing climate across the conterminous United States," *Hydrological Processes*, 29(24) (2015), pp. 5016-5030, available at https://www.fs.usda.gov/treesearch/pubs/48417.

15 BenDor, T. et al. "Estimating the size and impact of the ecological restoration economy," *PLoS ONE*, 10 (6) (2015): e0128339.

16 Ibid.

17 Ibid.

18 The Beck Group. "Dead Tree Utilization Assessment," CALFIRE and California Tree Mortality Task Force (May 2017), available at http://www.fire.ca.gov/treetaskforce/downloads/WorkingGroup/Beck_Group_Report_5-1-17%20.pdf.

directly addresses threats to forest health while also helping to grow a restoration economy that supports new opportunities for rural prosperity. The FRB model could play a pivotal role unlocking these opportunities at a scale that impacts forest health and rural lives across the country, while simultaneously contributing to large-scale efforts that mitigate the effects of climate change.

Understanding the Forest Resilience Bond

The FRB model is, most simply put, an investment in forest health. Its potential for impact is predicated on the idea that the long-term value of forest health exceeds the initial cost of restoration. Using an investment structure comparable to infrastructure project financing, the FRB relies on contracted cash flows to monetize the ecological and social outcomes associated with forest restoration.

The FRB accelerates the pace and scale at which restoration activities can be undertaken by raising private capital to fund the full cost of restoration upfront. Then, a range of stakeholders that benefit from project outcomes like reduced fire risk and improved water quality share the cost of reimbursing those investors over time at a modest rate of return. Depending on the project, beneficiaries may make contracted payments of two varieties: (i) fixed cost-share payments; or (ii) pay-for-success payments that reimburse investors at different rates based on project outcomes. In either case, contracting with beneficiaries–including but not limited to federal agencies, state governments, water and electric utilities, water-dependent companies, and private landowners–converts restoration benefits into cash flows for investors.

What differentiates the FRB from other approaches is not only its use of investor capital to fund restoration quickly and at scale, but the collaborative model of cost sharing between beneficiaries. This approach engages a range of stakeholders to split the cost of repaying investors and involves them in project development. As such, the FRB model encourages a collaborative systems-level response to forest health challenges that makes use of funds, experience, and expertise from a range of public, private, and civic stakeholders.

In November 2018, the project developer Blue Forest Conservation launched its first pilot, raising $4 million for a $4.6 million project to restore 15,000 acres of California's North Yuba River Watershed. Due to the perceived financial risk and smaller size of this initial launch, Blue Forest Conservation used a blended capital structure that relied on funds from concessionary sources that can tolerate higher risk as well as non-concessionary sources. Concessionary capital came from program-related investments (PRIs) made by mission-focused foundations that generate below-market-rate returns of one percent. Market rate investors–including an insurance company looking to diversify its portfolio, generate a market rate return, and reduce its risk of insured losses over time–will earn a four percent return. Investors will be repaid over five years by a local water utility and the State of California, both of which reap the benefits of increased water quality and quantity, as well as reduced fire risk.

Given the staggering scale of ecological need, Blue Forest Conservation plans to scale the FRB to fund projects in the $25 to $50 million range, as well as aggregate smaller planned projects into a fund structure. Working at this scale will allow access to larger institutional investors such as pension plans, endowments, and insurance companies that require a certain scale of opportunity to invest. In addition to opening doors to new investors, larger projects fund more acres of restoration, reduce transaction costs, and make the time and cost associated with investors' due diligence worth it. Blue Forest Conservation envisions future larger projects as fully market-rate transactions that mirror infrastructure project financing.

Growing the Restoration Economy through the Forest Resilience Bond

Bank lending indirectly follows the patterns and limits set by insurers and FEMA. Banks lend to property that can obtain the appropriate casualty or flood insurance. Bank loans are secured by liens on specific parcels. Current practice then is to lend to insurable parcels owned by borrowers with adequate credit. However, successful climate change adaptation measures for WUI fire risk are not exclusively parcel specific. As noted above, WUI fire risk mitigation also needs to be at a neighborhood or community scale. Consequently, lending to rebuild a community devastated by a climate change disaster to a new, more adaptive, standard is not consistent with current bank lending protocols. Banks will lend where insurance is available. Consequently, as has been noted by many, if the federal flood insurance program promotes rebuilding in flood prone areas, banks will continue to lend to those areas. That amounts to bank lending to rebuild to fail.

The FRB's potential to unlock opportunities for ecological and community resilience falls into four primary buckets. First and foremost, the FRB matches investment-ready capital with on-the-ground restoration projects that yield both environmental and social returns. Second, it accelerates the pace and scale at which restoration work can yield these dual returns by raising funds upfront. Third, it smooths out and stabilizes otherwise irregular funding from public sources, allowing work to move forward more rapidly and predictably. And fourth, it signals to the broader market a steady supply of woody biomass, encouraging investment in rural economies awaiting growth opportunities.

