Can Blockchain Lead us to Forest Sovereignty?

A future imagining of more-than-human relations.

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Abstract

This work endeavoured on a preliminary futuristic imagining of what it would take for Forest to practice its sovereignty in our current system. The concept of Forest Sovereignty is employed to mitigate against the challenges identified in this work within the forest governance space in Canada. As an attempt to make this imagining real, the practice of governance is leveraged to anchor the concept of Forest Sovereignty. Because there are signals in the Web 3.0 space that are exploring ways in which natural resources, particularly Forest, may be governed differently, blockchain technology is explored as a tool to do this. While it is determined that blockchain technology is not sufficient, it is revealed that this research question is essentially an exploration into two significant matters: 1) understanding that this question is essentially exploring **the relationship** between a natural entity (forest) and a piece of technology (blockchain), and 2) ways in which we, humans, may be able to engage more-than-human beings in meaningful ways as an attempt to shift away from human-centric systems. This shift is considered vital as human beings continue to demonstrate a lack of regard towards Earth.

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INTRODUCTION

Degradation to our natural world continues despite the existence of conservation and protection-based policies. Persistence in this degradation requires investigation given the fact that we are in the middle of a climate crisis. It is suspected that there may be underlying motivations driving natural resource governance decisions. This matter is of great importance. The lives of More-than-human and Human beings depend on natural entities like freshwater and forests and harm to them is harm to us.

Forests in Canada are critical in many ways: First, they are a key contributor to the Canadian economy, allowing for the manufacturing of lumber, panels, wood pulp, and newsprint. In 2021, the forest industry contributed 5.3% of the gross domestic product (GDP) in Canada. Forest exports increased between $26 billion in 2011, to nearly $45 billion in 2021 (Natural Resource Canada, 2022) . Second, they contribute to tourism and recreation. Increased wildfires has resulted in cancelled travel plans within and into Canada (Blake, 2023)**.** Finally, and probably most important, the benefits of intact Forests are invaluable and contribute significantly to the health of ecosystems (Natural Resource Canada, 2022)**.** Yet despite this, there is mounting evidence that suggests harm to forests persists. Causes of degradation appear to be varied. The causes that are identified in this work are:

1. Overcrowding of interested actors and stakeholders in Forest: There is a significant amount of actors and stakeholders in Forest who have overlapping tensions, desires, wants and needs resulting in diluted accountability.
2. Political election cycles and associated ideologies: The political churn and the ideologies that are tied to changing political leadership leads to instability in conservationist and protectionist attempts. Furthermore, the approach taken to conserve and protect Forest is greatly influenced by political ideology. Forest as subject to the *politics du jour* exacerbates and causes harm.
3. Innovation and experimentation is blocked by political will to scale: It was noted that often, key experiments are sunsetted either because they are backed by precarious financial resources and/or there appears to be a lack of political will to scale

Given the fact that humanity, as of July 2022, has cross the 6th planetary boundary (Pote, 2022), this work seeks to leverage the concept of Forest Sovereignty as a metaphor first and then Horizon 3 (H3) reality to address some of the challenges identified in the forest governance

space. In asking the question of whether technology, specifically blockchain, can facilitate Forest Sovereignty, I seek to make preliminary attempts at exploring how we may shift from human-centric systems into Earth-centric ones. I believe that this work scaffolds such a pathway.

As a first step towards this, a piece of technology was used to explore how we may go about, initially, leveraging the concept of Forest Sovereignty to shift human worldview and values, into reality, especially considering how it has been noted in other reports that the use of technology can help us achieve many of our Sustainable Development Goals (SDGs) (Force for Good, 2023). Since there are many interesting innovations happening in the Web 3.0 space, I was curious to understand how it may be entering matters of forest governance. Blockchain was the selected technology because of how it is already being leveraged in spaces of governance (Thejaswini & Ranjitha, 2021). Ultimately, what was discovered was that blockchain technology was not sufficient to facilitate Forest Sovereignty. This finding is similar to the works of others i.e., (Oberhauser, 2019).

In the end, it is acknowledged that perhaps it may be in the best interest of Forest, and for all of Earth, for that matter, if human-beings emphasized efforts away from computer-generated technology, and, instead, focused more on the business of evolving themselves.

Methods

A literature review was conducted to understand the topic of forest governance in Canada. In this process, it was found that there were several tensions, conflicts and overlaps within the forest governance space. Conservationist and protectionist policies are in place that are meant to protect Forest, yet we see continued degradation of Forest. This is despite attempts at upgrading forest management practices to reflect cultural and social values, and evolving views among Canadian citizens who are very concerned about climate change (Dr. Castleden et al., 2023). This led me to wonder why that was.

As an attempt to provide alternative solutions to these challenges, the notion of Forest Sovereignty is contemplated as a potential approach. Because Forest Sovereignty is not part of mainstream approaches in forest management and governance, this work is largely a conceptual exercise in order to locate pathways to a potential future. Essentially, if we are able to create systems that are designed around forests *as sovereign*, then we may be able to use this notion to shift human worldviews towards ones that would naturally treat forest in a way that does not perpetuate the harm that is current being done to them and/or commodify them.

Governance is leveraged to help anchor the concept of Forest Sovereignty in our current system. Since there are several innovations happening in the Web 3.0 space, particularly related to blockchain, this work contemplated how advanced technologies like blockchain may be able to facilitate the sovereignty of forest through the process of governance.

In attempting to investigate the question of whether b*lockchain technology could lead us to Forest Sovereignty*, desk research was conducted in order to begin to articulate some key concepts inherent in this research question. These concepts are discussed in Part 1 of this work:

1. What is Forest?
2. What is Forest Sovereignty?
3. What is Governance?
4. The relationship between Forest Governance and Blockchain

Semi-structured interviews were also conducted to explore two ideas: Forest Sovereignty, and blockchain's capability to facilitate Forest Sovereignty. 6 participants for each discussion 1) what

is Forest Sovereignty? And, 2) can blockchain fulfill requirements to Forest Sovereignty?, was required (Fusch & Ness, 2015). The nature of these conversations were as follows:

1. The first set of interviews explored the notion of Forest Sovereignty: what it might mean and look like. Through these interviews, 6 requirements to Forest Sovereignty emerged. The requirements were not a result of a direct question.
2. These requirements were then presented to the second set of interviews that were conducted, with blockchain developers and professionals. This group of individuals were asked whether blockchain technology had the technical capability in fulfilling the Forest Sovereignty requirements and if so, how, and if not, why not. In these conversations, blockchain values and culture were also uncovered.

Analysis from these conversations was conducted and a blockchain-based-governance-system, designed to facilitate Forest Sovereignty, emerged. This system was evaluated against how true it stayed to our understanding of Forest Sovereignty. After determining it was not able to facilitate the sovereignty of Forest in a meaningful way, another version of said system was designed, (i.e., v2), this time approaching the design through a biologically oriented lens. Here again, it was determined that the blockchain-governance design was not sufficient to facilitate Forest Sovereignty in the way that it was envisioned, at least for now, anyways.

How this work is structured

This work begins with a vision for the future: Forest Sovereignty. It is considered to be a vision of the future because Forest Sovereignty does not exist within our current, *mainstream* system. This was also confirmed by many of the people I talked to, some of whom explicitly mentioned that they “haven’t heard the term Forest Sovereignty before” without any sort of prompting.

The method that most appropriately anchors this process is the 3 Horizon framework. The 3 Horizon framework is a method developed by Bill Sharpe who sought to provide a pragmatic approach towards attaining the future we want to see (Sharpe, 2020). The framework itself recognizes a cyclical component to all things and takes into account how things in the present that are alive and well, may very well perish and/or transform into something else “the model is based on the observation that businesses, technologies, political policies and even whole civilizations exhibit life-cycles of initiation, growth, peak performance, decline and even death” (H3Uni, n.d.). A cyclical approach bodes well to the natural orientation of Forest.

The framework maps our 3 horizons: Horizon 1 (H1), Horizon 2 (H2) and Horizon 3 (H3). They are described as follows. Graphical images of each of the Horizons are sourced from an external site (H3Uni, n.d.):

Figure 1: Horizon 1

H1: This is the system in today's present. It is the "business-as-usual" status quo. The curve which H1 is associated with is very informative. The downward curve of H1 suggests that it is the very things in the present that begin to feel outdated. They often face a decline soon after they have peaked. H1 in the case of this work includes forest governance as it is currently implemented today; worldviews and beliefs that are tied to it.

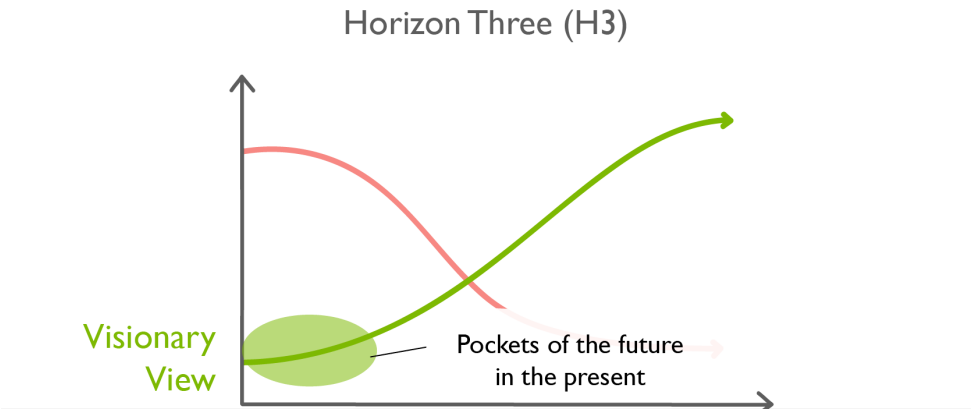

Figure 2: Horizon 3

H3: These are the visions of the future we want to see. These are the structures, systems, ideas, worldviews, values, beliefs, that we want to hold but currently do not. Often, you may see glimpses of the future in H1 in the form of weak signals and/or fringe spaces to help

contemplate the alternative. This is where the idea and concept of Forest Sovereignty lives. The curve associated with this horizon is one of upward progress where we see an incline of H3.

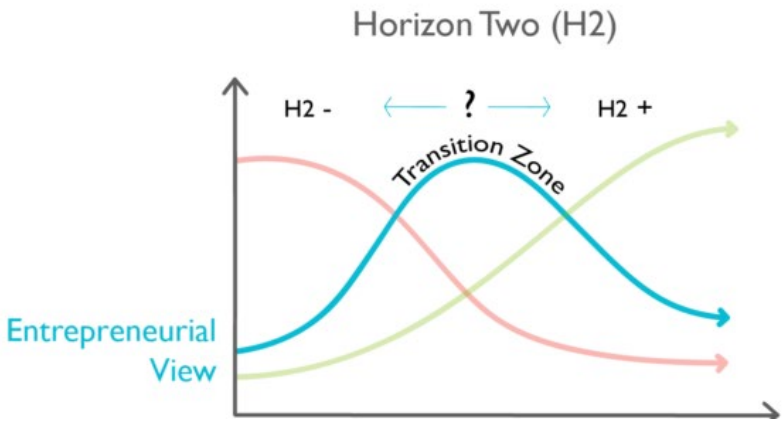

Figure 3: Horizon 2

H2: This horizon is concerned with the practical; “how might we move from H1 to H3?” This horizon is transitionary and is reflected as such by way of the curve, where its peak is in in between H1 and H3, suggesting that this horizon acts as a bridge, where innovation and disruption often sits. For me, I also see H2 as the place of implementation for the notion of Forest Sovereignty. What tools in H1 do we have that may help us bridge to H3, Forest Sovereignty? The concept of governance itself is considered as H2. Since we are exploring blockchain as a potential tool for governance, blockchain then too becomes H2.

The 3 Horizon framework is interwoven throughout this work. The Forest Sovereignty requirements, which emerged from the interviews, are categorized based on horizon. In this way, we are able to assess which among the requirements we may have to begin with in order to reach our horizon 3 vision of Forest Sovereignty. A 3 Horizon narrative is also built on the notion of Forest Sovereignty. For H1 and H2, Forest Sovereignty is used as a metaphor to shift human worldviews towards Forest so that we can begin to create systems that make space for the sovereignty of Forest. H3 conceptions of Forest begin to think about Forest as actually sovereign and the types of systems and capabilities that may be needed for this to happen. As such, while we begin with a future vision, much of this work contemplates how we may adjust human-centric systems in H1 and H2, all the while keeping hope that we can move towards systems that are more Earth-centered. Essentially, the framework helps us scaffold steps we

can take to get us to our preferred future. To begin, an articulation of *whether blockchain can facilitate Forest Sovereignty* are discussed in the following order:

1. What is Forest? Establishing a common understanding of what is meant by “forest” as it relates to this work serves the basis of what exactly is being referenced when we speak of Forest Sovereignty. In addition, to explore the sovereignty of Forest, Forest is regarded as a being in their own right and is written as such. Here, we begin to explore how changing the ways in which we regard Forest, even in written language, may change our mindset and approach towards Forest.
2. An understanding of Forest then leads us into defining what Forest Sovereignty means and looks like. An initial contemplation of what is meant by sovereignty is discussed, followed by what Forest Sovereignty means and looks like across all 6 participants who were interviewed. This understanding of Forest Sovereignty is then followed by the 6 requirements to Forest Sovereignty which arose during the interview process. These 6 requirements are initially described as they were described in the interviews, followed by an analysis of these requirements as per the 3 Horizon framework.
3. Once the above analysis is complete, the concept of governance is explored both in terms of how it is used today versus how it *could* be used. Governance is also discussed as an anchoring tool (i.e., H2) that would allow us to make, slightly more concrete, the implementation of Forest Sovereignty.
4. All of the above foundational concepts allow us to then fully explore the question of whether *blockchain technology can lead us to Forest Sovereignty*. Two versions of a blockchain-based governance design are discussed followed by a discussion of the limitations of the technology and the implication of those limitations in holding space for Forests’ Sovereignty.
5. This then allows us to reach our conclusions to discuss the overall project followed by some final thoughts.

PART 1: THE FOUNDATIONAL CONCEPTS

This section provides an articulation of the foundational concepts that need to be explored in order for us to answer the question of whether *blockchain technology can lead us to Forest Sovereignty*. The concepts that are presented are:

1. What is Forest?
2. What is Forest Sovereignty?
3. What is Governance?

Each of these three major concepts are broken down to further elaborate on how these ideas are relevant to this work and how they may help in forest governance challenges. To begin, the importance of this work is articulated.

Why is work this important?

As Figure 1 one demonstrates, humans use Forest in many ways. The forest sector in Canada is thought to be among the leading producers of forest commodities in the world (Lindhal et al., 2017). Canada is thought to be one of the friendliest to forests, yet significant challenges persist.

