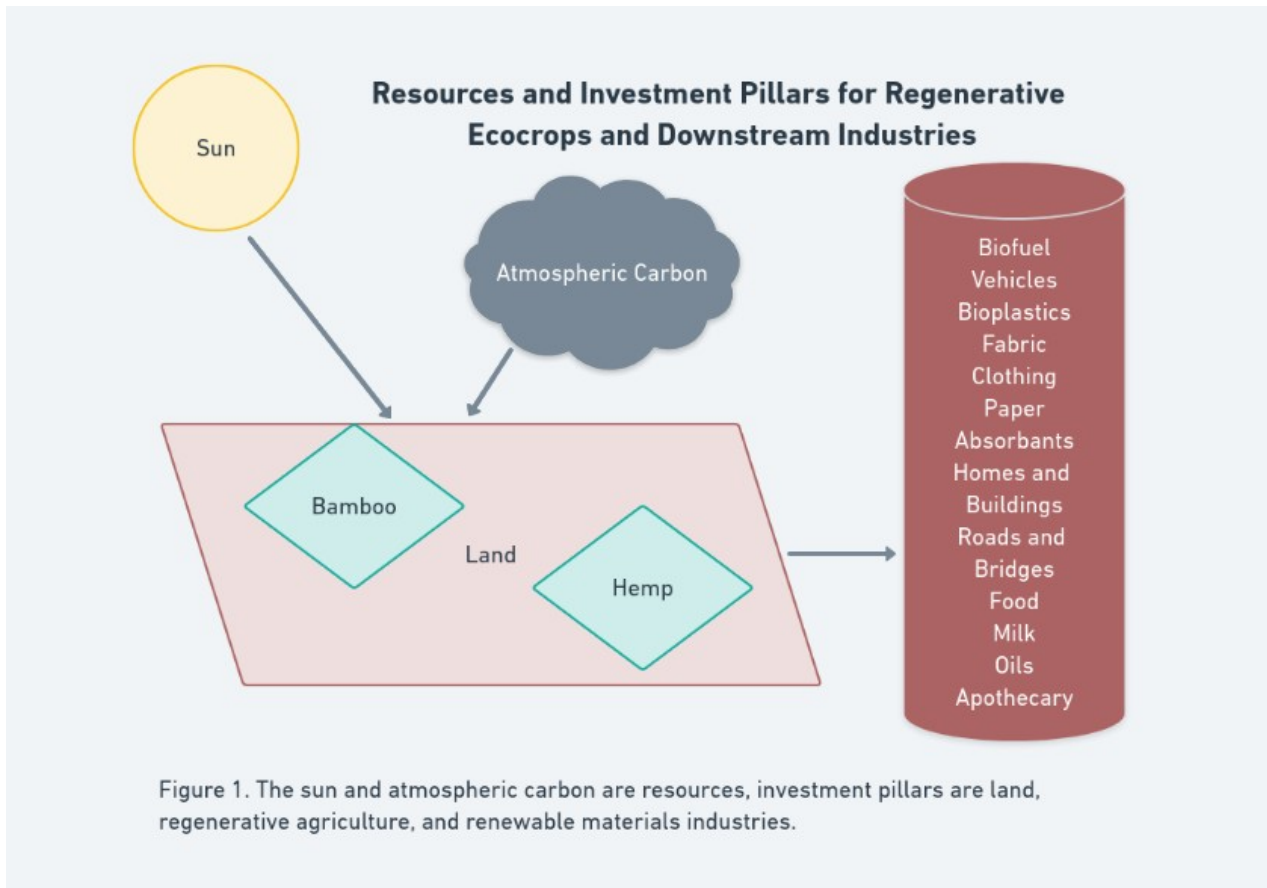


Solarpunk: A Regenerative Land Management Framework For Economical Carbon Neutrality.

I bought a toothbrush that was made of bamboo and packaged in a hemp paper box. The box said 'replace after 60 days'. My immediate intuition was 'that's wasteful'. But upon deeper consideration, I realized, no actually, this product is made completely out of sequestered carbon. It is a product that, the more we buy, the healthier our atmosphere becomes. It is a regenerative product, valuable to me as a consumer, and economical to the producer. What if everyone in the world used a bamboo toothbrush? What if our homes were made of bamboo and hemp? What if our roads and bridges stored sequestered carbon? What if our agricultural crops regenerated soil and our plastics and fuel industries depended on atmospheric carbon rather than petroleum? What if we could benefit from the swell of industry that would thrive through the transition of such a world, making healthy, sustainable profits for investors? What if we could become a carbon neutral species by investing in more efficient and smarter economies? The good news is that we can. If we were to use as much land to farm bamboo as we do wheat, 200 million hectares, then we would sequester 60 billion tonnes of carbon per year, which is almost double our current global emissions. This proposal outlines a quantitative framework for a global shift in land management towards the development of exceptionally regenerative agricultural industries.