Putting Undeployed Conservation Capital to Use

A 2016 assessment of the emerging market of conservation investing–or investing motivated by profit generation as well as positive impact on natural resources and ecosystems–documents the sector's dramatic growth over the last decade.[19] Between 2009 and 2015 a total of $8.2 billion was committed to conservation investments worldwide, with the average annual capital committed doubling from $0.8 billion between 2009 and 2013 to $1.6 billion in 2014 and 2015. The assessment also tracked $3.1 billion in undeployed capital at the end

19 Hamrick, K. "State of Private Investment in Conservation 2016," Ecosystem Marketplace (January 11, 2017), available at https://www.forest-trends.org/publications/state-of-private-investment-in-conservation-2016/.

of 2015, indicating that investors are on the lookout for investable conservation projects. Unfortunately, barriers such as a lack of attractive risk/return profiles, small transaction sizes, and a lack of management track records are keeping investors from immediately deploying capital.[20]

The FRB could play a key role in connecting undeployed investment-ready capital with forest restoration projects, with Blue Forest Conservation playing the role of match-maker. As the project developer, Blue Forest identifies landscapes with ecological need, pre-designed and permitted restoration projects, land managers on the lookout for new ways to finance critical work, beneficiaries to repay investors, and partners to implement treatments. Building on its North Yuba River watershed pilot, Blue Forest Conservation will also pursue projects that do not rely on concessionary capital, thereby addressing investors' concerns about risk/return profiles and transaction size.

Accelerating the Pace and Scale of Restorations

Forest health treatments are expensive, ranging from hundreds to thousands of dollars per acre depending on the landscape and treatment prescription. Historically, the cost of restoration activities nationwide has been shouldered by individual land managers, such as the USFS, state governments, municipal water utilities, and private landowners like land trusts, private companies, and individuals. However, the work undertaken by both public and private stewards is severely constrained by financial resources, be they annually appropriated funds, philanthropic dollars, or companies' operating budgets. As such, forest restoration is proceeding at a pace and scale that does not meet the urgency or scale of the need. In the case of the USFS, resource limitations exacerbated by the rising cost of wildfire suppression have prompted a 30 to 45 year backlog of forest restoration work in California alone.[21] As these interventions are further deferred due to resource constraints, the costs of restoration continue to rise.

The FRB addresses this challenge by raising funds to cover the full cost of project implementation upfront. In the case of the North Yuba River watershed project, work that would have taken a decade or more to complete if relying on USFS annual appropriations is projected to finish in just two to three years. Speedy deployment not only allows work to get done faster, it saves land managers the compounding costs of inaction over time and helps create psychological momentum that moves communities from risk-averse mentalities to mindsets that embrace innovation and opportunity.

Providing Financial Flexibility

In some cases, financial resources already exist to fund restoration, but putting them to use on the ground can be difficult. Many federal and state programs provide reimbursable grants, meaning that organizations–often small resource-constrained nonprofits–must

20 Ibid.

21 U.S. Forest Service. "Ecological Restoration and Partnerships–Our California Story," U.S. Department of Agriculture (2018), available at https://www.fs.usda.gov/detail/r5/landmanagement/?cid=stelprdb5412095.

complete the work, or a portion of it, before they receive funding. Even after work has been finished, it can take months for project implementers to see funds deposited in their accounts. For cash-poor organizations, finding the upfront funds to implement forest health treatments in a timely manner can be a huge challenge.

By raising capital to cover full project costs upfront, the FRB directly addresses this barrier. Project implementers have funds in hand before work begins, meaning that restoration can happen on quicker and more predictable timelines than would otherwise be possible. Reimbursable grant dollars can still be used within the context of the FRB model, as a source of repayment with extremely low credit risk for investors. In the North Yuba River pilot project, the State of California is providing reimbursable grant dollars as work is implemented. Ultimately, the same state funds are still deployed to improve forest health, but the upfront use of FRB capital smooths out an otherwise irregular timeline of implementation and reimbursement.

Signaling the Market

Building strong rural economies in forested areas requires demand for forest-based products, as well as supply chains that can meet that demand. As demand for bioenergy grows globally, demand for low-grade raw materials to fuel bioenergy facilities is also on the rise.[22] However, the domestic biomass sector has had difficulty guaranteeing a steady supply of woody debris to meet the year-round capacity of existing generation facilities, much less new ones. While the trajectory of demand for mass timber products is less certain, supply can also be an issue for this emerging market.

