



A CLIMATE CHANGE ADAPTATION ASSESSMENT OF THE STATE OF WASHINGTON: INDUSTRIAL HEMP & BUILDING THE EVERGREEN STATE OF OUR FUTURE

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ABSTRACT: This Adaptation Assessment of the State of Washington is intended to highlight the great potential of industrial hemp as an agronomic defense powerhouse against climate change, helping humanity transition away from the long-exhausted use of fossil fuel. In theory, Washington with its total cropland considered, has the potential to sequester over 28 million tonnes of CO₂e annually. That is, if Washington were to incorporate industrial hemp into its already existing crop cycles, statewide. Furthermore, industrial hemp has a myriad of known uses and potential uses, including both hemp-based plastics and fuel. However, given the public perception of hemp and its controversial history in the United States, there simply remains a lack of research in this field of study and consequently the potential of industrial hemp remains yet to be fully recognized, let alone realized. Washington can potentially change that (if it can meet the moment) but it must start from the top down with good policy, and urgent implementation.

Introduction

Now is the most important time for humanity, and particularly the State of Washington, to go all in on large scale industrial hemp agronomy, that is with the passing of the 2018 Farm Bill and the long underappreciated existential threat that is climate change. It is one of the oldest domesticated crops in the history of civilization, and yet for the greater part of a century, hemp (*Cannabis sativa* ssp. *Sativa*) has been ‘demonized’ for zero legitimate reasons. In a time before the United States’ exhaustive thirst for oil, hemp was a colonial cash crop, and even our Founding Fathers, Thomas Jefferson and George Washington were both hemp farmers. In fact, even in the worst times (e.g., in times of war) it recurrently becomes our patriotic duty to grow industrial hemp on a large scale, though only utilizing a modicum of its colossal potential—that is, its some

25,000 uses and counting. This assessment aims at cultivating a proper climate change adaptation plan for the State of Washington, one that favors a carbon-negative result. Thanks to the industriousness of hemp and its innate ability to sequester incredible amounts of CO₂e (carbon dioxide equivalent) in a brief period of time, and the potential to fertilize even the most vulnerable, arid soils in its undertaking.

Hemp is more than just a remedy for soil. A sustainable economy is within the United States’ grasp, if we can only seize upon it. Washington is often regarded as ahead of the curve in terms of its ‘smart’ infrastructure, sustainability, and progressive policies, being that it is a tech hub for some of the biggest companies in the history of the world, but this paints a rather incomplete and misleading picture, as this paper will assert. In the grand scheme of things, Washington’s adaptation plan is insubstantial and its



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implementation is meager when compared to a ‘greener’ potential. Perhaps above all, without first addressing Washington’s notoriously regressive state and local tax system, its historically racist zoning laws, and/ or without comprehensive community and stakeholder inclusion and involvement, any kind of equity-driven climate change adaptation plan will be off to a comical non-starter. Appreciating the fact that the near-lost tradition of hemp cultivation in the United States goes as far back as Jamestown in 1616. As contested as it may be, it’s very likely that the early drafts of the Declaration of Independence were indeed written on hemp paper, before ultimately being completed on animal parchment in 1776 (Ministry of Hemp, 2019). With one of the greatest known existential threats ever known to humanity (global warming) this adaptation assessment aims to plot out a roadmap for building a genuinely holistic, eco-centric, and hemp-based climate change adaptation plan for the State of Washington, and one that has the potential to be a beacon for the world; that is, if implemented.

Method

The Roadmap to a Vital Hemp-Based Adaptation Plan

The key objectives in this hemp-based climate adaptation plan are to: (1) Invest in education, research, community engagement, and expanding infrastructures for developing a comprehensive, inclusive, and equitable state hemp agronomy program that is ultimately carbon negative. (2) Integrate hemp into already existing crop cycles on Washington’s agricultural land. (3) Sequester >20 million tonnes of CO₂e, annually by growing hemp using a no-till style method of polyculture. (4) Regenerate soil health; (5) produce and manufacture hempcrete, plastics, paper, fuel, automobile parts, and food and medicine, etcetera. (6) Create less waste, pollution, herbicides, pesticides, logging, and deforestation; (7) use hemp byproduct as fuel for power plants that can provide power to whole towns, or for desalination plants, perhaps. (8) Alleviate ecosystems of the negative aspects of human behavior and activities;

Figure 1. Detailed Map of the State of Washington (state-maps.org, 2007 – 2022)





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(9) improve the quality of life in the state of Washington for all of its people, including Nature; (10) have it be replicable.