Hemp and bamboo are used as two primary examples of economical and regenerative ecocrops. Both of which grow at an anomalously fast pace, acting as substantial carbon sinks, while nurturing the soil, and producing high yield social and economic benefits. Carbon sequestration is quantified using biomass yield and composition formulas, and economic projections are made to show the desirable wealth management properties of ecocrops. A comprehensive framework is proposed for land acquisition and regenerative enterprise, with a focus on indigenous leadership, systems engineering, and quantitative optimization. A holdings company will be established to facilitate the investment, oversight, and orchestration of a long tail distribution of data driven investments across land and ecocrop industries. Additionally, we show how macro ecological and economic modelling can be applied to our framework to quantify a path towards complete carbon neutrality.

The moonshot objective of such a framework is to disrupt the oligarchical grip of the cotton, petroleum, and plastic industries that unnecessarily dominate our global economy. With a rapid acceleration towards regenerative industry, we can bring balance to our world, liberating our society from its addiction to destructive extraction, and illuminating the abundance of opportunities available through growing green, sustainable, renewable materials and fuels. In a sense, shifting our global dependency from subterranean carbon to atmospheric carbon, and from extraction, to regenerative cultivation.



Land is a largely under rated and miss-understood option for portfolio optimization. In fact, many wealth management firms, do not even have frameworks for pricing land opportunities, and even neglect to include land in their portfolio all together! As Benjamin Franklin famously wrote in his 1729 pamphlet on the nature of paper currency, land is the ultimate backstop to money. It is a fixed supply, revenue generating asset that is easily translatable into labour for universal value[1]. Land scores extremely high on two of the three dimensions of financial utility, and is rapidly increasing in the third; yield, stability, and liquidity, respectively.

The financial yield of land has been monotonically positive since Siddhartha walked the earth. Better yet, the yield is not only positive, but it is positively stable. Land as a financial vehicle suffers only from lack of liquidity. Heavily permissioned, bureaucratic, and bloated regulation, in addition to a lack of marketplaces make the land market one of the least liquid. However, liquidity has been drastically increasing in recent decades as our world becomes globally connected, and new marketplaces come online. Tokenization, fractional ownership, and permissionless, decentralized markets are becoming a reality for land. These mechanisms explode accessibility to land markets for new demographics of participants. When new market participants come online, demand pool is increased, which in the case of a fixed-supply asset like land, inevitably leads to a price increase.

The price of land is positioned for an exponential increase due to a set of synergistic exponential technologies and market conditions currently being observed. Blockchain technology allows for fractional ownership and permissionless marketplaces. Global high speed internet access from satellite will diminish the importance of city dwelling for modern office space and residences. Work-

from-home industries will continue their exponential launch that was initiated by the covid19 pandemic. These factors multiply to make a case for mass emigration from urban to rural dwelling. This multi-factored influx towards rural dwelling will increase the demand for land ownership by orders of magnitude of what it is today.

Emigration patterns are naturally exponential processes. Cultural momentum will build behind the concept of owning land. As cultural momentum builds, and prices soar, a feedback loop will be in place which empowers land owners, and encourages them to promote rural dwelling because it will in turn continue to raise the price of land. Thus rural lifestyle will be productized, marketed, and sold in the typical capitalistic fashion. Demand for ownership of land will snowball, but the supply will be fixed. Thus we encounter a similar situation that we have seen with Bitcoin over the past decade, an exponential price function that results from fixed supply and exponentially increasing demand. Thus land itself should be considered an extremely appealing option to be included in wealth management strategies. Especially those concerned with sustainability and decarbonization.

Land plus sun plus atmospheric carbon is a recipe for an incredibly prosperous, regenerative global economy. There is a lot of discussion these days on solar power. The sun is certainly the most abundant source of energy that we have in our local neighbourhood, but an obsession with silicon chips and lithium capacitors as portrayed by people like Elon Musk is not the most direct approach to leveraging the power of the sun. Nature has already engineered for us a plethora of technologies that efficiently combine sun light and atmospheric carbon into self-perpetuating systems of crystallized capacity, delivering both the energy and the storage all wrapped up in clean green packages ripe for harvest. We need to expand our paradigm on ecocrops like hemp and bamboo to see the incredible potential that eclipses the gains we have realized from petroleum driven industry.