The inconsistencies in supply hindering these markets are not due to a lack of raw materials. In California alone, an estimated 102 million dead trees were accounted for in 2016, which equates to more than 40 years of timber harvesting at 2015 levels.[23] A USFS inventory showed small diameter timber to be even more prevalent–an estimated 6.8 billion trees with diameters less than five inches filled California's forests in 2010.[24] Instead, insufficient financial and human resources have created a bottleneck when it comes to removing fuels and transporting them to biomass facilities and wood processing plants. Even with growing demand, these inconsistent supply streams discourage investment in the sector and in the rural communities that house these facilities.

FRB projects could prompt investment in rural economies by signaling to the market that restoration economies are primed for investment. Capital from the FRB signals that work to thin forests and remove trees will be happening, and happening more quickly and predictably, prompting a consistent stream of supply for both bioenergy and mass timber products. In the context of rural economic development, investments in harvesting equip-

22 Oliver, A. and Khanna, M. "Demand for biomass to meet renewable energy targets in the United States: implications for land use," *Global Change Biology Bioenergy*, 9(1) (2017), pp. 1476-1488.

23 The Beck Group. "Dead Tree Utilization Assessment" (May 2017).

24 Christensen, G.A. et al. "California's Forest Resources: Forest Inventory and Analysis, 2001-2010," U.S. Department of Agriculture (February 2016), p. 104, available at https://www.fs.fed.us/pnw/pubs/pnw_gtr913.pdf.

ment, biomass and wood processing infrastructure, and job training programs could be indirectly stimulated through the deployment of FRB capital. These auxiliary investments could come from public, philanthropic, or private sources with a variety of motivations and goals.

Overcoming Barriers Beyond the FRB

Opportunities for the FRB to create jobs and stimulate rural economic development are abundant. However, barriers persist that the FRB cannot solve alone. To best take advantage of the infusions of private capital generated through the FRB, progress is required in three additional areas: access to education and job training, availability of working capital to fund equipment and infrastructure, and investments in market-building activities.

- ***Education and Job Training.*** In many historically forest-based communities, skillsets that were once common have been lost. Workers with training in relevant areas have aged, and opportunities rarely exist for younger generations to acquire the same skills. Investments in accessible, low-cost education and job training opportunities could play major roles in jumpstarting local restoration economies.
- ***Infrastructure and Equipment.*** Investments in infrastructure and equipment for forest management, wood processing, and biomass utilization are also a critical piece of fueling local restoration economies. As many forest-based industries have declined, so have the infrastructure and facilities that supported them, including sawmills, biomass plants, vehicle fleets, and harvesting equipment. Further, a lack of visibility into woody biomass supply has limited investor interest in this critical infrastructure. Raising the upfront capital to fund the purchase or retrofitting of critical equipment is often prohibitive for small-scale enterprises, but grants or loans to assist with these costs could help get otherwise stagnated work off the ground.
- ***Wood Markets.*** Investing in markets that can utilize woody biomass extracted through restoration activities promotes forest health, as well as community resilience. Creating pathways for growth in industries like mass timber could include research into new products, promotion of local wood branding, and education and awareness-building around new materials. Strategically co-locating wood businesses, training facilities, and research centers could help to incubate emerging markets, encouraging idea exchange and reducing cost through resource-sharing efficiencies.

In the near term, public and philanthropic funds are the most readily available to jumpstart investments in these three critical areas. In some cases, programs supporting this work already exist but could be better taken advantage of, especially in the rural context. In other cases, there are gaps to be filled. Federal programs focused on economic development–including Opportunity Zones and New Markets Tax Credits–can help create conditions for growth by incentivizing long-term private investment. Many state and philanthropic

funding programs are focused on supporting economic development and/or rural areas. Pairing public and philanthropic investment in these three areas with private-sector capital raised through the FRB could help local communities to better reap the benefits of budding restoration economies.

Conclusions

Recent destruction caused by wildfires across the western U.S. has drawn major attention to forest management and the need for restoration. Public and philanthropic funds are increasingly focused on responding to this crisis, but alone will never be enough to meet the scale of capital required to restore forest health and reduce wildfire risk nationwide. Private sector engagement shines as a beacon of opportunity, with the FRB providing a pathway for accessing this untapped source of financing. By connecting investor capital with on-the-ground restoration projects, accelerating the pace and scale at which these projects happen, and stabilizing otherwise irregular funding streams, the FRB promises to increase the number and size of forest restoration projects undertaken.

In addition to the clear ecological benefits of accelerated restoration, the FRB unlocks new opportunities for rural economic growth in forest-based communities that have fallen on hard times. The model impacts communities through job creation and stimulates rural investment by sending signals to the market that there will be a steady supply of raw material. With FRB financing, rural communities can unlock new opportunities to build both ecological and community resilience as they transition to restoration-based economies.

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