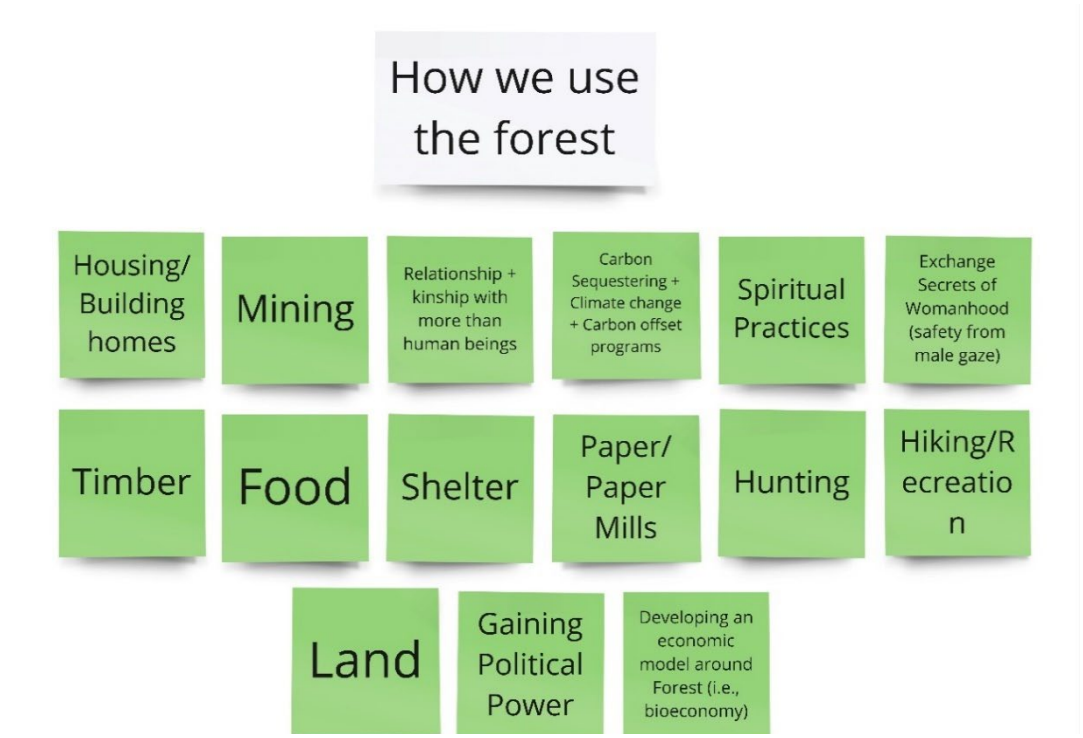

Figure 4: A non-exhaustive list of ways in which Forest provides for human needs, wants and desires.

provide paper and also building material, while what hides underneath forest floors provide access to minerals, fuel and resources. Forests are also on land and since humans are land creatures, this means that the literal ground from which forests arise from is of extreme value. It may be suggested that Forest is in competition with human development. Forest also provides food which ties human beings to forests in very important ways. In these ways, Forest gives many things to human-beings.

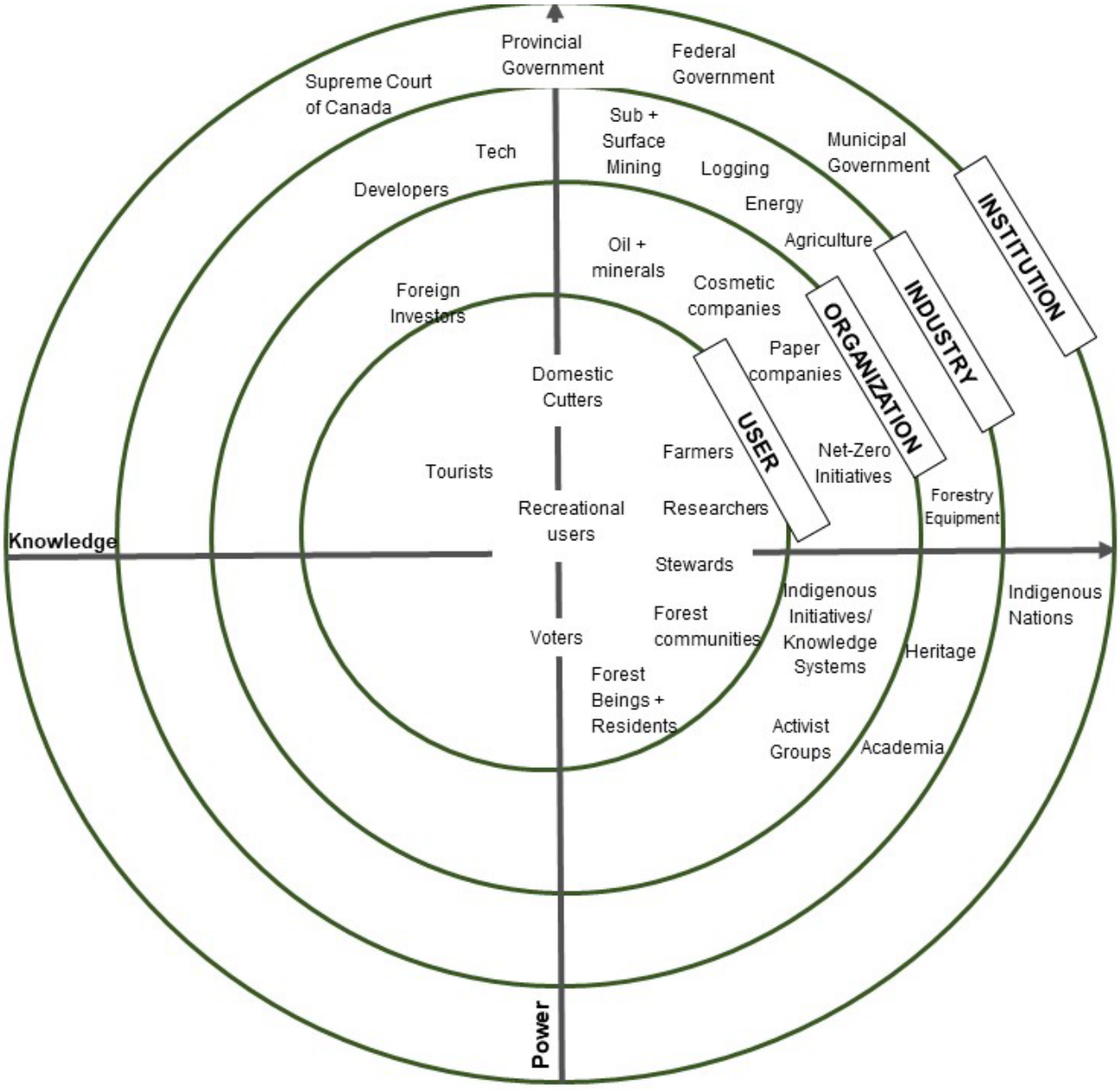

Figure 5: A non-exhaustive actors map of players in Forest. This map was adapted from the Systemic Design Toolkit (https://www.systemicdesigntoolkit.org/)

Figure 5 above is meant to outline some of the political, legal and economic activities that happen within the Forest in order to manage all of the aforementioned activities and resources. What is of particular interest is the clustering of high-power actors, stakeholders and institutions that exist within Forest. This may contribute to tensions and dilute accountability. What is also interesting is that those who have less power also, often, appear to have the most knowledge of forests. This suggests that science, evidence, information, etc. may **not** be keys to the system. Turns out, in this case, knowledge *isn't* power.

Since Forest provides so much to human beings, there is also a lot of power that comes with being able to control the resources of Forest and/or to control Forest itself. Presently, it is The Crown and/or Canadian Government who theoretically "owns" Forest (what a strange thing to say, to "own" a Forest). More than 95% of northern Ontario is Crown land with about 77% of the province's land mass managed by the Public Lands Act, with an additional 10% of Crown land held as provincial parks and conservation reserves (Province of Ontario, 2023c). There are also many laws put in place that are meant to regulate behaviour and activities within Forest. A preliminary exploration into some of these laws is important as it will help highlight some additional challenges within the forest governance space and therefore provide rationale for this work.

Forest and Law

The Environmental Assessment Act, the Environmental Bill of Rights, Crown Forest Sustainability Act, Provincial Parks and Conservation Reserves, Endangered Species Act and the Public Land Act empowers the Minister with the authority to buy, sell and dispossess public lands and forests. This list of Acts and Legislations directly influence Forest. There are also other laws and legislations that indirectly affect Forest such as the Environmental Protection Act which provides the legislative basis for a range of federal environmental and health protection programs. Two other indirect but important acts for Forest are the Ontario Heritage Act and the Planning Act. All of these Acts, Laws and Legislations listed above are at the Provincial level.

At the federal level, there is the: Species at Risk Act, Fisheries Act, Migratory Birds Convention Act, Plant Protection Act, Forestry Act, Timber Regulations, Indian Act, First Nations Land Management Act, National Parks Act. Since Canada also seeks to export Forests' resources out of the country, we also have to look internationally. The convention on biological diversity, and

the convention on international trade in endangered species of wild fauna and flora both have implications on Forest (Government of Canada, 2020).

All of these acts, directly or indirectly stipulate behaviours towards Forest. They govern how Forest is to be treated at various institutional levels. The intention behind these legislations and laws appears to be “good”, in a normative sense. They appear to have been made with the direct intention to help Forest. Yet, despite these laws and legislation, we observe continued degradation to forests. In order to be able to understand why harm continues towards forests, a closer look into a component of the forest governance sector is required. The Forest Tenure system was selected as it is this system that determines who gets to extract resources from Forest and how.

Forest Tenure

Tenure rights generally have two main purposes: 1.) to establish the conditions under which timber is made available in the marketplace and 2.) allocate responsibility and accountability for the performance of forest management requirements specified in regulations and policy. These are typically signed by the owner of land (Province) and the forest company (Rotherham & Armson, 2016). Presently, forest management plans must accompany a bid for tenure and is underpinned by the Environmental Assessment Act (EAA) which requires that “companies hoping to log in any forest management district must register a five-year operating plan with the Department of Environment at least 180 days prior to starting operations” (Sinclair, 2006).

Tenure policies in Canada and have been around for quite some time, potentially since 1872 (Yarhi & Regehr, 2023), though there have been several critiques of them “they fail to recognize environmental values adequately; do not incorporate non-timber values in operations and management; do not take sufficiently into account Aboriginal and community concerns; and do not provide the proper incentives for investment (either in the resource or in processing the resource)” (Lindhal et al., 2017) . It is also suggested that tenure agreements have privileged “rich, well-educated white people of Canada through the stumpage and Crown ownership systems, top-down control enabled commercial and industrial forestry to thrive in the 20th century. This success is considered by some as the antithesis of sustainable development. For years, the people who opposed the state-controlled system had no outlet for their opinions” (Open Case Studies, n.d.).

Tenure polices seem to have challenges both at the top-level and on-the-ground where the former appears to perpetuate discrimination and white supremacy, and the latter appears to have a significant issue of accountability, despite the Acts, Laws and Legislations that seek to promote “good” behaviour towards Forest. In order to address the critiques towards the land tenure system, attempts have been made to pilot different tenure models, ranging from what is understood to be incremental change which could provide greater latitude to forest managers or diversify tenure allocations (Nelson, 2008), to transformational change which could consist of a deviation from traditional ownership models altogether i.e., transferring ownership/control from public to private. This would require the withdrawal of the Canadian Government from having a direct role in managing the resources, relying on non-market goods, or expanding the role of existing markets (Nelson, 2008).

Transformational tenure allocations have been piloted in the province of British Columbia (BC) whereby Community Forest Agreements (CFA) have been issued. CFAs are “an area-based forest license managed by a local government, community group, First Nation or combination of local governments, First Nations and community groups, for the benefit of the entire community” (Open Case Studies, n.d.). It has been found that CFAs tend to “maximize benefits of forest values to a different and usually wider range of stakeholders while simultaneously serving as mechanisms to reduce conflict between stakeholders; which is to say that community forestry enables a broad array of objectives that represent more “sustainable and equitable outcomes, serving multiple actors, rather than state or governmental groups, than do institutional-level governance and/or tenure ownership arrangements” (Open Case Studies, n.d.). Specifically, it has been found that CFAs provide both short-term and potentially long-term benefits: “short-term improvements of the tenure type over traditional commercial timber tenures include managing for non-timber forest products, heightened awareness of habitat requirements, and localized decision-making that represents community members’ values. Long-term improvements to the historical timber tenures include reduced effects to ecosystem function, improved fish habitat and food availability, protection of stream structure and wood inputs as well as a sustainable annual cut based on the long-term growth trajectory of individual stands within an area” (Open Case Studies, n.d.).

Yet despite these benefits, CFAs still face systemic level barriers “outdated stumpage system that is designed to serve three broad values: retaining crown ownership and control, encouraging industrial timber production and sales, and creating governmental revenues

through timber sales. These values are state-level values, which have extremely limited trickle-down effect for BC citizens" (Open Case Studies, n.d.). Additional challenges in terms of the propagation of CFA's include; "lack of control over non-timber resources, lack of strategic decision-making power and small economies of scale" (Arrieta, 2013).

The systematic challenges described above with respect to the propagation of CFAs suggest that the issue does not appear to be a matter of a lack of innovation, rather, it seems to be a problem of systematic will, and, particularly of political will. The lack of political will in making meaningful change that can alter our relationship with Forest are further elaborated by looking at the public consultation process.

Public Consultation

Across the broad, provinces continue to tout the importance of public consultation. In fact, public consultation is required under EAA plans. These days, there is a particular focus to seek consultation from Indigenous Peoples and Communities. However, there are significant critiques against the engagement process. There are no stipulations listed in terms of how much of what is learned during the consultation process, is **actually** considered **and** implemented. This often leads to inauthentic engagement processes that end up being a waste of time and creates more harm. Due to mounting pressure to change these practices, initiatives have been developed by the government that seeks to empower Indigenous Peoples and Communities.

Recently, the Federal government of Canada has launched the Indigenous Forest Initiative (IFI) that "provides financial support to Indigenous-led economic development projects in Canada's forest sector. Benefits of the program are: increased Indigenous participation in forestry-related opportunities, businesses, careers and governance; increased engagement and economic development for Indigenous communities and peoples involved in the forest sector; increased investment and collaboration between Indigenous peoples and other natural resource development stakeholders, including governments, industry and non-governmental organizations (Government of Canada, 2023a). The IFI just launched in May 2023 therefore benefits from this program are unknown, however, the hope is that such programs continue. There is, of course, a risk that they don't. For instance, the First Nations Forestry Program implemented in 1996 in partnership with the Federal Department of Natural Resources (NRCan) and the Department of Indian Affairs and Northern Development (DIAND) as so named at the time) sought to locate ways to incorporate Traditional Ecological Knowledge (TEK) in forest

management plans. Several projects were funded to explore and articulate ways in which TEK can not only be incorporated but successfully implemented. However, despite the several benefits reported, the FNFP was scheduled to sunset March 31, 2001. Reasons cited “demand for funding is high and the amount of federal government funding is decreasing over the life of the program, other sources of funding to maintain a viable program are being pursued. The FNFP is investigating other partnership opportunities including complementary federal government programs, such as employment programs and other Aboriginal based programs. First Nation participants are also seeking federal, provincial and industry support, although they have difficulty attracting traditional sources of funding since they do not have the equity with which to secure it” (Smyth, 1998).

The barriers highlighted under the implementation of CFAs and meaningful public consultation demonstrate a consistent pattern that may help explain why harm is perpetuated in Forest despite our conservationist and protectionist attempts:

1. Real decision-making power remains with The Crown.
2. Programs that seek to empower people and communities appear to be backed by precarious financial instruments and are *especially* vulnerable to changes in political leadership.
3. Innovation and experimentation is happening, even in older systems like forest tenure, but here again, power and control remain centralized and not distributed.

In recognizing this pattern, one could conclude that the crux of forest governance challenges lies in the reality that **it is not a matter of not knowing what to do or how to solve the challenges, rather, appears to be an issue of will: We already know what to do. Decision-makers *don’t want to do it.*** Acts and laws and legislations can dictate all of the rules we want, but none of that appears to matter if the capacity to change the rules lies in the hands of political leadership that is motivated by power and political gain/influence. By looking at the forest tenure and public consultation process, the following insight is developed:

In addition to the issue of power addictions (Rodhan, 2014), it is the *rules* of the system and having **access to them**, is what matters most. To explore the validity of this claim, a foray into Forest and the rules are explored in the following section.