With force applied to the right leverage points on regenerative agriculture, we can launch our civilization into the next stage of ascension. Biofuels, bioplastics, and biomaterials are keys to higher magnitudes of energy access and economic prosperity. Ultimately, shifting our paradigm on atmospheric carbon from a dangerous problem, to an essential resource.

Hemp is a wonder plant. It's utility is beyond imagination. This single plant has the potential to render cotton, plastics, and fossil fuels obsolete while nourishing soils and sequestering enormous amounts of atmospheric carbon. Every single part of the hemp plant has use, from the fibre, to the core, to the flowers and the seeds. Hemp can be harvested up to 4 times per year, takes no pesticides, takes a fraction of the water of most major crops, sequesters atmospheric carbon at a rate of 1.63 times its biomass, and regenerates the health of soil in which it is grown. Farming hemp can produce up to 10 tonnes of biomass per hectare per harvest, that is up to 65 tonnes of carbon capture per hectare per year. Globally, if we were to grow as much hemp as we grow wheat, 200 Million hectares, we would sequester 13 Billion tonnes of carbon per year, equivalent to 37% of our current global carbon emissions.

Hemp fibre has 1000s of uses; stronger cars, cleaner fabrics, renewable papers, and biodegradable plastics among them. Henry ford's original car was made of hemp fibre. Hemp fibre materials can be up to 10 times stronger than steel at a fraction of the weight. Imagine the fuel efficiency. Cotton, the worlds largest GMO crop takes 5000 gallons of water to produce two pounds of fabric, and takes a quarter of the worlds pesticides. Hemp paper pulp takes a quarter of the space, and less than 2% of the time to harvest compared to wood. The pulp and paper industry is Americas third largest polluter, pumping over 220 million pounds of toxic waste into the environment every year, three million pounds of which is bleach, whereas hemp can be bleached with hydrogen peroxide, a safe and natural alternative. All of this, from just one part of the plant, the fibre[2].

Now consider the core of the plant. It can absorb up to 4 times its weight which makes it perfect for soaking up oil spills, or being used as animal bedding. More exciting yet, is its promise for homes and buildings. Hempcrete, a practical, inexpensive alternative to concrete. It's thermal and energy efficiency properties are through the roof. Hempcrete can be used in flooring, walls, and insulation, as well as bridges and roads. There is a hempcrete bridge in the south of France that is over 1500 years old, still in use today[2].

The econometrics of hemp are outstanding due to the utility of every part of the crop. It is estimated that a farmer can make around \$2400 profit per hectare per year by simply selling both raw core, and raw fibre of the plant[4]. Compare that with the average soybean farming yield in the United States which is estimated around \$72 profit per hectare per year[4]. These numbers go off the charts when looking at potential profit from CBD oil yield from hemp farming which alone can yield up to \$144000 profit per hectare given optimal conditions and yield. Additionally, hemp seeds are a source of complete protein, antioxidants, a rich profile of vitamins and nutrients, omega-3 and omega-6 fatty acids, and may reduce symptoms of various ailments, improving the health of the heart, skin, and joints.[6] Additionally, there is an emerging health craze for juicing cannabis leaves for anti-inflammatory and pain relieving benefits. Every part of this crop produces profit leverage far above the input costs of farming, while being brand-able as a completely regenerative resource. The first economy in the world to fully embrace the wonders of this plant will pave the way for new levels of abundance in health, wealth, and carbon neutrality.

If you think that the carbon sequestration capabilities of hemp are impressive, wait until you see the numbers for bamboo. A hectare of a mature bamboo forest contains from 100 to 400 tonnes of carbon. In addition to the carbon that is sequestered, consider the displacement factor of using bamboo for materials such as plastics and concretes instead of more emission intensive materials. In this case, we can achieve enormous sequestration, from 200 to 400 tonnes per hectare per year[3]. This means that if we had as much agricultural land for bamboo as we do for wheat, 200M hectares, we could sequester around 60 Billion Tonnes of carbon per year, which is almost double our current global emissions rate.