If Washington omits industrial, polyculture hemp agronomy from any kind of climate change adaptation plan, then it necessarily must go back to the drawing board, because humanity can no longer afford to ignore or put off the regenerative qualities of hemp. On either side of the Cascade Mountain Range, hemp could flourish, hypothetically, but it's in golden Eastern Washington where hemp can truly make a fundamental shift in Washington's agronomic priorities, bolstering both state and national levels of economy in its wake. Pictured above, in Figure 1, is a well-detailed map of the State of Washington. According to Farmland Information Center, Washington has a total land area of 43,279,500 acres. Out of this land area are 15,398,200 acres of agricultural land; and out of this acreage, there are 6,749,800 acres of cropland, as of 2016 (American Farmland Trust, 2022). Only about 142 acres of cropland in Washington were being used for growing hemp, as of 2018, according to Vote Hemp (2021). By comparison, Oregon had grown about 14,196 acres of hemp in 2020; Colorado had 27,092 acres of hemp in 2020, down from about 52,275 acres in 2019; California, 3,332 acres in 2020, down from about 21,844 acres in 2019; Arizona, with 1,386 acres in 2020, down from 5,432 acres in 2019; Kentucky, 5,000 acres in 2020, down from 26,500 acres in 2019; and, Illinois, with a meager $\frac{1}{4}$ acre of hemp in 2020 (Vote Hemp, 2021). Washington is lagging behind, but it is moving in the right direction, nevertheless.

An Unprecedented CO₂-to-Biomass Conversion Tool

In one recent study conducted by Ifeoluwa Adesina et al., it was found that integrating hemp into the crop rotation would drastically improve the health of the soil, and that, "the hemp cropping system is suitable for crop rotation, cover cropping, and livestock integration through animal waste applications (2020). Hemp also has significant environmental benefits since it has the potential to remediate contaminated soils through phytoremediation, convert high amounts of atmospheric CO₂ to biomass through bio-sequestration, and as hemp biomass for bioenergy production (Adesina et al., 2020). This has significant implications for both air and soil quality regeneration wherever hemp is grown and integrated into crop cycles, as opposed to simply continuing to exhaust the soil by way of monoculture practices. According to the European Industrial Hemp Association (EIHA), one hectare of industrial hemp can potentially absorb 15 tonnes of CO₂ per hectare, and that "hemp's rapid growth makes it one of the fastest CO₂-to-biomass conversion tools available, more efficient than agro-forestry" (EIHA, 2019). Another figure from the same author, Catherine Wilson, board advisor of the EIHA, reveals that no-till hemp farming potentially enables 10.5 tonnes per hectare a year of carbon to be sequestered from the atmosphere, while also contributing to the overall restoration of soil health (2019). With Washington's approximate 142 acres of hemp, this sequesters perhaps 861, 981 tonnes of CO₂e, according to my own calculation:



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1 acre = 0.404686 hectare,

142 acres = 57.4654 hectares,

15 tonnes of CO₂e per hectare of hemp,

57.4654 hectares × 15 tonnes = 861,981 tonnes of CO₂e (sequestered).