Forest and Access to the Rules

Access to the rules of the system, and in this case, Forest, appears to be the key to power and determining Forests' fate. This has been demonstrated through recent changes made by the Ford government in the Laws and Legislations that form the basis of how Forest is governed. The creation of Bill 108 in 2019, More Homes, More Choices Act and Bill 197, Covid-19 Economic Recovery Act, 2020 made adjustments to the who and what of forest governance. It is important to understand what these changes are:

1. Adjustments to the Environmental Assessment Act: (EAA; "The Minister's power to issue a "bump up" order of a class environmental assessment (EA), is now limited to situations where such an order is necessary to prevent, mitigate or remedy adverse impacts on Aboriginal or treaty rights, or matters of provincial concern." An EA class are projects/groups of activities that are regularly planned **and therefore are exempted from a full environmental assessment** because they follow a standardized planning process (Province of Ontario, 2023e). Attaining an EA classification can be an advantageous position. The bump-up order creates a loophole matters of "provincial concerns." Additional changes to these new adjustments include the development of a screening process to assess whether a certain EA **class may be exempt from certain undertakings** as stipulated under the Act as it relates to one's respective EA class. Certain Crown Corporations may be exempted from section 15.3(3) of the EAA which stipulates that **a proponent may be exempted from consultation** given a screening process but must ensure that conditions specified within the class EA are complied with (Province of Ontario, 2023a).
2. The Endangered Species Act: There is a fund that is tied to this Act. The adjustments now state the fund will be subsidized by landscape agreements which is a type of agreement formed with the Minister **to allow otherwise prohibited activities to be carried out,** provided various conditions are met. Furthermore, **a one-year grace period is provided after a species has been listed as endangered** and the **Minister reserves the right to "suspend protections for endangered or threatened species that are listed for the first time for a period of up to three years** (does an endangered species even have that much time?)**.** The Minister may also issue orders to refrain from or halt any activity that may have a significant adverse effect on a threatened or endangered species, including orders to address the adverse effect of the activity" (Sliwa, 2019, p. 108).

3. The Ontario Heritage Act: Where the municipality ecoregion fails to make a decision within 120 days**, the heritage designation is deemed to be withdrawn.** In addition, heritage by-laws are now appealable to the Ontario Land Planning Appeal Tribunal (LPAT; formally known as the Ontario Municipal Board, OMB) instead of the Conservation Review Board (Sliwa, 2019, p. 108). LPAT is an independent administrative tribunal who hears appeals related to matters on the land, heritage conservation and municipal governance (Lidder, n.d.). LPAT is subject to the Planning Act and therefore, **LPAT does not hear matters related to Provincial decisions on official plans and major official plan updates where the Minister is the approval authority** under section 26 of the Planning Act (Lidder, n.d.).
4. The Planning Act: the Bill repeals the stringent limitations on appeal grounds introduced by Bill 139 (Building Better Communities and Conserving Watersheds Act, 2017) stating that the Bill (Bill 139, that is) **is inconsistent with the Provincial Policy Statement (PPS)**, it provides more power to the Local Planning Appeal Tribunal (LPAT) to make planning decisions such as one of the limitations stated under point 4 above basically giving the Minister full range (Sliwa, 2019).

The objective of Bill 108 was to address the housing crisis and promote the building of various housing types. Bill 108 sought to reduce approval times as it relates to official plans, zoning by-laws, and plans for subdivisions. Bill 23 (More Homes Built Fast Act, 2022) is bult from Bill 108. Bill 108 made changes to the Ontario Heritage Act, by increasing requirements to consider something of Heritage value. I find it important to note at this time that the Ontario Heritage Act not only covers heritage buildings but also archaeological sites, cultural heritage landscapes, and historical Aboriginal values and cemeteries which also happen to be found in forests (Province of Ontario, 2023d). It should also be noted that upon inquiring how Ontario Heritage values are embedded into Forest management plans, I was informed that there are no indicators established to track whether these values are being adhered to. This was disappointing to hear as the values appear to be quite thorough (Personal Correspondence). These changes to the Ontario Heritage Act fueled by Bill 23 are justified under the guise of “developing efficiency and cost savings” (Province of Ontario, 2023b) yet it has been found that “the opportunity costs of cultural heritage preservation are miniscule in comparison to the societal benefit in preserving these values. In a policy context, pursuing this revised guide (on heritage values) is therefore beneficial in meeting our social, economic and ecological sustainability objectives” (Province of Ontario, 2023d). Bill 23 also seeks to remove protections

from the Greenbelt in the name of advancing the PPS, however, the PPS itself identifies areas of the greenbelt as ecoregions (5E, 6E and 7E) which **cannot** be built upon (Province of Ontario, 2020; p 37). Under the PPS, ecoregions are to be protected yet these very regions are being impacted via Bill 23. Recent news stories reveal that Doug Ford has already given away parts of the Greenbelt to his Developer friends (Winfield, 2023).

Legislation, and therefore rules meant to prioritize the health of Forest appear to be amended and/or adjusted in ways that prioritize human needs and/or political gain. *Strangely*, what appears to be happening is that those in power are changing and adjusting the rules so that they have *more power* and there doesn't seem to be any rules against this for *some reason*. It is no wonder that Canadian governments have a deep public trust issue (Norquay, 2022). These issues appear to also be fueled by, what appears to be, a false global narrative that suggests that Canada is to be exemplified in its forest management practices (The UN, 2019). There are many other reports and pieces of literature that are running counter to this global narrative. For instance: Our increasing wildfires. The cause of these wildfires are thought to be caused by climate change. If we were truly good to our Forests, would we have an issue of increasing wildfires? This challenges the government story that Canada's forests are in fine health and need not be concerned about. Studies examining Canadian-run forest management practices have shown that they have been more harmful to forests than helpful "much of this is in irreplaceable, uniquely carbon-rich and biodiverse primary forests — forests that, once they're clear cut, can never be replaced," she said. "Canada is selling off its forests to the highest logging bidder" (Fortune, & Matteis, 2023). Adding fuel to the fire (pun intended), it is suggested that even conservationist policies and legislations are simply not sufficient in addressing the real threats to Canada's forests. This is because conservationist efforts are still based on notions of incremental change rather than what might actually be required, which would be systematic, regenerative transformation**.** There are several benefits to natural regeneration in restoring the harm that has been caused to forests, however several policy barriers exist that prevent natural regeneration efforts (Chazdon et al., 2020)**.** The preference is to pursue conservation efforts that insist on human intervention. Ontario in particular has been cited as a Province that has not only been failing conservationist policies but that the Ontario government **has actively reversed previous conservationist efforts** implanted from previous governments (Souza, 2021). This is also confirmed through Ford's recent decision to build houses on The Greenbelt. Interestingly, Ontario's failing report card, which was published in a report by the Canadian Parks and Wilderness society in June 2021, was *after* the several changes made to

environmental and conservationist acts such as the Environmental Assessment Act and the Endangered Species Act, as discussed above.

The global narrative on Canada's forest appears to make it seem like we are good to Forest but this narrative seems to act more like an enabler for bad behaviour than reflecting the *actual* truth. Protection for our forests is only done when it is convenient for those in decision-making capacities. Otherwise, it seems that the desire to acquire political power far outweighs the health of Forest. This suggests a dysfunction in values and worldviews, especially given the fact **that we are in the middle of a climate crises**, which means that the problem is significantly deeper than simply a matter of policy change – the change needs to happen within humans at much deeper levels. We can have as many Laws and Acts and Legislations as we want, but none of it matters if the rules of the system are sitting in the hands of an ideology that values power over the health of Forest.

Articulating the problem space

In the above sections, the following challenges in forest governance have been articulated:

1. The forest governance space is made up of overlapping actors, stakeholders, desires, wants and needs which dilutes accountability. This makes Forest a site of political activity subjecting Forest to matters of power rather than allowing Forest to simply be a forest. This then clouds how we view and interact with Forest.
2. It can be thought that both Forest and Humans compete for similar resources: both entities are land-based. This positions Forest and Humans in competitive stances against one another because of the ways in which human systems seek to assign and distribute land. This can create systems of competition between Forest and Humans which result in humans wanting to take over control over Forest.
3. At the global level, there appears to be a narrative that positions Canada to be good to its forests, however, this narrative clouds what is actually happening and could be serving as an enabler for bad behaviour or could be a demonstration of our low standards.
4. Innovation and experimentation is, in fact, happening within these spaces. Some of which were discussed under the Forest Tenure section. However, it was noted that these experiments are sunsetted either because they are backed by precarious financial

resources and/or there appears to be a lack of political will to scale these initiatives in meaningful ways.

5. Finally, and most important, is that there appears to be absolutely no recourse for political leadership to stop making changes to Acts, Laws and Legislations that are meant to protect Forests, simply on the basis of political ideology. What is worse is that there we do not appear to have any sort of rule and/or consequence that prevents political leaders to adjust or develop legislation that seeks to give *more* power to those *already* in power. This is astounding given the fact that we are in the middle of a huge climate crisis.

For the challenges articulated above, it is clear that matters of political power and ideologies are driving forest governance decisions. This leads to decisions that not only permit removing conservationist and protectionist policies and rules meant to help forests but enable power hoarding and power addictions. This tells me that we do not actually value our forests which is a problem given that we are in the middle of a climate crisis. Even more troublesome is that some of our conservationist attempts, which insist on human intervention, are showing to be inferior when compared to scenarios that have allowed for natural ecosystems to simply regenerate themselves. Even more troublesome is that the ability for Forest to regenerate themselves is blocked by human-made policies.

Given these challenges, this work is leveraging the notion of Forest Sovereignty as a metaphor to update human worldviews and values so that we can begin to develop and enforce rules that are truly meant to help Forest rather than constantly centering ourselves, even if, and especially if this means that humans are not involved in some processes. In the context of the 3 Horizon framework, you may be able to see that Horizon 1 and 2 would seek to leverage the notion of Forest Sovereignty as a metaphor and where Horizon 3 would evolve this metaphor into actual reality. Some very speculative imaginings of this H3 future is discussed in this work.

In an ideal world, this work would articulate what it would be like to explore systems that are not human-centric, however, this, I feel, would go beyond the scope of a Master's level project. Instead, I would suggest that Forest Sovereignty as a metaphor may be the first step *towards* a future where we are able to develop Earth-centric systems and not human ones. As such, when Forest Sovereignty as a metaphor is discussed, you will see that solutions and approaches are suggested within the confines of human systems as an attempt to work with the system in order to change it. The notion of Forest Sovereignty will now be discussed.

Forest Sovereignty

In this section, a definition of Forest Sovereignty is explored. This definition has been developed in two ways: 1) through literature review and desk research and 2) through interviews. In the former, this definition attempts to articulate what Forest Sovereignty might mean by way of describing what it does not mean. The second way is through semi-structured interviews which were conducted across 6 participants who contemplated what Forest Sovereignty is. Through no specific prompting from the research participants, what ended up emerging was an exploration in *how* Forest Sovereignty might happen rather than what it was. These are referred to as Forest Sovereignty requirements as they are understood to be concepts, ideas and tools that appear to be needed in order to make Forest Sovereignty happen (i.e., moving out of metaphor into H3 reality). In contemplating what Forest Sovereignty means, participants naturally leaned into defining Forest Sovereignty in terms of *how* rather than *what.* Each of the Forest Sovereignty requirements are categorized under specific Horizons. Our definition of Forest Sovereignty begins with defining what is meant by the term “Forest.”

What is Forest?

Forest is alive in-of-itself; it is integrative in its nature and has capacity to not just hold plurality but to *be* plurality.

Forest has played significant roles in some of our greatest stories: it has been the site of epic transformations, deep mystery, mischief, madness and disorientation. Forest is often considered to be the place where the great unknown, the hidden; are gathered. Where life and death intertwine and intermingle in ways that make a human question the distinction. For instance: a dead piece of wood on the forest floor provides significant and critical housing for other beings. Dead wood also provides nutrients to the soil and to the entire forest ecosystem. Removal of dead wood has been shown to reduce biodiversity in the form of insects and birds. It has also been shown to help increase food supply (Thorn et al., 2020). Essentially, life and death play the same role in Forest: they both contribute to Forest thriving. Forest, also, has been and continues to be a place of spirituality. It has been documented that it has been a place where women are able to practice female rituals and exchange female rites and ways of being; exchanging the secrets of womanhood without the male gaze (Dossa, 1983). In this way, Forest has also been a site of liberation for women just as much as it is perceived to be a site of liberation for men.

In these ways, Forest is beyond just a plot of trees. *It is a world* where more-than-humans and humans live. Forest has its own cycles and time and therefore has its own ontology – there is a way of Forest and each forest has its own way. Therefore, a Forest, as it is understood in this work, is a world composed of nature and natural elements intertwined and interconnected that gives residence to more-than-human and human beings.

What is Sovereignty?

When we hear the word sovereign, we may think of the sovereignty of a nation. A sovereign nation is suggested to be one that has supreme authority over itself and can impose their authority on someone/something else. Something that is fully sovereign has ultimate decision-making powers and authorities and requires 3 factors: to have authority (who holds this authority has ranged across millennia from kings to people ruling through constitution which includes the idea of the right to command and the right to obey. This authority rests on legitimacy that requires agreement through laws), supremacy (the holder of sovereignty is supreme i.e., the constitution trumps the government of Toronto), territoriality (in terms of a specific geographic location and the diversity said geography may hold) and recognition of its claim i.e., a nation asserting independence from mother states (Philpott, 2020).

Self-determination is directly related to sovereignty. Self-determination could be understood as the “volitional actions that enable one to act as the primary causal agent in one’s life and to maintain and improve one’s quality of life, has four characteristics: (a) the action was autonomous; (b) the conduct was self-regulated; (c) the action was preferred as result of some event, in a psychologically empowered manner and (d) the decision maker acted in self-realizing manner” (Shrinkhal, 2021) . The recognition of self-determination as a legal right at an individual, human rights level, was confirmed by the General Assembly resolutions and International Court of Justice in 1971 and 1975 respectively (Pentassuglia, 2002).

The United Nations General Assembly 1966 provides that “all people**s** have the right to self-determination. By virtue of that right, they freely determine their political, social and economic status without external influence (The UN, 1966). The caveat to self-determination, however, is that self-determination lies in the collective freedom of *all* people to self-determine. Antonia Cassese (1995) suggests: “plainly, self-determination is the summa or synthesis of individual human rights because a people really enjoy self-determination only when the rights and freedoms of all individuals making up that people are fully respected. On a different level, the

enjoyment of individual rights presupposes the realization of (external) self-determination because if a people is oppressed by a colonial or occupant power, individuals cannot really be free to exercise their basic rights and freedom." (Pentassuglia, 2002). In other words, colonial systems are counter to self-determination as it seeks to actively restrict individual freedom. Basically, in our current structure, one needs to acquire recognition from "legitimate", colonized institutions to be recognized as people**s** in order to have the freedoms of self-determination. Legitimacy is among one of the factors that allow for sovereignty, as defined above. Therefore, our current understanding of sovereignty and self-determination is not only dictated by but made incredibly limited by the colonial agenda. This causes a great deal of harm.

Such harm has been and still is held by Indigenous Nations in their fight for sovereignty and self-determination. Some Indigenous scholars would not only suggest that self-determination is considered to be *jus cogens* (that is to say, self-determination and the values onto which they hold cannot be exempted or laxed in any sort of way (Lagerwall, 2015), but would also suggest that the fight itself for sovereignty and self-determination to the colonized state is counterproductive in itself (Shrinkhal, 2021).

Prior and even a little time after European contact, Indigenous nations were free to govern themselves in the way that was correct for their specific nation. They were also free to practice their own culture, engage in their own economic activities, and enter into peace and friendship treaties with Europeans without having to *acquire* these rights from anyone but themselves "the Two Row Wampum Treaty entered into by the Haudenosaunee (Iroquois Confederacy) and the British Crown in 1664 at Albany (now in New York State). By that Treaty, each party acknowledged the sovereign independence of the other, and agreed not to interfere with it" (McNeil, 2007). It was between 1871 – 1921, after the creation of the Constitution, and the first Indian Act, where treaty-making was halted by the British government, Indigenous lands were taken and tiny reserves were created without Indigenous consent (McNeil, 2007). This process led to a slew of atrocious crimes committed against Indigenous people, their cultures, rituals, and lands. For Indigenous peoples, land was not only a source of food and a ground onto which shelter could be made, it was and still is also a source of spiritual practice, identity, and culture. To be removed from land and dropped elsewhere is a physical demonstration of what it means to have your sovereignty being taken away and subsequently have your self-determination stifled as one is no longer able to take "volitional actions that enable one to act as the primary causal agent in one's life and to maintain and improve one's quality of life" (Shrinkhal, 2021).