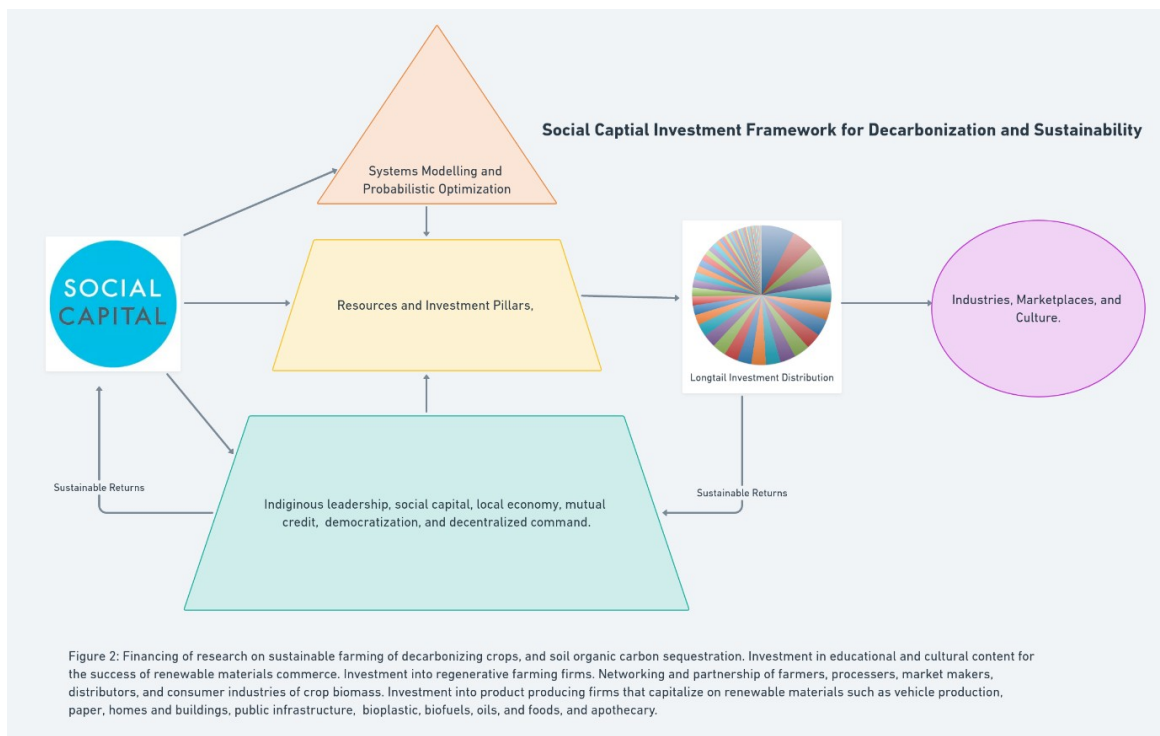
Similar to hemp, bamboo grows like a weed. It does not require pesticides and consumes very little water. It is so resilient in fact that it is a controlled plant in many countries due to it's ability to rapidly spread and take over ecosystems. This plant is yearning to consume atmospheric carbon. The possibilities for innovative agriculture and genetic modification of bamboo are enormous, given that there are over 1600 known species of bamboo found in nature, with extreme diversity in growth behaviour and qualities. Many of which have not yet been studied for application to carbon sequestration and industry. This is a blue ocean sector, with incredible upside opportunities for early investors.

Given the rapid speed at which bamboo grows, and the small amount of resources needed to farm, the econometrics become as astounding as hemp. Bamboo has thrived in the manufacturing of durable products like furniture, flooring, housing, and pipes, as well as consumer goods such as toothbrushes and pencils. Recent innovation in hemp processing has found success in high quality fabrics, and generalized lumber products. Hemp has been proven as a sustainable source of thermal and electrical energy production through gassification[6]. Bamboo could become an industrial staple across the world due to its hyper efficiency in farming, awesome carbon sequestration capabilities, and versatility in commerce.

In addition to the raw capitalization of these regenerative ecocrops through material and product commerce, there is an additional avenue for profit through trading of carbon credits that would be accumulated via mass farming of these mega sequestering systems. With so many parallel avenues

of revenue, a leading firm in the ecocrop industry would experience compounding growth as it accumulates land, research, technology, and human capacity to accelerate its foothold across regenerative industries.

The purpose of the holdings company in this framework is to secure the ownership of vast amounts of land that can be used for regenerative farming of ecocrops, as well as substantial private investment into regenerative agricultural innovation, renewable materials supply chains, downstream industries of renewable products, and finally educational and cultural development for shifting consumers towards regenerative market demands. A big data approach to long tail portfolio optimization using systems modelling and probabilistic optimization will be applied. Indigenous leadership will be encouraged and consulted, and emerging governance systems will be embraced to encourage resilient and stable networks of commerce across the globe.