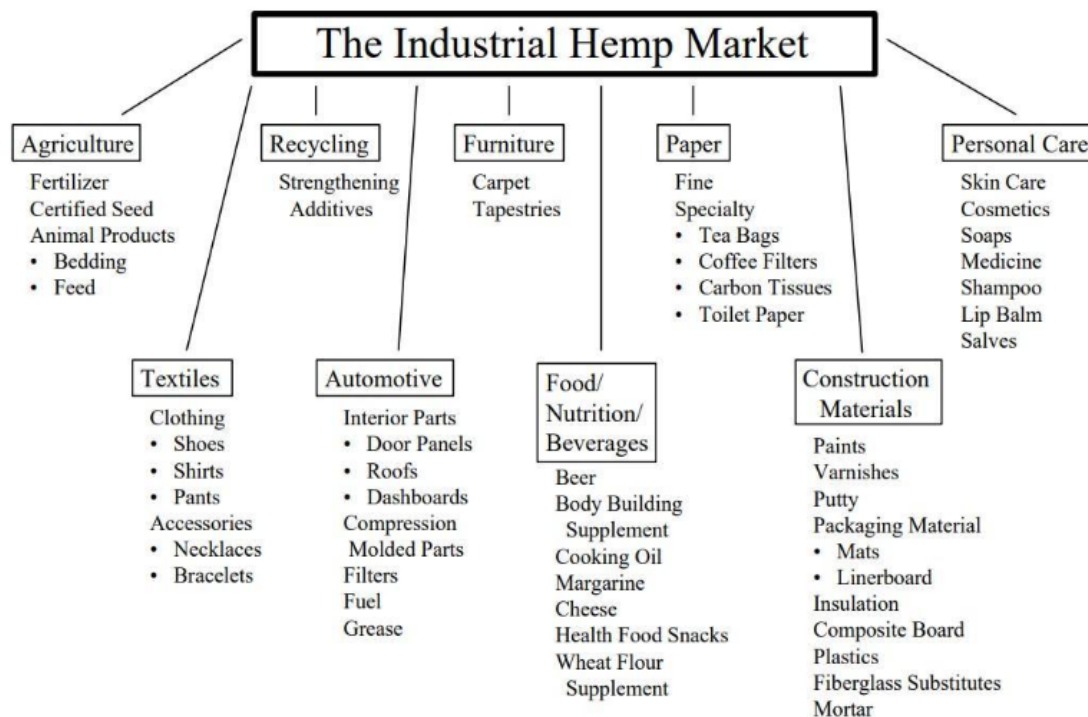
Exploring this further, if Washington were to hypothetically integrate hemp into its crop cycles, then its 2016 figure of 6,749,800 acres of cropland has the potential to sequester approximately 28,681,245 tonnes of CO₂e, annually.

6,749,800 acres = 2,731,547.148 hectares,

10.5 tonnes × 2,731,547.14 hectares = 28,681,245 tonnes of CO₂e (sequestered per year).

If the calculation is correct, this figure is astounding. To think of the dramatic, positive effects this would have on Washington's ecosystems: The money saved in healthcare costs, the amount of pesticides and herbicides eliminated, the amount of plastics removed from reaching the Great Pacific Garbage Patch, and the fossil fuel it can help bury back into the Earth. Humanity has this great opportunity to utilize already existing infrastructures to cultivate industrial hemp on a grand scale as we transition to more sustainable, alternative energies, such as nuclear fusion,

Figure 2. Hemp as an agricultural commodity (Kraenzel et al., 1998).





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which may lie just around the corner. Now, I wonder how many tonnes of CO₂e the United States as a whole could sequester per year by integrating industrial hemp into its crop cycles? This question is worth finding an answer for. This plan won't be able to address in detail of how hempcrete has the ability to absorb CO₂ out of the atmosphere, over its some 100 (+) year lifespan; or that growing hemp is 24 times more efficient than growing cotton, and it requires less chemicals, as well (Wilson, 2019). A viable solution could not be more clear.

Raising Awareness & Cultivating Community Engagement

On the subject of industrial hemp, people are aware of its goods and benefits, but perhaps not to the extent being offered in this assessment. On a general level, citizens of Washington might not be completely aware of the full historical context of this traditionally sacred plant. In the ancient Hindu text, Atharvaveda, hemp is referred to as 'sacred grass'. Many civilizations of the world have been using hemp for millennia, and it was only until the early 20th century when a racially motivated anti-cannabis campaign in the United States led to the passing of the Marihuana Tax Act of 1937, where hemp was taxed alongside marijuana. According to the USDA:

The industrial hemp world market consists of over 25,000 products in nine submarkets: agriculture, textiles, recycling, automotive, furniture, food/nutrition/beverages, paper, construction materials, and personal care. These products are made or manufactured from raw materials derived from the industrial hemp plant: fiber, hurds, and hemp seed/grain (Kraenzel et al., 1998).