The lack of access to Land/Forest can be understood as the physical manifestation of a lack of self-determination and sovereignty because the “taking away” of it resulted in reduced self-determination and sovereignty. Therefore, by this logic, Land/Forest itself *is* sovereign. This is because you cannot give to someone or something else what you are not. If not having access to Land/Forest results in a lack of self-determination, then that means that Land/Forest itself is already sovereign **because it gives** self-determination and sovereignty to others.

What is Forest Sovereignty?

If Forest provides human beings with sovereignty and self-determination, then that would suggest that Forest may be higher up on the "food chain”, so to speak, than we would care to admit. This work makes the claim that Forest is *already* sovereign and self-determining but is living in a system that perpetuates an artificial sense of inferiority onto Forest through control measures. Because Forest gives self-determination and sovereignty, Forest Sovereignty becomes an ontological claim because it sheds light on what/who Forest *is.* To suggest an ontological claim onto Forest would naturally require, then, that we do not seek to anthropomorphize Forest, nor attempt to ascribe human conceptions of intelligence to Forest or ignore the fact that Forest lives on a different time scale than do humans.

Forest Sovereignty, in the way that it is conceptualized here, as an H3 concept, is to imagine the possibility that we respect and accept the Forest as they are. This means that the sovereignty of Forest does not need to be legitimized, granted or imposed upon others which deviates away from the ways that sovereignty has been conceptualized by the colonial order. In order to accomplish this, it is critical we **do not** rush towards ascribing Forest and Forest beings, human qualities. That is to say that we do not anthropomorphize Forest. This is not the objective of Forest Sovereignty. Seeking to anthropomorphize Forest would be counter to the notion of Forest Sovereignty as an ontological claim, as it would only end up re-centering human beings. Rather, we learn to make space for the existence of the forests’ natural ontology in our current system. “Trees are not misconstrued as leaf-wearing humans but respected as unique, sovereign beings equal to or exceeding the power of humans” (Kimmerer, 2021).

In avoiding this anthropomorphizing, we are also able to acknowledge that Forest may display a level of what we, humans, may call “intelligence” in different and/or similar ways. For instance, as described in *Planta Sapiens: The New Science of Plant Intelligence* by Paco Calvo and Natalie Lawrence (2022), plants do not have nerve cells, as humans do, but they do use

electrical signals that connect adjacent cells and transmit information along roots and stems, similar to humans. Networks of chemical messages complement these electrical connections. Calvo & Lawrence goes even further suggesting that plants are cognitive beings and may have “diffused consciousness.” “When a vine sends out tendrils, it does so with intent, he writes, using light and chemicals to explore and then home in on a target” (Brady, 2023). The author claims that the plant is not “simply reacting,” but it is “making meaning” through inner awareness, perhaps similarly to an octopus whose consciousness seems spread among its arms (Brady, 2023). Although plants do not have nerves, plant cells are capable of generating electrical impulses called action potentials, just as nerve cells in animals. In fact, all biological cells are electrical (Jabr, 2010). However, unlike animals, measuring electrical impulses in plants is easy but linking them to specific plant functions is much more difficult (Jabr, 2010).

Finally, in speaking and working with the sovereignty of Forest, we must also acknowledge that Forest lives on a different temporal reality as humans do which has implications on how we go about understanding and making space for the sovereignty of Forest. The issue with our (human) perception of time is not necessarily that it is considered to be linear, though, linear conceptions of time are quite limiting, it also means that this linear, colonial conception of time is considered to be the *only* way through which time is experienced thereby eliminating any sort of temporal diversity.

Forest Sovereignty means that the forest themselves are able to live within their own prescribed time, forest time. Forest time lives on a much slower timescale than techno-driven-human time. Forest continues to grow and change according to its own temporal reality despite other pressures. This is simply the way in which Forest experiences its changes through life. By understanding that all types of time exists within present time and to also acknowledge forest time as being slower than human time, we are able to ask ourselves better questions about Forest, especially when we are attempting to extract resources from Forest: given that we know Forest lives on a slower time scale, what are the implications of cutting this 200 -year-old tree today? Today, we know that this tree provides a significant amount of carbon storage. Today, we know that this tree provides nutrients to other trees. Today, we know that this tree is a hub to the Forest. To cut down the tree today to benefit a future that is one second from now, or to cut down this tree today because a new seedling has been planted, is to simultaneously hurt the forest today and the future. It will take 200 years for this seedling that has been planted to

provide similar benefits to the tree one is looking to cut down today. In cutting down the tree today, we are not securing our future, we are harming it.

Much of what has been described above are conceptualizations of a forest that is sovereign in the future, H3. As it has been mentioned before, this work seeks to create a pathway towards that H3 future and our H1 and H2 realities. To do that, we begin by understanding Forest Sovereignty as a metaphor. A metaphor seeks to create likeness among two ideas, concepts, people, things (etc). Eduardo Kohn argues that a metaphor can bring together two different world together (Kohn, 2013), and I suppose this is what this work is doing. In this way, Forest Sovereignty as a metaphor suggests that forest *and* sovereignty are alike. Given that an argument has already been made that Forest *is* sovereign, the metaphor itself is feasible. This metaphor is then leveraged as a way to help shift human worldviews and values towards designing systems and structures that will prevent and altogether stop harm to Forests. As such, what this work seeks to do is to locate systematic structures that can be built, which begin to acknowledge, recognize and respect this inherent sovereignty and self-determination and explores what this recognition would essentially to do us, humans. The type of actions and tools we may have to move us from Forest Sovereignty as metaphor into Forest Sovereignty as reality are explored under the forest requirements. Requirements that are categorized as either H1 or H2 will describe what it may look like to design structures that give way to forest as a metaphor whereas requirements that are categorized under H3 would be telling the narrative of forest as sovereign.

Forest Sovereignty Requirements

As part of this work, I had the opportunity to elaborate on the above definition of Forest Sovereignty with 6 participants who kindly donated their time, energy and knowledge in this conversation. Occupationally, participants ranged from medical devices, government, tech, natural resource sector, anthropology. While the question started off as “what does Forest Sovereignty mean to you” what ended up emerging were potential answers to what was needed for Forest Sovereignty to happen in our current system.

It is also important to acknowledge, before presenting these 6 requirements, the limitations inherent in them. While I was privileged enough to talk to a range of individuals on this topic, I will say that the responses are limited. I was unfortunately unable to develop sufficient rapport with Indigenous Peoples and Communities, nor was I able to discuss this topic with individuals

who did not have some sort of advanced degree and/or people who oppose such a view. This is important to mention as the responses will subsequently be biased in these ways. Even though I did speak to a diversity of people, the socio-economic demographic and worldviews to which I engaged with was not, and this matters. That said, the 6 requirements follow and are each elaborated upon:

1. Control
2. Legal
3. Community
4. Self-hood
5. Ethics
6. Communication and Language

The requirements are elaborated on below:

Control:

The idea of control appears to be the basis of sovereignty. Applications of control look like the forest being able to make choices, decisions, hold and exercise power and the ability to own other things, on behalf of Forest itself. In order for Forest to exercise control over itself, based on the current system, Forest would need to essentially own itself. Presently, human beings, and specifically a small group of human beings appear to have control over Forests in the way of public/private ownership models. Crown land can become private land, even temporarily, based on tenure rights that are sold from the Crown to private companies. Once the tenure rights are sold to a private company, care of the land is the responsibility of the corporation themselves. Crown land can also become co-operatives and/or community land trusts seeking to decentralize ownership models. In the literature, decentralization has been advocated in various ways, including the idea of community-based management in which the state transfers powers of regulation to the community, however defined" (Sinclair, 2006). Co-management also appears to be an avenue at which people are exploring to solve the various tensions that exists; to come together to the table and make decisions together; essentially to govern forest as a larger community with overlapping needs and requirements.

Legal:

This component seems to be positioned as the system and structure to grant "teeth" to the idea of Forest Sovereignty and is seen to be a mechanism to provide personhood, regulatory

protection and enforce ideas of accountability which includes helping to think about who (humans) may speak on behalf of forest. Legal authority appears to be the thing that gives the forest control and because control seems to underpin the legal requirement, it may be that, here again, legality, or the idea of needing “teeth” is a consequence of understanding how the current system works and recognizing that Forest will not achieve sovereignty without legal orders. This line of thinking makes sense given recent trends giving legal personhood to natural entities**.**

Community:

The factor of community in this conversation of Forest Sovereignty speaks about human communities and their relation to Forest. As with legality, it also poses the question of who speaks on behalf of Forest, what and which communities govern over the resources of forest, Indigenous rights to hold control over their land which has been and still is for some Indigenous communities, a forest. This requirement of Forest Sovereignty appears to be concerned about who ultimately gets to be interacting with, making decisions for, and have access to Forest - it is essentially a question of who gets to be in relation with Forest. It is also a question of power.

Ethics:

The notion of ethics in relation to Forest Sovereignty is meant to underpin our interactions with Forest. In this way, using ethics as a guide in order to appropriately govern how folks may forage, addressing complexity when extracting resources (i.e., “if I remove this tree, what happens to the soil, to the animals who live in the tree, etc”), honouring cycles of death and taking only what is needed. Here, ethics is being leveraged as a way to enforce normative ontologies and govern our relationship with forest in the way that we think Forest may want to be treated.

Communication and Language:

Finally, in order to achieve Forest Sovereignty, we wonder whether and how we may communicate with Forest in order to implement and achieve it. Communication and language played a particularly important role in the requirement of community. While this category itself wasn’t one that explicitly came up, through the responses of participants, it seemed like this requirement emerged. How Forest may stand their ground against any human infraction towards Forests’ sovereignty and how might Forest choose to communicate with humans, if any at all, are some of the considerations that are part of this requirement.

Selfhood:

Selfhood and the notion of it seems to be the goal to be accomplished in this conversation around Forest Sovereignty. Selfhood in this case looks like agency, right to exist, being seen, trees that can do things to human, forest culture. Narratives and self-awareness, in terms of what stories are being assigned to each tree and whether the resources to be extracted from the forest are actually fulfilling a need versus a want, are showing up as drivers to this notion of selfhood.

Given that we are envisioning Forest Sovereignty as a 3-horizon concept, it would serve us well to examine whether the 6 requirements that emerged across all 6 participants would lead us to this stated future. As such, an analysis on each of the requirements is undertaken through a horizon lens, meaning requirements that adhere to current systems would be placed under Horizon 1 (H1), requirements that may serve as a bridge between the current system to an alternative future would be placed under Horizon 2 (H2) and finally requirements that sees us in the 3rd horizon, into the future, 20 years from now, are categorized as horizon 3 (H3). For more information, a detailed explanation is provided under the Methods section of this work. To help anchor this a little more, it is important to note the stance being taken to understand “current system”.

This work takes the position that our current institutions and systemic structures, at least in the human realm, are built on the colonial agenda. Capitalism and its many practices such as the inclination to extract natural resources and emphasis on private property, are considered to be the handmaiden of colonialism. Since many of our institutions were established before, during and after the attempted genocide of Indigenous people in Canada, they too are considered to not just be part of the colonial/capitalist agenda but also seen to be agents in keeping it alive. Requirements that reflect concepts, ideas, mindsets, values that reflect back coloniality are likely to be identified as H1.

Analysis on the 6 Forest Sovereignty Factors:

Control: H1

Through a systematic lens, we may find that the notion of control may be “too simple” of a concept when attempting to apply it to a forest. Researchers discuss 8 characteristics of Forest that emerge when viewing them through the lens of complexity science, the 8 factors being:

Heterogeneity, Hierarchies, Self-Organization and Emergence, Openness, Adaptation, Memory, Non-linearity and thresholds, Uncertainty (Filotas et al., 2014). What is most salient here is that the idea, concept and term of control is not mentioned once. Hierarchy may imply control but upon closer examination, it is different. Human systems suggest a hierarchy that values the top. Meaning whatever/whoever is at the top of the hierarchy, matters most. In the forest, this is inverted. Life in Forest appears to begin at compost, i.e., animal feces, rather than at the highest tree. Based on this, the concept and term of control does not particularly apply to Forest. Forests' natural inclination towards more organic forms of self-organization suggests that Forest itself does not need control.

While Forest themselves do not *need* control, control may be needed to implement Forest Sovereignty as metaphor, in our current system, since it plays such an important role in our lives today. But when control is being used here, it is not so much something leveraged by Forest more so than it being applied onto human beings. Control would be used here as a tool to regulate *humans.* In the psychological sense, our locus of control should be turned inwards. Rather than attempting to place control outside of ourselves, we seek to control ourselves. Asking questions about whether we truly need the resources we are looking to extract or whether we can make do with what we have, or whether alternative trade agreements can be made, allows us to take responsibility of ourselves rather than imposing responsibility on Forest to meet all of our desires and needs. As such, shifting our locus of control onto ourselves rather than seeking to control forest seems like a solid H1 step we can take towards Forest Sovereignty as a metaphor.

Legal: H2

Hard and soft law play different roles in our legal system and may provide some interesting options in terms of employing Forest Sovereignty in the ways in which it is being conceptualized in this work. Regardless of the non-binding nature of soft laws, breaking them can produce serious consequences. Political consequences for infractions of soft law can look like legal ramifications such as retaliatory sanctions, similar to those we could see when a hard law is broken, making the two indistinguishable (Shelton, 2008)**.** Many times, soft law becomes precursors to treaty negotiations which could then become customary international law, codify and crystallize trends towards particular norms, fill in gaps in existing treaties and even substitute legal obligation when on-going relations make formal treaties too costly and time-consuming or otherwise unnecessary or politically unacceptable (Shelton, 2008).

The role of soft law in the Canadian system is quite extensive. This is because soft law tends to be quicker and more flexible than hard law. This proves to be quite helpful for industries that move and change quickly such as the tech industry, particularly related to AI governance and regulations (Gutierrez & Marchant, 2021). Soft law also appears to have a significant role in natural resources which is of particular interest to this work. In *Governing the Commons*, Elinor Ostrom (1990) highlights how collective action encourages the use of soft law. Ostrom shows how groups of people who make use of a common resource come together to establish norms, values and behaviours that benefits not only the users of a common resource but also the resource itself. In many of the case studies Ostrom presents, there is a combination of bottom-up, community level action, to establish non-binding norms relative to the common resource which become precursors to legal agreements (hard law).

Soft law could be the legal tool unto which we can begin to re-imagine and re-haul our legislative capabilities as it relates to implementing Forest Sovereignty as metaphor, given the signals and trends currently present. One such signal is the matter of *the tree that owns itself*. In this instance, the *tree that owns itself* was a deed given to the tree itself by the previous "owner" of the tree. Under the guide of hard law, this type of deed had no real legal implications because, under common law, the recipient of a piece of property must have the legal capacity to receive it, and the property must be delivered to—and accepted by—the recipient. Both are impossible for a tree to do, as it isn't a legal person (*Tree That Owns Itself*, 2023). Despite this, however, the trees' ownership rights have been upheld and intact through soft law. Where hard law was not able to accommodate something as seemingly abstract as granting ownership to a non-human-being, soft law appears to provide the flexibility to do so.

The challenges around soft law must also be mentioned. A paper written by Sossin and Wiltenburg (2021) suggests that soft law does not seem to require adherence to the Charter which can cause some serious issues: "soft law may not even always be written, and it can develop through shared practices in a decision-making body, passed on through training, mentoring, and meetings. In Langenfeld v. TPSB ("Langenfeld"), a "practice" instituted by the Chief of Police to search members of the public before permitting their entry into police headquarters was an unjustifiable infringement of the Charter" (Ibid). This example illustrates the blurry lines soft law lives within. The authors go on to suggest that "where soft law is the driver of discretionary decision making, it should be the focus of legal accountability" (Sossin &

Wiltenberg, 2021). In other words, where soft law is in place that drives decision-making, legal ramifications must be in place in order to promote ethical behaviour. While the authors make a valid argument, I question this stance given that it has been shown and discussed above that breaking soft law could lead to legal ramifications equivalent to breaking hard laws. In addition, the non-binding nature of soft law also poses an adaptation challenge. United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) is an instance of a critical legal document that is considered to be soft law because the declaration is not legally binding and subsequently not legally enforceable. Canada initially did not accept the document and there were no ramifications against that. The document was passed in 2007 and Canada did not adopt it until 2020. Despite these challenges, however, we are beginning to see how signals in soft law transform into trends found in hard law.