The power of this framework comes from the ability to precisely quantify the impact of ecocrops. Consider an ecocrop to be a naturally farmed asset that acts beneficially on a set of defined environmental variables. Environmental variables can be embedded into spatial dimensions. Consider two dimensions, carbon emissions, and nutritional effect on the local soil. In this case, we measure carbon emissions as tonnes of carbon emitted per hectare per year, and soil nutrition to be a measurement of delta carbon richness and diversity of life of in the soil under the harvested crop. In this case, we consider a crop to be an ecocrop if it has negative carbon emissions, and a positive nutritional effect on its underlying soil.

Additional spatial dimensions can be identified. For a clear visualization of this, consider embedding the UN's 17 sustainable development goals onto a 17 dimensional space, giving one real number metric for each development goal. Then, for any set of selected goals, we can discover ecocrops that are strictly beneficial given the selected criteria. By modelling the spatial embedding of crops in

addition to the correlation between crops, we can apply rigorous portfolio optimization techniques in order to farm along an efficient frontier of regeneration and economic yield.

Once a spatial embedding is structured in memory, we can perform data science techniques such as dimensionality reduction, supervised and unsupervised learning, reinforcement learning, systems modelling, and visualization. These techniques allow us to apply engineering principles and probabilistic optimization to the state of our ecosystems.

Indigenous First Nations across Canada own more than 3 million hectares of land. Partnering with these nations would be a significant strategy for rapid iteration on sustainable strategies and execution. Indigenous leaders are the stewards of the land, meaning they have a deep intrinsic desire for sustainable and regenerative industries that preserve the health and diversity of natural ecosystems. First nations also offer an abundance of cultural and ancestral knowledge about governance, circular economy, and sustainability, as they hold the heritage of tens of thousands of years of oral wisdom. Indigenous leaders hold many of the keys to healing the traumas of our societies. To empower them strategically and economically is a move towards long term prosperity.

There are additional benefits to partnering with first nations. The government of Alberta in Canada has put together a \$1B fund for backstopping loans towards indigenous led ventures. This means that loans or bonds can be taken out for large scale infrastructure projects (typically oil and gas) with zero risk to the underwriter as the loan is ultimately secured by the Alberta government, making it a triple A rated bond. This mechanism can and should be leveraged for regenerative agriculture rather than oil and gas, and would enable farmers to tap into the abundance of green bond financing available from global banking institutions. The Indigenomics institute is connecting industry around the world to grow the indigenous economy in Canada from \$30B to \$100B. A strategic partnership with Social Capital would set the stage for an incredibly fruitful regenerative alliance.

In 10 years, Bitcoin has spread like a virus, and changed the way that we communicate value around the world. The framework that we have proposed enables a similar viral spread, not for financial records, but for regenerative industries. Decentralization enables parallel development, mutual staking, network effects, local stability, and open collaboration. The synergy of these phenomenon allows for faster and more resilient change than ever before. Integration with emerging financial and governance networks will empower a new generation of makers and explorers to push the bounds of what is possible in creative disruption and solarpunk innovation.

A final investment sector is required. In order to realize the full potential of renewable industries, we need a cultural revolution. There needs to be a collective hope that as a species in union, we can overcome our attachment to extraction based industry. A mindset of abundance needs to be disseminated so that people may feel purpose and belonging in their autonomy. A future generation must be targeted, and groomed to inherit the earth with full awareness of responsibility for the consequences of their behaviour. It is a joy to use my bamboo toothbrush, it would be amazing to live in a hempcrete house, and it would be the ultimate thrill to tell my grandchildren about how our species was able to collectively pull ourselves up by the bootstraps, change our behaviour, and make the earth an incredibly safe and stable planet to inhabit. With hemp, bamboo, and other ecocrops, we unlock a higher order of solar power than what our civilization has achieved so far. With healthy governance, indigenous leadership, and rigorous engineering, and the power of the sun, we have the power to create a resilient, thriving, safe world. A solarpunk world.

[1] **A natural capital based earth dollar, Mark Anielski 2015**

[2] Hemp holds the key to a sustainable future, TEDxSeattle, Amy Ansel,

https://www.youtube.com/watch?v=Qkb_TT685tM

[3] <https://www.inbar.int/understanding-bamboos-climate-change-potential/>

[4] <https://www.bonafideseeds.com/how-much-can-i-make-hemp-farming-profit-per-acre/>

[5] <https://www.medicalnewstoday.com/articles/323037>

[6] <https://www.inbar.int/programmes/sdg7-green-energy/>