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Investment in Wildfire Resilience:

Can the private sector save us from "Smoke Season"?

August 2024

It's August and the two geographies I call home - the Pacific Northwest and British Columbia - are burning. Again. Professionally, I've been trying to shake a degree of weariness regarding impact investing's fit with private capital, which stems from more than seven years of trying to write a "sustainable alpha" into institutional investment theses. Personally, I'm working through the brain fog that comes with the loss of a parent and trying to find a clear path back to doing things I'm passionate about. My psyche isn't the only thing that could use some clarity right now. The view from my family's Kootenay Lake cabin – normally a jaw-droppingly gorgeous one that has inspired happiness and peace since childhood – is marred by what has become a too-typical August occurrence, wildfire smoke. The brownish air has blocked out sun and mountain vistas, rendered the lake's brilliantly clear blue water a dull gray, and generally dampened my mood. So, the sustainability-oriented investment researcher in me has to wonder – **can the private sector help save us from an inevitable summer "smoke season"?**

On average, 2.5 million hectares burn in Canada each year. In 2023, 18.4 million hectares burned, a significant portion of which were "megafires" exceeding 10,000 hectares.[1] While it's true that many of these occur in remote areas, we've been recently and painfully reminded that whole cities (Lytton, BC) and iconic tourist areas (Maui and Jasper National Park), are not immune. In some cases, megafires burn for months; even more frighteningly, "zombie" fires have increasingly begun to smolder throughout the winter and remerge in the spring. While Canada's 2024 statistics look better, with only 2.2 million hectares burned through July (vs. 11.0 million the previous year), forecasts for warmer-than-historic average temperatures and minimal rainfall point to a continuing trend of smoky summer months. The US has not fared better, particularly in the west. The 1.8 million hectares burned to-date in 2024 amounts to more than the 1.1 million hectares that burned in all 2023[2].

[1] NASA Earth Observatory

[2] National Interagency Fire Center (NIFC)

That these fires have catastrophic effects on human life and health, and nature, is obvious. Less so are greenhouse gas (GHG) emission impacts. The 2023 wildfires in Canada resulted in the release of more than 1,740 metric tons (MT) of CO2 equivalent, or three times the annual GHG emissions of the country's entire economy.[3] The economic consequences are also enormous, e.g., property damage, fire suppression costs, loss of business revenue, and increased insurance claims. 2023 global insurance claims due to wildfire increased to an estimated $10 billion per year.[4] One of the highest profile examples of business consequences is California utility Pacific Gas & Electric's (PG&E) 2019 bankruptcy filing, which resulted from more than $25 billion in wildfire liabilities. Wildfire management costs now far exceed public sector budgets and insurers' tolerance but are there enough incentives for private finance and public-private partnerships to scale a response?

[3] Canadian Interagency Forest Fire Center (CIFFC)

[4] C3 Solutions, "A Burning Issue: The Economic Costs of Wildfire"

THE REFORESTATION OPPORTUNITY

It was the sheer scale of the recovery need that sparked my research into the potential for investment in wildfire resilience. To start with, the reforestation value chain seemed to offer opportunities in high-yielding nurseries, automated planting, and resilient genetics. The prospect of additional returns from the voluntary carbon market (VCM) only increased the appeal.

REFORESTATION VALUE CHAIN

Source: Equilibrium Research

Of course, the investment case for planting trees extends beyond wildfire recovery into the broader natural capital markets. In addition to carbon sequestration, reforestation benefits biodiversity, erosion control, air filtering, fresh water supply, habitat linking, and recreational experiences. According to Reforestation Hub, a 146-million-acre opportunity exists in the US to restore forest cover. Reforesting this entire area with 76 billion trees could capture 535 million MT of CO2 per year, equivalent to removing 116 million cars from the road.[5] Given that US tree nurseries currently produce just 1.3 billion seedlings per year, there appears to be enormous potential to increase production. Practically speaking, however, feasibility is limited by:

- Accessibility and topography
- Unpredictability of wildfire-generated demand
- Seed and labor availability
- Uncertainty regarding carbon credit revenues stemming from the lack of measurement, verification, and forward-crediting frameworks coupled with questions around government mandates, public lands, additionality, permanence, and pricing

Despite the enormous need, few profitable entry points for new players exist in seedling propagation, at least without also solving for seed supply and outplanting bottlenecks, the latter comprising the bulk of reforestation costs. Companies like Mast Reforestation and Proon Tech are doing interesting work in these segments, via AI-enhanced unmanned ground and aerial vehicles (UGVs and UAVs), and various seed solutions. The goal is to make reforestation easier, faster, cheaper, and more reliable.

[5] Reforestation Hub

"Nurseries that produce seedlings for profitable commodities… often have more investment into infrastructure, supplies, and training… than do nurseries that produce plants for restoration purposes" –US Forest Service

OTHER INVESTMENT OPPORTUNITIES

Beyond recovery-focused reforestation efforts, other sectors and strategies can potentially offer returns, positive community impacts, and wildfire resilience. Examples include:

1. **Improved forest management**: controlled burns, strategic afforestation, and vegetation management
2. **Detection and monitoring technologies**: satellite imagery, drone surveillance, and AI
3. **Firefighting equipment and strategies**: precision water drops and less harmful suppression chemicals
4. **Rehabilitation**: ecosystem recovery and soil stabilization
5. **Risk-mitigating financial products**: insurance policies that payout based on predefined conditions, e.g., size and intensity of fires