The case of the Four Rivers around the World that has acquired personhood provide insight into how soft law becomes hard law: The Whanganui River in New Zealand, the Rio Altrato in Colombia, and the Ganga and Yamuna rivers in India, have all successfully gained legal protection as a way to safeguard these rivers in an effort to preserve their ecological health. Doing so allowed for lawsuits to be filed against corporations and bad actors who violated the rights of these Rivers. This move has essentially turned that colonizers tools against themselves (Jacobs & Utting, 2022). These are important steps in terms of defending the Rivers and ensuring their protection, however the implementation of these hard laws are bumping up against some challenges in much the same as *tree that owns itself*.

It remains unclear as to whether these actions will actually safeguard these natural entities on a long-term basis. “What exactly is the party seeking on behalf of the injured entity? Does the party seek to compel an authority figure to pay for damages incurred? How are these damages measured? Who can be held responsible for these damages? Could the appointed guardian be held responsible if a river floods and causes damages? Who has a say over a trans-boundary river, such as is the case in India where the Ganges and Yamuna rivers extend beyond the border of Uttarakhand? If a complaint alleges that climate change is a threat, how much liability does a specific industry’s activities bear in that respect?” (Challe, 2021). It appears that the way in which hard law is designed makes it inherently incompatible with exploring legality outside of the human realm. Soft law may be the tool that helps uphold legal personhood for natural entities in the event that the implementation of the hard law becomes infeasible.

The use of soft law allows us to take first steps in attempting to resolve some of the complications tied to implementing personhood towards natural entities in court proceedings, allowing us to explore alternative worldviews tied to natural entities in more “serious” ways. This process also begins to allow us to explore how we may leverage legal instruments to develop a new set of behaviours, worldviews and values for humans to adjust to the metaphor of Forest as sovereign. Doing so (using soft law) would provide time for institutions and corporations to make the necessary adjustments to begin installing human norms that reflect Forest as sovereign.

Ethics: H2

Consciously looking to develop an ethic around Forest Sovereignty can provide us with guidelines and behaviours, of sorts, that can help us treat Forest as sovereign and can work on re-shifting our relationship with Forest. While contemplating ethical behaviour could bring up philosophical debate, it may encourage human beings to think about important questions such as:

1. When might be a good time to cut down a tree? Time taken to understand what a “good time” means and consist of will be necessary here.
2. What might be the best way to cut down a tree?
3. What are the beings that inhabit this tree that we are looking to cut down and will they be able to find another residence?
4. Where might be the least impactful areas to act and explore in Forest? What sort of harm are we allowing as humans visit Forest?
5. Does Forest need to be greeted before entering and if so, what might be the greeting?

Applying an ethics to Forest Sovereignty, and giving time to answer the questions above allows us to think explicitly about how we treat Forest and the more-than-human-beings that reside in Forest. These ethical questions can also form the basis of the soft laws we seek to practice in creating systematic structures that make way for the sovereignty of forest. For these reasons, ethics has been categorized as an H2 requirement as it allows us to ask questions that can bridge between H1 and H3.

Community: H2

Forests are an elegant complex system where more-than-human and non-human beings, “alive” and “dead” reside. Forest is capable of housing an incredibly diverse set of life. Forest is

essentially plural. It *is* community. A wide range of beings are able to conduct their activities and practices in the way that is correct for them, they are able to govern themselves in the way that is aligned to their nature and aligned to Forest. No one group is attempting to control another or specifically control Forest. Perhaps domination over a particular territory happens in a forest, though it does not happen through changing Forest landscape or harming Forest to adapt to the needs of the being, rather, the being adapts to Forest. For instance, in the song and dance of predatory and prey relationships, Forest can become, for pray, as safe haven as they are able to camouflage themselves, and predators are able to hide in Forest so as to be able to hunt their pray; the beings adapt *to* Forest. The beings in Forest and the Forest themselves are one in the same – they are not separated from one another.

Re-framing Forest *as* community allows us to de-centre the human (i.e., initial conceptualizations around this were concerned around what human group gets to speak on behalf of Forest) and re-centre Forest. We create an opportunity to consider the question of how we may consider and include non-human *communities* in our political discourse in order to create systematic structures that extend *beyond* the human. As we may do for a human community, recognizing Forest as community may change how we go about engaging with the forests. Say for instance, there is a proposal to build new homes but would require destroying a forest. As we may seek to consult human communities in that process, we may also involve Forest as a community stakeholder. This may perhaps make it easier to include Forest in public consultation processes or seek to develop methods to effectively engage with Forest.

When we make the assumption that a) a human community needs to be developed around Forest Sovereignty, we are ignoring that a community already exists: the forest already *is* community and b) by ignoring the former, we fail to take time to ask an alternative question: instead of asking who (among human beings) gets to speak on behalf of Forest, we can ask "what is our (human) role in the *already established* community of Forest? How might we treat Forest as community differently? Asking such a question allows us to explore alternative relationships with Forest.

To understand and accept Forest as community and develop a human community around this understanding is a step towards working outside of the current systemic structure. It means to develop a set of economics that does not depend on the extraction of resources or that one human community has more say above another but focuses more on developing roles and

responsibilities that are underpinned by respecting Forest *as* a community and seeking to develop our politics as such. By moving the question of community out of who gets to speak on behalf of Forest into who develops a relationship with Forest, we are able to already imagine alternative pathways and, in these ways, community falls within H2.

Communication and Language: H3

Communication and language have been part of human evolutionary history. It can be argued that all animals, perhaps even plants and trees, have their own forms of communication with one another. Neurons in our brain communicate with one another through electrical signals. Language is a form of communication. Some animals communicate through the language of songs. For human beings, language consists of a string of sounds through the use of letters and symbols, though this appears to be evolving due to the advent of social media and the proliferation of meme culture, driving a significant evolution of our language. As our language changes, does that also mean that who we may typically communicate with can also change? I would say “yes.”

At the moment, there are technologies that are being developed to help humans communicate with animals, particularly whales (Barkham, 2022). This communication is being done through computer-based technologies like AI. There is one instance, however, that is based on more feeling-emotional forms of communication, where a human is able to communicate to whales through song (https://www.michaelaharrison.org/whale-whispering-1). As such, humans may already inherently hold the required technology needed to develop such **inter-species communications.**

The relationship humans have developed with dogs is a preliminary foray into exploring the edges of an emotional-feeling-intuitive language (Westerlaken, 2020). For instance: you can *feel* when your dog might be sad or need your attention or comfort. Alternatively, dogs are able to pick up on their humans’ mood and act accordingly. You learn to sense what your dog might need despite the fact that the dog doesn’t speak your (human) language: you exchange information and knowing on a whole other emotional-feeling-intuitive level. The same can be said about the relationships we build with our house plants. If we co-exist with them long enough, we may begin to understand when they might need a little extra water or if they may need to be moved somewhere else in the house; without consulting the internet; it’s just a knowing we develop with them.

A kinetic-based language may also be another pathway to explore our exploration of inter-species language and communication. This language looks like developing our sensory receptors in our hands and feet in order to fine tune ourselves to the “voices” we hear in Forest floor or within a tree or on a leaf. Perhaps our tastebuds may provide us with information about the state of Forest soil. Perhaps the smell of a rotting corpse can tell us something about Forest temperature and whether that temperature signifies health or not. Perhaps we can imagine consuming certain materials/foods that may help enhance these capabilities: would eating paper help us hear trees better? Would our digestive systems adapt to consuming paper and allow us to get closer with Forest? Would developing a kinetic-based language with Forest evolve us into literal Forest-Sapiens?

Rather than using more resources to develop technology to do the job of communicating with Forest, why are we not already looking to use what we already have and seek to develop that? It may be the slower and perhaps more challenging route, but it may also be the most sustainable.

Therefore, this particular requirement of communication and language allows us to think about H3 possibilities in ways in which that lay at the fringes of our society. Here, we are able to really think about the sovereignty of Forest as reality and not just as metaphor. Once humans are able to communicate with Forest in these ways, we would be able to co-create with them rather than *for* them. I do not believe we are very far from this future. We are already seeing human beings develop their animal-communication and forest-communication capabilities, it is happening.

Selfhood: H3

Selfhood, and the topics to which this concept orients itself towards is quite extensive and continues to be a topic of exploration for many human beings. It has only been a recent unfolding for us colonized minds to seriously apply selfhood to more-than-human-beings. The Cyborg Manifesto written by Donna Haraway in 1985 was one relatively early contemplation of this. As of late, there are several works that have presented the idea of a more-than-human conception of selfhood.

Forest selfhood is a topic to which Eduardo Kohn discusses extensively in his book *How Forests Think (*2013). Kohn argues that selfhood in Forest can be understood within the world of semiotics; Forest communicates through signs. This form of communication works towards

developing Kohn's theory of forest selfhood. Through Kohn's extensive research, he shows the intricate and intertwined relationship the Runa people have with Forest demonstrating that human and Forest and all the alive and dead beings in it are connected; are essentially one in the same. Kohn suggests that "an ethnographic focus not just on humans or only on animals but also on how humans and animals relate breaks open the circular closure that otherwise confines us when we seek to understand the distinctively human by means of that which is distinctive to humans" (Kohn, 2013). Contrary to what western culture and ontologies suggest, Kohn offers a view that steps out of how we have traditionally seen our human place to be, into in the larger web of life in a way that requires us to rethink where we might be placing ourselves (Herman, 2016). What these alternative conceptions of selfhood allow us to do is to imagine what it is like to not only consider ontological states of non-human-beings but to also reconsider and re-evaluate where humans are placing themselves in the larger picture. In this way, Kohn and other works force us to ask questions we do not yet have answers to, for instance: if Forest is a Self, what does that mean in terms of how we account for Forest Selfhood within our system? What does this mean in terms of how humans relate to Forest? Asking these questions allows us to imagine alternative possibilities to those we do not yet live in and is subsequently an H3 requirement.

The implications of Forest selfhood are vast. The first allows us to consider how Forest may perceive us, human beings. Kohn argues that it matters how other beings see us "sleep faceup! If a jaguar comes he'll see you can look back at him and he won't bother you. If you sleep facedown he'll think you're aicha [prey; "meat" in Quichua] and he'll attack." If Juanicu was saying a jaguar sees you as a being capable of looking back—a self like himself, a you—he'll leave you alone. But if he should come to see you as prey—and it—you may well become dead meat. (Kohn, 2013). In this exchange between jaguar and human, we begin to be able to not only conceptualize but also experience, in a very real "life" and "death" way that we are in relationship with Jaguar. In this way, "we" becomes a new "we" in this exchange between human-to-human relationships and also human-to-animal-to-Forest, allowing us to break open our relational ties (Herman, 2016). By breaking open our relational ties outside human species, we are able to open ourselves up to the understanding that Forest can influence and impact human beings outside of simply being a place where resources are extracted.

There are many stories and understandings around how some trees can do things to humans. In a piece by Aaron Denham, The Social Lives of Tree Spirits: A Kinship (2020), he discusses

the relationship the Nankani tribe has with the Nankani Tree. This tribe not only attributes human qualities to these trees, they also recognize these trees to be “autonomous beings or malicious spirits. And like humans, trees also have unchecked moments of unpredictability” (Denham, 2020). Trees specifically have had an interesting dynamic with humans. The relationship between tree and human has been intertwined and complicated in many ways: we have the capacity and will to develop relationships with trees – some of us have a favourite tree, one in which we look at and to so as to feel connection with; unknown and unfound in the human world. We often view these trees as quite special. We hug trees. We form identities with tree types. We view trees in special and important ways. We also take from trees and rely on them in significant, life-giving ways, and while many of our relationships thus far may appear to be romantic, I would suggest that this is because we are only scratching the surface. As Dunham and others have suggested: trees can do things to humans: “When a tree changes into a human,” said Ayanobasiya, “it gains the same humanly power to destroy”. “The Nankani describe how mental illness (gongo) is a consequence for failing to acknowledge a tree (or, ultimately, one’s social responsibilities) and not offering what it wants. A woman remarked, “If you see someone laughing and talking and doesn’t know anything, or is wandering around like they have no sense, it’s the trees that have done that. [...] They say she got it from a tree. Trees can change your brain. They can make you do anything” (Denham, 2020). This conceptualization of Tree being able to do things to humans allows us to understand that we are in relationship with Tree and, could be in relationship with Forest. This suggests that Forest has just as much influence and power over us than humans do to on them.

To acknowledge that Forest is not simply a site of extraction but can be a point of critical and significant consequence to humans, we are seeing more than one side of Forest and *all* of the ways in which Forest can work with and **against** human beings. What is ultimately being suggested here is a reconsideration of our relationship with Forest formed on the basis of animism (belief in innumerable spiritual beings concerned with human affairs and capable of helping or harming human interests (Park, 2020), as a way to re-conceptualize the ways in which we go about being in relation with Forest. This, of course, is a worldview held by many Indigenous Peoples. Essentially, one cannot fully adopt the notion of Forest Selfhood without acknowledging that a Forest, a non-human entity, is, in fact, alive; imbued with a soul and/or spirit. As such, considering Forest as a Self requires significant adjustments to worldviews and subsequently to systematic structures which would qualify Forest selfhood as being an H3 concept.

The hope underpinning this work

Leveraging the notion of Forest Sovereignty first as a metaphor into a reality allows us to take practical steps towards making this future into a reality. This future also appears to be a preferred one based on interview responses. Mind you, as prefaced prior to discussing this idea of Forest Sovereignty, all research participants were likeminded in terms of being open to and quite excited about the idea of Forest Sovereignty. I was unable to chat with anyone who disagreed with the idea. Despite this limitation, however, this mental exercise encourages us to stretch the bounds of what is possible and to imagine how our relationship with Forest may change and alter in the event that we create systems that give space to the inherent sovereignty of forests. Forest Sovereignty seeks to be a radical balm towards the often conflicting tensions that exist within Forest. The assumption being employed here, of course, is that Forest Sovereignty could mitigate the many challenges described in earlier sections of this work and that Forest Sovereignty is a normatively "good" concept and/or idea. At this point, almost any deviation from current approaches and worldviews would be welcome. The hope is that in attempting to abstract, conceptualize and anchor this concept of Forest Sovereignty in our current systemic structures, we find pathways and laneways that weave us into alternative ontological and epistemological futures that encourage the evolution of the human spirt and allow Planet Earth some rest and healing.

In the above sections, we have explored 6 requirements and categorized each one of them based on horizon level. Requirements that can be leveraged in our current system, like control as applied to ourselves, is a critical first step (H1). Requirements that allowed us to begin to imagine how we may bridge sovereignty via soft law (legal) and developing human community *with* forest community (community) were categorized under H2. Finally, requirements that allowed us to explore opportunities outside of our current reality such as developing a forest language (communication and language) and forest selfhood (selfhood) were categorized as H3. These particular requirements help us move the narrative from Forest Sovereignty as metaphor into Forest Sovereignty as reality. The hope in doing so is that it helps us develop a structure that allows us concretize something that may seem quite abstract, i.e. the sovereignty of Forest in an effort to address the challenges identified in forest governance. If Forest becomes sovereign, we cannot simply just change the rules based on political whim or pick and choose when we adhere to conservationist and protectionists rules, it allows us to create structures of governance that promotes self-determination of Forest and requires human beings to respect that.

Leveraging the 6 requirements in the governance system may be quite helpful in terms of anchoring this concept of Forest Sovereignty. As mentioned in the methods section, governance is being categorized as H2. This is because governance has not only been shown to be a tool that allows for the perpetuation of status quo, it is also a tool that can be leveraged to make significant systems change. In these ways, governance is positioned to be an effective bridge to get us to H1 into H3. As such, a discussion on governance, what it is, its relationship to Forest Sovereignty and how blockchain may come into the conversation is elaborated upon in the following sections.