And of hemp's myriad of ways to be commoditized:

The best way that hemp can draw awareness to itself is through its plethora of uses. Hemp straw can even be used for door panels (Shen et al., 2022). It can be used to make biofuel. According to Doug Fine, author of *Hemp Bound*, hemp byproduct can be used as a power plant fuel source (Fine, 2014). Therefore, what could next be envisioned is the development of a closed loop system, in which the industrial hemp we grow can also be used to provide the fuel for hemp power plants. Subsequently, being used to power rural towns or cities, or to power desalination plants that provide irrigation water, as an example. The plastics that we use in Washington could be grown, processed, manufactured, and recycled right here within our own state, cutting out petrol-based plastics for good if we wanted to.

Equity & Justice

In the age of smart cities, AI, automation, and biotechnology, there seems to be an ever-widening socio-economic gap between the working class and the wealthiest people in the United States. A lot of this has to do with the systemic racism and classism that have been built into the zoning laws of urban and rural areas in the U.S., alike, even in Seattle, of all places. The zoning laws that existed in Seattle's early history still shape daily life in the city today, including on Amazon Prime delivery routes (Jung, 2022). In the mid-1800s, Chief Si'ahl (Chief Seattle), personally brought American settlers to his homeland, but to this day arguably the oldest inhabitants of Washington, dx^wdəwʔabš, the Duwamish Tribe, have yet to be federally recognized (Buerge, 2017). In the State of Washington,



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the conditions of the treaties with Native American groups were either plainly unfair, or they were hardly even met by the United States government. It's a travesty of justice that in the city of Seattle, the Duwamish Tribe, who shared their land and waterways, are still not officially recognized by the U.S. government to this day.

The significance of hemp, and the great meaning it brings to people worldwide, is all the more reason to cultivate it in reverence with the land and its ecosystem. Growing industrial hemp involves the creation of new jobs, education, and systems of agriculture and manufacturing. Therefore, "Change must come from the top, and it must be so systemic that it begins to reform the entire assemblage" (Romero, 2022). Without systemic change occurring at the top level, we are doomed to repeat the same tribulations, as we have been for a long time. At a time when 'environmental personhood' and panpsychism is gaining ground in popular culture, industrial hemp stands to be the ultimate transitional tool toward a sustainable, eco-centric future humanity is moving toward in capitalism, come hell or high water.

Discussion

A WSU Assessment

After the passing of the I-502 Initiative, Washington State University published a report concerning the opportunities and challenges of growing industrial hemp in this state. However, this was published during a time when hemp was still listed as a Schedule 1 controlled substance, "Despite recent changes in state laws, industrial hemp is still classified as a Schedule I controlled substance under federal drug

policy, and as such is regulated by the U.S. Drug Enforcement Administration (DEA)" (Fortenbery, 2014). Nonetheless, the report, itself, is quite useful in gauging where institutions and academia stood on large scale industrial hemp in Washington at that time. It's unclear whether or not students taking courses through WSU during that time were even able to ask direct questions regarding the cultivation of hemp. For example, this is indicated even in 2022, with this Washington State Department of Agriculture (WSDA) statement regarding WSU's Cultivating Success course. "Instructors cannot provide cannabis-specific information or answer cannabis-related questions," for students wanting to learn how to grow hemp (WSDA, 2022). If this climate change adaptation plan for the State of Washington is to succeed in helping save our planet, and by extension ourselves, then our attitude on hemp must change. Which may be possible only through the pragmatic investment of educating people on the facts and wonders of industrial hemp, because only then can we build the sociopolitical momentum to revolutionize current agricultural systems and practices.

Conclusion

This assessment began with a lofty hemp-based climate change adaptation plan that could be shaped and molded to fit the needs of any peoples, for all relevant stakeholders, especially those who have been historically underrepresented. The surprisingly triumphant passing of the 2018 Farm Bill has successfully removed hemp from being misclassified as a Schedule 1 controlled substance; therefore, the dynamic State of Washington can make up for years of lost time on hemp-oriented research. In addition to this, ESB 5372 Hemp Processing Registration & Extract Certification was recently signed by Governor Jay Inslee



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in April of 2021. This is a promising step forward. Then, of course, this adaptation assessment falls short in many ways, in that it is not comprehensive enough. However, it does in fact begin to envision and construct a brighter, more biodiverse future. With some basic methodology and formulas to be replicated wherever this adaptation plan may help people resist climate change worldwide, by efficient and fiscally responsible agronomic strategy.

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