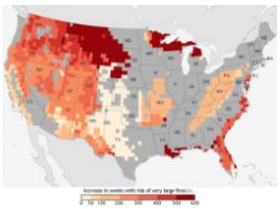

Photo credits: CBC, Team Wildfire, NOAA, Morfo

FINANCING MODELS

Without question, the need for capital is huge. The Environmental Policy Innovation Center estimates a $12 billion cost just to properly manage fire-prone areas in the western US, which is more than double the US Forest Services' annual budget.[6] However, **if investors finance wildfire resilience, who pays them back and how?**

Returns for many early-stage VC forest management and fire technology investments are based on the sale of carbon credits in a VCM currently plagued by additionality and quality controversies. Still, both the carbon and nascent biodiversity credit markets can provide funding models, if the following prerequisites are in place:

- A clear value proposition that defines benefits and avoided costs.
- Beneficiaries who are willing and able to pay
- Investor demand

Assuming reduced emissions can be directly tied to the implementation of practices, technologies, and equipment, e.g., climate smart forest management, fuel treatment, and biodiversity enhancement, wildfire emissions reduction funds could finance wildfire resilience via the sale of credits.

[6] Environmental Policy Innovation Center

Outside of the VCM, philanthropic and impact investors are good funding candidates, in part for their low cost of capital. Large defense corporates like Lockheed Martin offer both deep expertise and pockets, plus cutting-edge technology, government relationships, and the wherewithal to develop markets for wildfire solutions.[7] Insurance companies are prominent investors in conservation finance mechanisms and have a vested interest in avoiding wildfire losses. The same is true of utilities, for which wildfires pose a serious financial threat. One potential solution could be a utility-backed bond model that would fund the construction of sustainable community microgrids. The intent would be to minimize powerline-caused wildfires, increase power availability, reduce insurance premiums, mitigate carbon emissions, and preserve biodiversity. It could also provide an attractive fixed income investment for pensions, foundations, and institutional investors seeking stable returns.


Wildfire Threats Make Utilities Uninsurable in US West

As wildfire season starts, some utilities are now operating without insurance — and are on the hook for millions of dollars in damages if their power lines are linked to a blaze.

Public-private financing options can take numerous forms, such as environmental impact bonds, matching grants, low-cost loans, and accelerator and green bank catalyst programs. The federal budget can be tapped via FEMA, USDA, EPA, and DoD programs. The latter's Defense Innovation Unit, for example, is focused on accelerating the adoption of commercial technology to solve national security challenges at speed and scale. Others include:

- **US Forest Resilience Bond**: leverages private capital to finance forest restoration projects on public land; entities that benefit from Forest Service projects pay back investors based on criteria such as reduced fire risk and watershed restoration
- **US Infrastructure Investment and Jobs Act (IIJA):** provides $10 billion for federal, Forest Service, and Interior Department wildfire risk reduction and has the potential to match private investment in capacity, R&D, and other wildfire resilience efforts
- **California Climate Catalyst program**: offers low-interest loans to jump start investment forest resilience, biomass utilization, and market development
- **Canada Wildfire Resilient Futures Initiative (WRFI)**: Natural Resources Canada has allocated $285 million over 5 years for fire prevention and mitigation efforts, wildfire knowledge building, and accelerating technology innovation
- **Water utility borrowing programs:** because wildfires and fire suppression activities pose serious risk to watersheds, water utility investment will pay off in terms of water quality and quantity dividends

While interest in the development and expansion of funding tools is high, persistent challenges remain. The regulatory landscape is complex and there is a lack of coordination between generally underfunded local, state/provincial, and federal agencies. As with climate adaptation infrastructure more generally, it is difficult to quantify, aggregate, and monetize benefits in a way that creates the cash flows required for private sector investment. Insurance solutions require clearly defined means of evaluating potential wildfire damage costs absent risk reduction work (and liability insurance does not, for the most part, extend to prescribed burns). The carbon removal case would be better incentivized if wildfire emissions were included in the UN Framework Convention on Climate Change (UNFCCC); however, because wildfires occur on unmanaged lands and/or result from 'natural' causes, this is not currently the case.

[7] "Defense giant Lockheed Martin eyes new opportunities in wildfire fighting", Forbes

CONCLUSIONS

The places I love are desperately in need of wildfire solutions as are businesses, communities, and our stock of precious natural capital. A fragmented, under-resourced public sector is simply not capable of addressing the scale of this challenge on its own. Private sector capital, innovation, speed, and risk sharing is critical, but it is not yet clear how to make investments bankable.

New financial models must somehow account for the economic benefits of prevention, adaptation, mitigation, and rehabilitation. Ideally, wildfire resilience and climate-smart forestry gets built into global decarbonization strategies and can evolve along with the carbon and natural capital markets into robust financial systems that offer transparent data and methodologies, as well as proof of returns. While this may seem like a pipe dream, the potential for direct and indirect cash flows exists, e.g., from insurance premium reductions and avoided recovery costs.

Insurance is only one tool; however, the goal should be to avoid losses in the first place and to ensure profit motives don't overshadow the protection of communities and ecosystems. Concessionary capital, i.e., philanthropic and impact dollars, will be required to de-risk projects upfront. Institutional interest could be generated by aggregating project cash flows into a critical mass that not only meets minimum ticket sizes but offers diversification, economies of scale, and systems-based resiliency. Quality data, metrics, measurement techniques, and benchmarks will all be critical in proving enhancement and avoided costs are directly attributable to acres treated, carbon stored, water quality improved, biodiversity protected, etc. Performance guarantees and accountability will be essential to a ROI-seeking private sector. The public sector needs to do this math, too, and consider the financial benefits of directing a share of existing disaster assistance budgets to wildfire resilience efforts.

I hope it doesn't take more Mauis and Jaspers to highlight the urgent need for repeatable, scalable deal structures and strategies that integrate investments across the built environment and natural landscapes, and across public and private sectors. I hope my lake cabin survives another summer and that the views are clearer during the next one.