Governance

This section will be articulating how governance is understood in the literature, how it is used and what is its relationship to this specific work looking at whether *blockchain technology can lead us to Forest Sovereignty*. An elaboration on the concept of governance and its relevance to this project is critical due to the positionality of governance within our system and the role it plays relative to upholding the rules of the system, and the role it plays in creating frameworks for decision-making; both of which have been previously identified as high leverage points according to Donella Meadows 10 Leverage Points (Meadows, 1999). Governance has also been identified as an H2 tool in this work and therefore may be a bridge we can leverage to bring us into a future, where we create structures that honours the inherent sovereignty of Forest.

Governance, Government and Politics

Governance, government and politics are often closely tied together and found to be interrelated. Since we are hoping to leverage governance as an H2 tool in helping to facilitate Forest Sovereignty, it may be helpful to distinguish between these three terms in order to achieve clarity when discussing them.

Governance is often described to be the thing onto which decisions are made, and rules are developed in order to steer behaviour towards a certain goal, vision, and mission. In current literature, governance appears to be a tool that is used to establish structure; to enforce and maintain. This can be due to the etymology of the word itself. The word governance originates from the Latin verb *gubernare*, an ancient Greek word *kubernaein,* which literally means ‘to steer’; ‘to control, guide or manipulate’. In this way, governance, as it is utilized today, is the thing that helps guide, to assist in regulating ourselves, and to give us a structure to operate within. According to the Institute of Governance, governance has 4 critical elements to consider: who has power, who makes decisions, how stakeholders make their voices heard and how accounts are rendered (Institute on Governance, n.d.) . When elaborated upon, these four elements lead to further questions in terms of how power is allocated and whose voices are heard and included relative to the decisions that need to be made. Governance, then, also becomes the framework onto which power is authorized and validated and determines whose voices are heard within a given community (UNESCO, n.d.). We often understand that

governance is something that happens in the public and private sectors, but also happens within communities and small-scale groups.

The ways in which we can understand governance: what it means and its purpose, can be influenced by the sector we are looking at. For the purposes of this work, we are looking at forest governance. Since forests, many of them, are considered to be crown land that also means that we are looking at governance within the context of government, which will then connect to the politics of government. It may be helpful to understand the difference between the two: An interpretation of Aristotle's work suggests a relationship between governance and politics: "a generous middle class who seeks to balance between the rich and the poor. That the practice of politics consists of high citizen participation towards the common good." This understanding of politics by Aristotle positions politics as a normative claim about the process of rule underpinned by the notion of power. Another understanding of politics is sometimes posited on the idea of conflict, whereby politics is essentially the salve of conflict between plural groups (The emergent practice). The state of our political landscape may provide some indication in terms of how politics is understood in our time today. Our current political landscape appears to be focused on the notion of politics as a tool for power. This has been discussed in earlier sections of this work. Such a claim is being made based on general perceptions of our political state: citizens lack trust in politics and politicians because of the power relationship that exists within the political domain; they do not feel like decisions are being made for their good but rather through political self-interest**.** Furthermore, laws and legislations are created and adjusted so as to grant *more* power to those who are already in power without any sort of oversight or consequences to these actions. It is proposed then that in situations such as these, something else, like governance, must take the place of politics as a tool to come to decisions since the political realm is tied up with matters of acquiring and/or attaining power (Piper, 2007).

Thus, governance and politics are meant to be complementary where the former manages the necessary functions of decision-making, stakeholder considerations and legislative requirements while the latter inserts into governance the needed authority and power for these decisions and considerations to be made. Michel Foucault also creates a distinction between governance and governmentality whereby the former is thought to be more of a neutral framework that facilitates the activities of governmentality. The latter suggesting that it is the mentality, worldviews and "meat" (my own interpretation) of the governing process and activities (Foucault, 1991), suggesting that the process of governance and its governmentality consists of

a lot more than simply managing actors, stakeholders and institutions, but also worldviews, beliefs and values. And, specifically, that governance itself is actually quite neutral. It is the process of governmentality that adds the “juice” to the process of governing. Given where I’ve seen most of the governance literature, it would seem that governance *is* governmentality. As such, they will be referred to as governance and specifically that of forest governance.

Worldviews, Forest Governance and Forest Sovereignty:

Forest governance, particularly Boreal Forest Governance is understood to include “actors that represent the interests of different groups and the different levels of government that represent state institutions for decision-making, institutions determine the processes, scope of authority, and accountability for forest management decisions (i.e., “who decides what about the management of our forests”) and how diverse forest values are represented in decisions, formal institutions include hard instruments such as property rights, legislation and associated regulations, and soft instruments such as policies and state-led processes that engage actors in decision-making. Informal institutions refer to non-state instruments such as voluntary agreements and third-party certification. Forest governance and its system, specifically for the Boreal Forest is derived from Canada’s federalist structure of government that divides authorities between national and provincial governments with spheres of responsibility set out under the Constitution Act (1867, 1982). Section 92A of the *Constitution Act* gives authority for land and resource management to the provinces and territories who then allocate dispositions and tenures for the use of or extraction of resources” (Fuss et al., 2018). In the governance of the Boreal Forest alone, we see a multitude of institutions, values and actors intersecting, overlapping, and conflicting as described in the introduction of this work. The ultimate authority lies in what is stated within the Constitution which gives Provincial governments authority to govern and manage most of the land. Worldviews and values involved in Forest Governance are influenced by the values and worldviews that the various institutions and actors hold and particularly of political ideology. While there are several legislative acts, institutions and actors that are involved in governing Boreal Forest in terms of conservation, protection, business and need-fulfillment, ultimately, much of the power and authority lies within the hands of Provincial government and the powers granted through the Constitution which was built and enacted by The Crown – a colonial structure. Being explicit about the origins of The Crown and the origin of power and authority that is enacted in governing Forest is quite important as it speaks to a particular worldview being attached to the ways in which Boreal Forest or any other forests for that matter, may be governed in our current system. Understanding the colonial mindset is quite

important as it ends up dictating the types of governance structures that are built, and, subsequently, mediates that type of relationship we hold with Forest.

We have discussed the various legislative acts and documents which outline the rules and behaviours associated with governing the forest, however, there are worldviews and values that often underpin these rules and behaviours. In these ways, governance acts like a mirror and the state of health through which something is being governed, i.e., the health of Forest, reflects the quality of that governance system, and, subsequently, the health of the institution from which it arises out of. Through desk research, it would appear that there are essentially 3 concepts that contain a set of worldviews and beliefs that underpin the rules and behaviours we seek to implement as it relates to how Forest is treated. They are: capitalism, colonialism and sustainable development. Colonialism, capitalism and sustainable development are ideas and concepts that perpetuate one another that often leaves local communities and Indigenous Peoples in significant harm, grief and loss. Each of these ideas come with it worldviews, values and beliefs about the world and about the role humans play in it which then influence the ways in which our systems and subsequently our governance structures get designed – our current experiences as coloured by a temporal spectrum which heavily consists of the past. Despite the developmental story you may be told, we are not heading towards the future, we are digging further into the past.

Sustainable Development, Colonialism and Capitalism

To take a closer look at the worldviews, beliefs and values that underpin Western governance models, it is helpful to start with the concept of sustainable development. As of late, there has been increased interest in and application of “new forms of governance” which seeks to address the goals of sustainable development. These “newer” forms of governance tend to include consultation and more participatory approaches (Howlett, 2009) in attempting to approach net-zero targets and alleviate some of the anthropocentric-capitalistic-driven climate change. “Old forms of governance” is understood to be decision-making as centralized, policy development that is closed, top-down and hierarchical (Bolton, 2022). Old forms of governance have been criticized for lack of progress towards sustainable development goals (SDGs). Net-zero targets, for instance, aim to decrease the amount of greenhouse gas emissions through tree planting and technologies that hope to capture carbon (Government of Canada, 2023b). It has been noted that progress has been slow in terms of target achievements and the issue appears to be that old models of governance are still in the drivers’ seat (Howlett et al, 2009). Take for

instance the 2 Billion Tree Project initiated by the Trudeau government. This target had been established in an effort to mitigate against climate change, particularly to stop rising temperatures of Earth's atmosphere. Previous reports suggest that the government is on track towards planting the 2 billion trees, however, alternative reports suggest that the government of Canada is using "creative accounting" and that "By 2022, NRCAN was supposed to have planted 90 million trees. NRCAN says that, to date, it has planted approximately 110 million trees" (Thurton, 2023). To better understand the initiative, I reached out to the general email inbox of this project. Upon further inquiry, I was informed that details on tree planting plans were not available to public, only to the organizations that received the grant. Upon attempting to reach out to organizations in Ontario who were awarded said grant to receive more information, particularly around what they planned to do with the seedlings they plant when they hit maturity or what they planned to do with currently mature trees as they planted these seedlings, I was met with non-responses throughout. This suggests to me that information remains centralized and that, despite this initiative happening on public land, regular citizens remained in the dark of what is actually happening. This is to say that despite the 2 Billion Tree Initiative being a new one, it appears to still employ old forms of governance to make it happen. In recognizing that there is a *govermentality* to governance, I was curious to understand what mental models may be underpinning sustainable initiatives like the 2 Billion Tree Initiative and wondered whether this was the cause of the slow progress.

The idea of sustainability and specifically sustainable development is thought to be formally put into mainstream politics in 1992 at the Rio Earth Summit which brought together representatives of more than 170 states. At this summit, world leaders formally pledged to make development 'sustainable' (Meadowcroft, 1997). Sustainable development in this way contains normative ideas of preservation, conservation, promotion of human welfare, especially the urgent development needs of the poor; concern for the well-being of future generations; and public participation in environment and development decision making (Meadowcroft, 2007). What is interesting is that while the intention and definition of sustainable development seems quite holistic, the literature suggests that the concept was borne out of **placating environmentalists** who brought up their concerns towards economic growth theories, like Donella Meadows (i.e., stories of infinite growth which appear to require infinite building of land which often results in the destruction of natural entities in favour of unyielding economic growth)(Ruddle, 2016). It would seem that the idea of "sustainable development" was not necessarily a conscious effort to help Earth, rather, it was a tool in the international space to channel dissent against economic

growth theories, thus creating a contradiction within the term “sustainable development”. This finding was particularly worrisome since many of our climate-change efforts are underpinned by this idea of sustainable development. A deeper dive into the term of “development” produces additional concern.

The term “development” itself comes from the US agenda towards evangelizing the world to the “good life” based in US terms and ideologies. In this way, “development” had a story tied to it that goes something like this: “build buildings on land -> build businesses -> Create more jobs -> Have more opportunities -> Live the American Dream. Convincing people to adapt to this narrative requires an agenda of hegemony which requires a great deal of control *on others* and not on oneself. A driver to this hegemony is thought to be motivated by the international trade agenda as a tool for wealth building (Ruddle, 2016). These “developments” are essentially grounded by European normative claims about what a “good life” looks like and thus imposes ideas of what it means to “develop”, “grow” and “progress.” “Development” was, in this way, regarded as normatively good and a universally desirable idea. The term implies a promise of prosperity through consumption (i.,e buy this house, get this job, buy these things and your life will be good). At the same time, the negative consequences of development projects to sustain this consumption are typically neglected. Well-intended development programs and policies tend to weaken social systems and local economies, creating dependencies and vulnerabilities. Infrastructure projects such as major dams, for example, cause displacement, resettlement and loss of livelihoods. An estimated 10 million people lose their homes in the name of “development” every year” (Ziai & Schöneberg, 2020).

Given the history of sustainable development, it would seem to me almost counter-productive to use the term to pursue initiatives that sought to address climate-change especially since we now know that the term was developed to hide away dissent. It is no wonder why initiatives that are housed under sustainable development efforts, like the 2 Billion Tree initiative, are slow in their progress: they are underpinned by values that actively seek to destroy the very environments they claim to help. It remains unclear to me how we are supposed to develop new forms of governance when we are using concepts and terms that have a track record of environmental destruction. To make matters worse, “development” itself appears to part of the colonial agenda as it seeks to eliminate local cultures, different worldviews and beliefs in favour of the ontological and epistemological realities of the parent country. Colonialism intentionally seeks to oppress and remove any sort of diversity of thought, worldview, and/or way of being

through genocide, oppression, dominance, and control, specifically towards Indigenous Peoples in Canada. These colonial tools were also then overlaid onto the ways in which business was conducted through development. Development turned into an economic theory: capitalism (Harrison, 2022)**.** Resource extraction practices were also imposed upon natural entities as part of the colonial project and were and still are treated as such in the name of power and accumulation of wealth. “Colonial interests were based on the principle of maximizing profits from natural resources, no matter the social, cultural, or environmental cost. Communities were also systematically excluded from any development or cultivation” (Light, 2020).

This idea of development shows up in the way that we govern our forests, and yes, even in Canada. The country that is supposed to be among the “friendliest” to our forests “the colonial desire for accumulation of wealth and power has been embedded in policies throughout history, at the direct expense of the wellbeing of people and planet. People, communities, and nature have been framed as resources to be exploited, extracted, and plundered in the name of economic growth.” (Light, 2020). Therefore, the values, beliefs and worldviews inherent in systems that seek to govern forests are inherently harmful to forests. This is because the values and beliefs tied to colonialism, capitalism and sustainable development are based on the idea of oppression, control and hegemony which prevents more-than-humans and human beings from being different – **there is a natural othering embedded in this system which actively seeks out to erase the other**. This type of structure then is inherently harmful to forests because forest is its own being and since it is not human and especially not a white human, it is an “other” and therefore subject to harm under the colonial agenda. It would not matter how we change our structures and systems, so long as these worldviews, values and beliefs continue to underpin them harm to forests will persist. As such, it is important to understand how forests may be treated differently under different worldviews and beliefs. The following section sheds some light.

Indigenous Governance

Indigenous governance offers an entirely new perspective on what governance is and could be, how it emerges and what its structures make space for. From the Indigenous worldview, rights are inherent, granted by the Creator, and tied to the land (i.e., it is their responsibility to care for the land and this responsibility is tied to their right to self-determination) (Starblanket, 2008). Prior to colonization, Indigenous governance was grounded on the ways in which people fit into the land: “governance is “the way in which a people live best together” or the way a people has

structured their society in relationship to the natural world. In other words, it is an expression of how they see themselves fitting in that world as a part of the circle of life, not as superior beings who claim dominion over other species and other humans." (Ladner, 2006). Ladner goes on to explain the different governance structures adopted by different clan members: "Each clan has a different governance system unto which their politics would emerge. For instance: The Blackfoot Confederacy created a complex web of clan, society and bundle structures of governance at the sub-national, national and confederal levels, each of which operated within its set area of responsibilities or jurisdictions and in a manner defined and confined by their own constitutional order. Meanwhile, their neighbors, the Plains Cree, had a more individualistic system of government consisting primarily of a council of family representatives with societies and bundles (as institutions) playing a more limited role than is the case in the Blackfoot political system. Created to fit within completely different territorial realities and to address different political, social and economic realities and needs, Indigenous political systems were extremely diverse" (Ladner, 2006).

Indigenous governance, like that of the Western colonized governance, also interacted with legal tools and processes. "Governance structures were essentially informed by political tools we use today such as types of government systems and constitutional orders. For example: the nations of the North West Coast (such as the Haida and Nisga'a), developed the potlatch system of government using interdependent and complex structures of clan and national governance. As on the plains, though similar in structure and function (especially for the untrained eye), each nation had their own distinct political system."(Ladner, 2006). Legal orders, such as the Nation's Constitution, formed the basis of Indigenous governance. For instance, the Haudenosaunee Great Law of Peace; the Mi'kmaq teachings of the seven districts that comprise the Grand Council and the rights and responsibilities of individuals, families, clans and leadership within each district; and the adaak and kungax of the Gitxan and Witsuwit'en nations which lay out the laws (rights and responsibilities) of each of the houses and the each of the nations. Each Indigenous constitutional order set forth a system of government, provided a defined and limited ability to make, interpret and enforce 'law' within a territory and set forth the rules of the 'political game' and the roles and responsibilities of all members of the nation. Such constitutions were not written documents and quite often – as is the case with the British Constitution – these constitutional orders consisted of a myriad of documents (albeit 'oral documents' such as songs, stories, ceremony, orations and bundles). Indigenous leaders

sought to protect and thus, maintain their constitutional orders through treaty relationships just as they had in the past in their dealings with other Indigenous nations" (Ladner, 2006).

Here too, like Western systems, governance, and the authority and power granted to govern, are provided by legal orders but largely differ in terms of how these legal orders are sought to be made official i.e., through songs, oral traditions versus only written documents. They also differ by the worldview that underpins governance. Indigenous governance appears to require a connection with the natural world rather than separated from it. Furthermore, governance and the ways in which it is enacted vary across tribes and, subsequently, across land. Governance becomes context-dependent rather than one-size-fits-all models. As opposed to one overarching governance model (i.e., The Crown), Indigenous governance is naturally made plural by respecting the autonomy of individual Nations to decide what type of governance would work for them relative to the land.

Governance and the ways in which we approach it is a reflection of the system from which the governance design is born out of. Governance is the emergent property of the various intersections, overlaps, tensions and conflicts. Thus, the governance approach that is selected will only be as good as the systems from which it comes out of. A deeper understanding of this can be seen through the differences between Westernized approaches to governance versus Indigenous forms of governance. An examination of the worldviews, values and beliefs that underpin forest governance allows us to understand why governance structures may be built in some ways versus others. A governance system that seeks to be relational with natural entities are more likely to take time to consider what the natural entity might need and to anchor the human's role in complementarity to that natural entity (i.e., control of self). A governance structure that seeks to control is more likely going to set up a structure that seeks to extract what humans need from the natural entity (i.e., control of others) – the relationship becomes one-sided. This is dangerous as we are now bearing witness to that impact of these one-sided relationships.

We see here how worldviews and values can either enhance or degrade our relationship with the natural entities we choose to govern. We also see how governance as a concept itself, when employed, can "make things happen" be it to perpetuate current systems and/or to transform them. This is quite helpful for making real the idea of Forest Sovereignty. The particularities are discussed in the next section.

Anchoring Forest Sovereignty through Governance

Here we discuss the ways in which governance may be an appropriate anchor to manifest systemic structures that honour Forest Sovereignty.

The role of governance in our society

From the viewpoint of human beings, it is being suggested that the act of governing, and the process of governance can be seen everywhere. Scientists have discovered that the process of governance also happens among animals. For instance, it has been found that the red Deer of Eurasia live in large herds, spending lots of time either grazing or lying down to ruminate. Some deer are ready to move on before others are, and scientists have noticed that herds only move when 60 percent of the adults stand up — essentially voting with their feet. Even if a dominant, more experience individual who makes fewer mistakes than their underlings gets up, herds typically favor democratic decisions over autocratic ones. A major reason for this, according to research by biologists Larissa Conradt and Timothy Roper, is that groups are less impulsive: "Democratic decisions are more beneficial primarily because they tend to produce less extreme decisions because each individual has an influence on the decision per se." (McLendon, 2012). So while non-human-animal groups may or may not refer to the ways in which they organize themselves as governance, and may simply be a combination of instinct and learning, the process of it naturally occurs within collectives (Nagrika, n.d.). Regardless of how it is understood in the minds of more-than-human and human beings, understanding that there may be similarities among how we tend to organizes ourselves in groupd allows us to develop a deeper likeness to them which may help in shifting worldviews.

Governance as Transformation

The importance of governance is validated by its positionality in our systemic structures and the places in which it shows up. From a systems level, governance seems to hold the key on more than one leverage point, as mentioned earlier. Donella Meadow explains that the rules of the system (such as incentives, punishments, constraints) are among the most effective leverage point (LP) to intervene in a system which is preceded by: 4) the power to add, change, evolve, or self-organize system structure; 3) the goals of the system; 2) the mindset or paradigm out of which the system — its goals, structure, rules, delays, parameters — arises and 1) the power to transcend paradigms (Meadows, n.d.). Bolton (2022) offers that LP #7 “The gain around driving positive feedback loops and LP 4 are leverage points that are quite accessible to public

servants and could initiate impactful governance changes. Based on how governance is defined i.e., a framework for decision-making, the process that authorizes and validates power and creates rules for a system, it would seem that governance itself has the ability to change and transform a system. At least in the perspective of the LP framework.

The idea that governance can be a transformative tool is further explore by a study from Rosenbloom (2017) where suggesting that governance can also be a tool for proper transformation in three ways: “governance **for** transformations i.e., governance that creates the conditions for transformation to emerge from complex dynamics in socio-technical-ecological systems; governance **of** transformations i.e., governance to actively trigger and steer a transformation process, and transformations **in** governance i.e., transformative change in governance regimes with the aim to develop more participatory and inclusive approaches to decision-making”. For the purposes of this work, all three forms of governance may be required to facilitate systems change for the sovereignty of Forest from metaphor to reality

Transformative Governance: Challenges and Barriers

At this point, it is important to note that while the transformative capability of governance is corroborated by scholars, in attempting to test out governance structures that seek to transform, an issue of authority seems to create barriers for these transformations to really stick in meaningful ways. Much like the pilots of innovation for alternative tenure arrangements as discussed earlier, transformative governance structures often bump up against already established political and administrative institutions (Edelenbos, 2005). While examining the implications of implementing more bottom-up and/or “interactive governance” as Edelenbos (2005) describes it, many of the outcomes from that process **were not** taken up by the existing institutions because the process (interactive governance) itself, did not have the appropriate authority assigned to it, to create the changes needed. It failed to interact between the “old structures”. This suggests that not only did the “old” institutional structure ultimately still hold the “real” authority to initiate any change but that also transformative governance structures appear to also require some sort of bridge between the old and the new. In other words, one of the reasons this experiment failed could have been due to the fact that there was no governance *of* the transformation, governance of transformation in the way that sought authority from the current structure *to* initiate change “therefore, we may state that existing procedures and new procedures, existed separately from each other, and that toward the end of the process, the

existing procedures had a decisive influence on the outcome of the interactive process." (Edelenbos, 2005).

As you may have picked up, this is reminiscent of the sovereignty issue discussed earlier, in that permission for sovereignty and self-determination needed to be sought through the very structures that were designed to oppress it becoming counter-productive. In this case, it is important to not only consider what tools of authority we may be able to leverage in order for governance to be transformative as it seeks to bridge our H1 and H3 futures but to also explore ways in which to mitigate against power hoarding, addiction and peaceful rebellion and resistance as acts to promote and encourage change. Under our Forest Sovereignty requirements, we explored how legal tools may be of help. In addition, we see in previous sections how governance structures are essentially built off of legal orders suggesting that the appropriate legal orders can "set free" governance structures that can lead us into transformation. In the following section, I briefly explore changes happening in law to provide a basis as to how traditional structures, often resistant to change, are being transformed.

Law and Transformative Governance

Live signals in our Canadian legal system point to the possibility of having more than one legal system which can create space for self-determination and sovereignty. This can be seen through the process of Indigenous Nation Building. two examples are highlighted here:

1. The creation of Bill C-92 which allows for Indigenous Nations to create their own child and family service legislation. Bill C-92 requires that (1) establishing minimum standards for how CFS, including prevention and protection services, must be provided to Indigenous children; and (2) recognizing and affirming that Indigenous peoples' inherent right of self-government includes jurisdiction over CFS, specifically, it recognizes and affirms Indigenous peoples' inherent right to make and administer their own CFS laws." (Louw et al., n.d.).
2. Current discussions are happening related to creating a separate criminal law system for Indigenous Nations. Michel (2023) state that there are 4 options available that will allow Indigenous Nations to attain jurisdiction over criminal law: "(1) a constitutional amendment; (2) a self-government agreement; (3) a claim under section 35 of the Constitution Act, 1982; and (4) federal legislation." (Michel, 2023).

These examples demonstrate that, even within the bounds of an imperfect constitution and the restrictions imposed by the Indian Act, pathways and alternatives are still possible for new structures to take root *while* using the colonizers tools. It is also important to acknowledge the fight, resistance and rebellion that Indigenous Peoples have had to endure and continue to endure for these changes to happen. Therefore, in order for governance to be the bridge towards a transformative future, our legal orders would need to support this but **appear to require a basis of resistance to the current system.** The good news is that, perhaps through the enactment of soft laws, there may be opportunities to pursue the governance structures we want (i.e, ones that facilitate Forest Sovereignty as reality) while still benefiting from the appropriate authority it needs to be transformative. As such, it is worth exploring what tools may be available to us that can help us structure a governance system to help us bridge between H1 to H3.

There are several innovations happening within the Web 3.0 space that is particularly concerned with ways in which we may be able to govern forests in more effective and just ways given the challenges that have been described in earlier sections of this work. These spaces also have an undertone of rebellion to the current system. The following section will provide a very brief overview of ways in which Web 3.0 technologies, specifically blockchain, is currently being contemplated and tested as a tool for forest governance.

Forest Governance and Blockchain

The mass implementation of the internet has led to significant advancements in the ways in which we exchange information, collaborate, create and consume content (Leiner et al., 2009) . While Web 1.0 (1990-2000) saw an era where users of the internet were relegated to “read-only” content, Web 2.0 (2000-2010; up until now) created a significant shift whereby users could not only create their own content but also interact and collaborate on content and projects from around the world (Madurai, 2018). The ways in which we use the internet largely depends on the applications that can be overlaid atop the general background; apps like Facebook, Twitter, Instagram, LinkedIn, TikTok and the like have all played a significant role in how we have come together and transcended national and geographical boundaries. The rise of such platforms has been able to facilitate a range of human activities from users who are looking to simply socialize with others to users who have their own business and offerings that they sell on sites such as Etsy. Despite the benefits these technologies have provided, they have also contributed to

some major challenges we are currently facing. such as exacerbating societal polarization (Simchon et al., 2022).

Some of the challenges that Web 2.0 technologies have brought into our space are currently being evaluated under the next iteration of The Web: Web 3.0. For the purposes of our work, we are particularly interested in blockchain. Blockchain is a decentralized ledger technology that claims to cut out the middleman. This has been motivated by calls for *more liberation* from state-run structures. Essentially, instead of having to rely on banks, or tech companies, blockchain technology helps connect users directly with other users without having to worry about building trust with another human being, rather, trust is built into the technology itself through various security features. Blockchain is often described through these features. While articles vary on how these features are titled and described, this work is particularly interested in the immutability, decentralization, and trust aspects of this technology, One of the most significant claims in blockchain technology is its inherent transparency mechanisms and the implementation of fair governance processes through smart contracts (Wall Street Journal, 2022).

Features such as these are particularly interesting for our conceptualization of Forest Sovereignty. Perhaps using a trust-inherent system that seeks to approach decision-making in more collective-friendly environments can create structures that respect the inherent sovereignty of Forest, mitigate against issues of power addiction, and provide the space for peaceful rebellion to act as a catalyst for change. Blockchain has already been applied in several democratic and humanitarian endevours because of its features (G'sell & Martin-Bariteau, 2022). Research that is embedding computer-based technologies into the forest is already underway. Digital technologies like remote sensing, lidar, machine learning, unmanned aerial vehicles (UAVs), smartphone apps and other digital operations are being explored to not just acquire forest inventory but also transform forest restoration approaches. Many of these technologies also help develop blockchain-based-governance systems.

Blockchain technology has joined efforts to re-imagine ways in which we may manage natural resources specifically intended to bring "power back to the people". Terra0 is one such example of such speculative art prototype that begins to lay some groundwork on how a forest may own itself. Terra0 deploys blockchain technologies and smart contracts to automate processes of forest maintenance and timber sales on behalf of the forest itself by digitally augmenting Forest

through a Decentralized Autonomous Organization (DAO) (Seidler et al., 2016). The main objective is for Forest to accumulate enough capital to essentially buy itself. The project also seeks to make Forest an active stakeholder in the process by humans buying ground and signing it off to Forest who is referred to as a non-human actor (NHA). The NHA is then indebted to the human actors and must pay back the debt (Seidler et al., 2016). This is certainly an interesting first step in assessing blockchain's capability in managing these precious resources. That said, however, I still have concerns about models that aim to make Forest "in debt" to humans and that are focused on capital accumulation – I do not believe that takes us far enough. As well, Humans still need to write/code the smart contracts and sell the licenses on behalf of Forest. Terra0's model continues to seek profit through the *selling* of Forest resources without any attempt for consent or consideration of Forest time thereby exacerbating current issues. There are others still who are attempting to leverage blockchain technology to re-examine natural resource governance and its management beyond an economic unit but rather as a way to develop "a medium of relations between divergent allies and other-than-human-beings allowing for the inclusion of a plurality of cosmologies" (Jacobs & Utting, 2022). This exploration is of particular interest to this work.

This possibility, to seriously explore the notion of allyship between other-than-human and human beings in the political arena and the governance of them, in order to bring about a plurality of cosmologies in our political ontology, which necessitates sovereignty and self-determination, is a motivating force behind this work. Should blockchain allow us to design a governance system that encourages humans to create creative structures that honour the sovereignty of forest, we could potentially see an entirely new set of possibilities related to our relationships with other-than-human-beings, land ownership, a new form of politics and perhaps more harmonic relationships between governance systems of "old" and "new". However, blockchain technology is still an emerging technology and there are many uncertainties that surround it. This work strives to evaluate whether blockchain can, in fact, move us towards designing a governance system that strives towards Forest Sovereignty.

Part 1 Summary

So far, this work has journeyed across several concepts that is meant to contribute to the answer of *whether blockchain technology can lead us to Forest Sovereignty*:

1. An articulation of challenges that are appearing in the forest governance space based on an overview of forest laws and rules.
2. What is meant by Forest.
3. What is meant by Forest Sovereignty, how it may help with some of the challenges identified, Forest sovereignty requirements and their horizon categorization to help us scaffold these requirements across time.
4. Acknowledged the role of governance to this research inquiry and how it could be a valuable tool to transformation.
5. Identified Web 3.0 tools, specifically blockchain, is being used within various institution-level initiatives, some of which include natural resource governance and could subsequently be a strong contender to facilitate forest sovereignty.

As the foundational concepts have now been reviewed and defined, part 2 will explore the research question of whether *blockchain technology can lead us to forest sovereignty*, directly.

PART 2: CAN BLOCKCHAIN TECHNOLOGY LEAD US TO FOREST SOVEREIGNTY?

Given that we have laid the foundational work of important concepts and element to this question, we are now ready to explore our research question directly. This part of the work offers two versions of potential governance structures powered by blockchain that may facilitate Forest Sovereignty.

According to the 6 blockchain developers and professionals I had the opportunity to interview as part of this work, the short **and very surface-level** answer to the question of *whether blockchain technology could lead us to Forest Sovereignty* is: “yes, but within severe limitation.”

The first governance (v1) structure presented here was developed solely on the semi-structured interviews that were conducted with blockchain developers and professionals. Some of the incentives that were suggested by the participants, in this governance system, were inspired by the Forest Sovereignty requirements; as an attempt to address them, however, the forest sovereignty requirements are not explicitly embedded in this design. This design satisfies Forest Sovereignty as metaphor.

The second governance structure (v2) is altered in two major ways: a) with the Forest Sovereignty requirements fully incorporated and b) this attempt approaches the design through a biological lens. In building this governance design, the forest sovereignty requirements aided thinking to ensure that each of the layers of the structure always came back to the sovereignty of forest in the way that it has been articulated as part of this work. This design, while still working within the logics of Forest Sovereignty as metaphor, also seeks to begin to take steps of what it might look like when Forest Sovereignty is reality (H3).

Governance System Version 1

In conversation with the blockchain developers and professionals, what began to emerge was a very preliminary draft of what this blockchain-based governance system could look like:

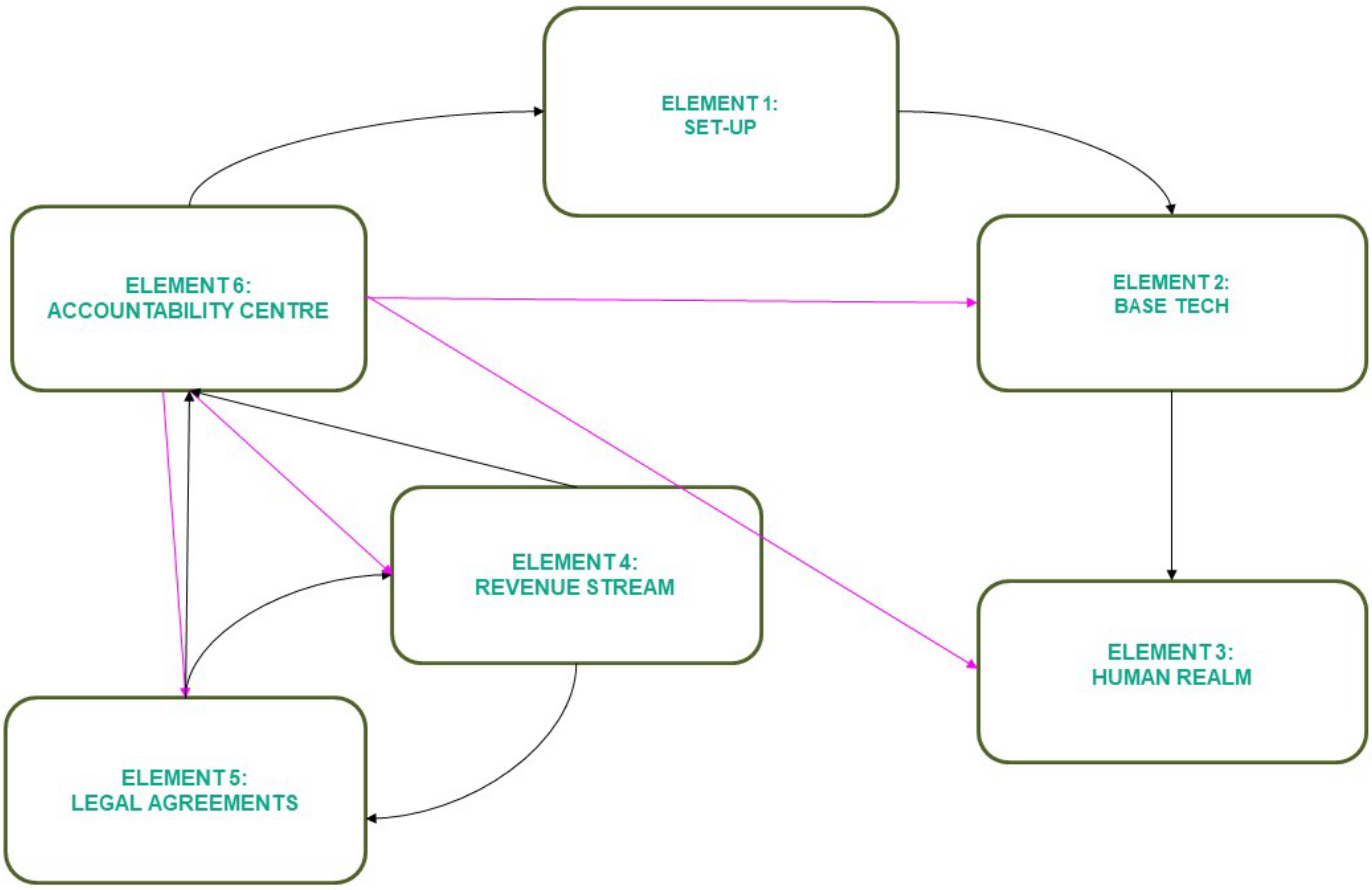

Figure 6: Flow of Governance System v1. Pink arrows symbolize accountability decisions that determine incentive distribution across all governance elements. Arrows from accountability centre to Legal and Revenue elements suggest that accountability controls legal and revenue to ensure ethical distribution. Revenue and legal agreements work together to draw up appropriate agreements as per revenue stream.

In the above blockchain-based-governance system that is meant to lead us to Forest Sovereignty, we see that there are, coincidentally, 6 elements to this governance system:

1. **ELEMENT 1 - SET-UP:** The first step in the process is to develop a community and shared vision of what the collective is wanting to build around this blockchain-based governance system. Establishing “the how” allows the collective to think about how they are wanting to conduct themselves around the idea of Forest Sovereignty. During this process, as they begin to work together, the collective begins to outline preliminary soft laws that may be employed. Several Indigenous and non-Indigenous stakeholders come together to specific nuances tied to Forest based on geographical location. Stakeholders must include Forest into this conversation and mechanisms need to be put in place that positions all stakeholders to have **equal power**.

2. **ELEMENT 2 - Base Forest Tech:** Establishment of base tech required to help understand Forest via telemetry system, sensors, lidar, tree and animal stories, and the establishment of animal welfare guidelines to feed into the on-chain tree identification system. This element can be considered as the data collection piece from which decisions could be made.
3. **ELEMENT 3 - Human Realm:**
    a. In-Field Stewards and/or Managers would submit daily reports into the oracle. Oracle information is collected and subsequently reported through an Indigenous and Complexity science lens. Information such as: Soil quality and state; Forest floor quality and state which includes fungal networks; Animal observations and housing; and explicit reporting on how these elements are connected and influence each other based on changes that are happening in the ecosystem. The aim with this approach is that it offers a holistic and responsible view of Forest and to understand Forests' way of being rather than Forest as a source for resources.
    b. Submitting information into the oracle would then follow the process of drafting smart contracts via Microsoft word or any other document processor. This document is then sent to a committee consisting of Indigenous and non-Indigenous people from various industries. After review from the committee, it is sent to government contacts.
    c. Negotiations on the drafted contract can happen but there are strict parameters that are established. Forest Sovereignty and thriving is put as priority and it is the responsibility of the committee to uphold this during negotiations. Once all parties are in agreement, the drafted contracts are then changed into an on-chain smart contract and sent to interested partners such as: Timber and logging, Oil and Gas, Transport Canada, Farmers/Food availability, Mining, Furniture stores, Cosmetic/Beauty industry, etc.
4. **ELEMENT 4 - Establishment of a Revenue Model:** Since there will be costs tied to running this governance model, there will be a requirement to generate revenue. Potential revenue streams could look like:
    a. The establishment of a tax to maintain and update this governance system.
    b. Sale of Non-Fungible Tokens (NFTs) on parcels of land with the explicit goal of conservation and protection where buyers of the NFT can get access to

exclusive information, tree stories, join the community and maybe have some voting power.

c. The sale of tenure rights is also an available option here but would require in-field visits, care assessment, and talking to the stewards and managers, and following protocols outlined in UNDRIP and United Nations Declaration on the Rights of Indigenous Peoples Act Action Plan (UNDA) before any sale is done.

5. **ELEMENT 5 - Legal:** to ensure the distribution of revenue is being allocated appropriately, legal agreements using tools in hard law would need to be developed. Hard laws are established through what unfolded in the soft law process (i.e., element 1). The majority of the legal aspect is to structure and legitimize the revenue streams and allocations of them. In these agreements, the following need to be taken into consideration:
    a. Revenue Stream Option: The establishment of a tax
    Legal Consideration: Need to ensure that the amount of tax and tax spending is held accountable.
    b. Revenue Stream Option: Sale of NFTs on parcels of land
    Legal Consideration: Need to determine where the revenues will go and ensure accountability for this.
    c. Revenue Stream Option: Sale of tenure rights
    Legal Consideration: Need to ensure that tenure rights are following protocols outlined in UNDRIP and UNDA. It is important to mention that this option **does not** promote Forest Sovereignty.
6. **ELEMENT 6: Accountability Centre:** This centre is to ensure the appropriate behaviour is being followed and allocation of resources are being done in the way that upholds Forest Sovereignty. All other elements essentially report into this centre and adjustments to incentives for all governance elements (1-5) are made here. Some on-the-chain incentives to help promote preferred behaviour could look like:
    a. Utility tokens that are underpinned by forest performance rather than extraction. Here, we are valuing the whole tree remaining intact, for instance, rather than valuing the removal of the tree. It is important to note that in keeping trees intact, we must also find alternatives to timber and wood products.
    b. Tokens to incentivize good behaviour among stewards and forest managers that uphold the framework's mission of Forest Sovereignty which includes accurate reporting into the oracle, and developing smart contracts that is in line with Forest

Sovereignty rather than favouring human demands, especially during negotiations with interested parties.

c. Determining what can be replaced and traded and what cannot. For instance: a whole forest itself cannot be traded or replaced whereas carbon sequestering can. Based on this, resources that are traded are only based on renewable items
d. Tokens to represent a diversity of species like mushrooms and moss to ensure diverse representation of all forest species. This is meant to help bring the more-than-human into discussions and decision-making into the political discourse.
e. Creation of NFTs geared towards Forest autonomy and sovereignty, that explicitly outlines the do's and don'ts within a specific area of a specific Forest.
f. Smart contracts to ensure the appropriate allocation of revenue; reports on how Forest is doing.

In addition to each of these governance functions, re-assessment and re-adjustments to the entire structure is made common practice. These adjustments are made based on how accountable and responsible the governance community is being with respect to upholding Forest Sovereignty as metaphor. Should any changes be required, it would go back up to the first governance element (creation of context-specific governance system; element 1). The system is meant to maintain this flexibility to ensure it is being cognizant of the needs of Forest which are then followed by human needs.

There are also several new job opportunities that arise from such a structure:

1. Element 2: Forest Ethnography and Anthropology; Forest Storytellers; Sensor, lidars installers and data readers; Animal storytellers
2. Element 3: In-Field Stewards and/or Managers; Smart Contract Committee Members; Peace Negotiators
3. Element 4: Policy makers to establish the tax; NFT developer teams that consist of lawyers, forest stewards and managers; UNDRIP experts.

The preliminary implications of a governance structure that leverages Forest Sovereignty as metaphor are illustrated below through this implication cascade diagram:

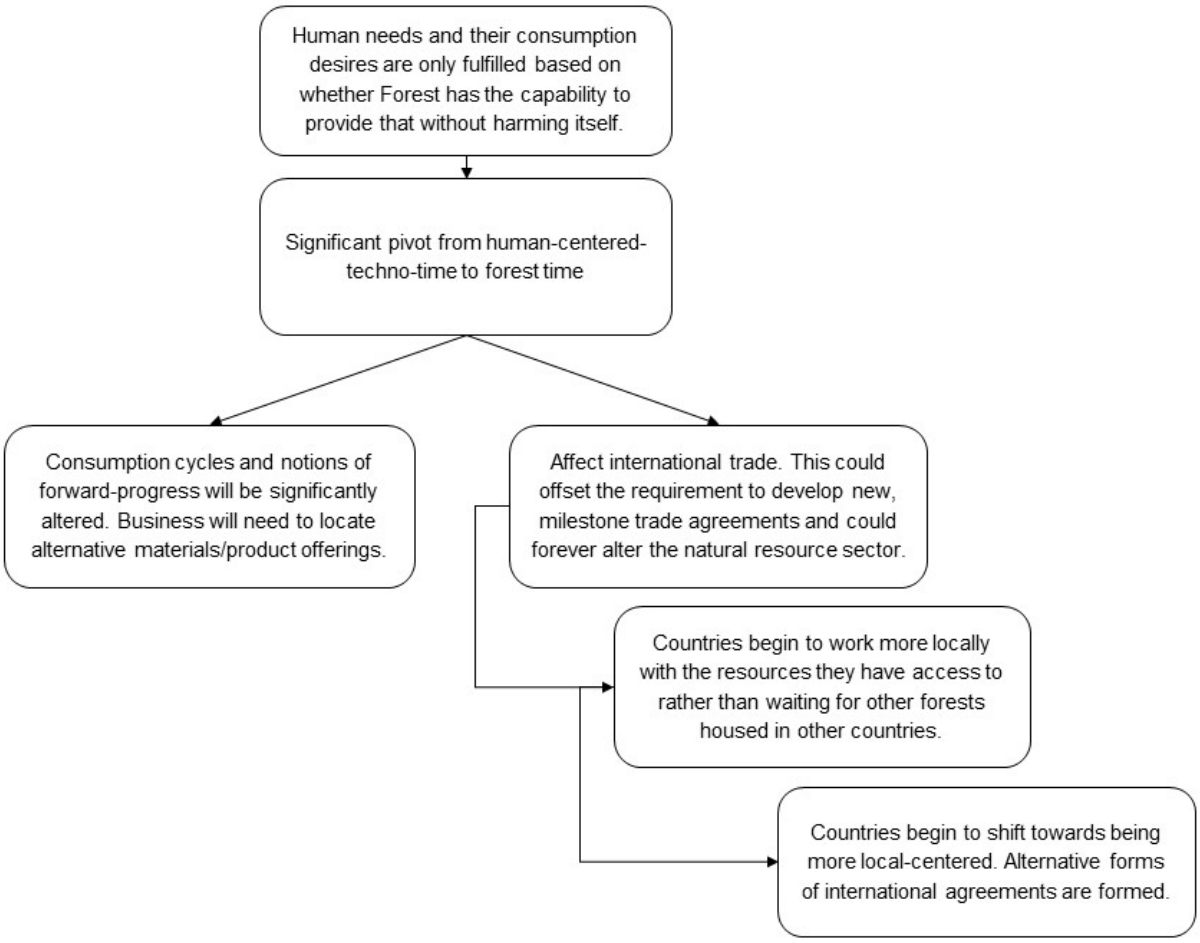

Figure 7: Cascade diagram describing implications on human beings if said governance system is implemented.

While these changes could prove to be quite interesting, there are some challenges with respect to this governance system presented. Specifically, that the function and structure of the current system would perpetuate current, status quo governance design.

Limitations of Governance System version 1

The most obvious limitation of this design is that it does not fully incorporate the Forest Sovereignty requirements. As such, we do not quite know whether the intended values and principles behind the notion of sovereignty will have any substance to it. What may happen is

that the notion of Forest Sovereignty in this design would be subject to the interpretation of the initial collective who is looking to set up such a structure. As a consequence, the sovereignty of Forest would rest in the hands of a small group of humans and subsequently of human bias and stereotypes. There would be nothing to anchor the idea of Forest Sovereignty. As a result of not including the requirements, what we end up creating is a typical governance system that aims to control and/or steer. The accountability centre as is currently conceptualized could inadvertently end up being a central control. This is because all reporting, incentives and adjustments feed into and depend on the results from this governance element. The accountability centre and all community within that centre could end up benefiting from a high degree of power and authority, thereby perpetuating “old” governance systems. This centre ends up *imposing* control on others rather than focusing on controlling itself and this is where the forest requirements could help ensure that the sovereignty of Forest is being upheld, at least in the way that it is conceptualized here.

An additional limitation of this version is that it does not quite reflect the system from which it is trying to govern: Forest. This is because the system itself reflects a siloed, divide and conquer approach. For instance, each “element” within the entire system all handles different functions on its own which then feed into each other. This type of structure is highly reflective of the ways in which current structures are created. Current studies that are grounded by complexity science reveal that Forest works differently than this. A simple read through The Mother Tree by Suzzane Simard (Simard, 2021) will highlight this fact, among other pieces of literature. This was also discussed under the analysis of the control requirement.

Community as it has been expressed in this version is also quite limited. Since the idea of community, at least in the interviews, all made the assumption that it would be humans speaking on behalf of Forest, the community requirement, specifically in element 1, is underpinned by this assumption. The conversations are not based on “what is my role, as a human, in this forest community”, rather, it is about “what community needs to be developed in order to make this happen.” This would perpetuate the idea that humans somehow have control and say over what happens with Forest.

There is also significant risk in this design. The risk lies in the various collectives and committees that are doing the work where, again, centralized decision-making is occurring relative to Forest. Here, we are perpetuating old forms of governance despite the use of

committees. Essentially, what ends up happening is that one central group is making decisions on behalf of Forest.

Acknowledging the way version 1 of this governance structure perpetuates current structures is an important first step as it opens up the possibility to ask: “what other structure can we create that may be more complimentary to Forest and therefore honour the sovereignty of Forest?” Re-framing our question in this way is essential. This is because, as we have discussed before, governance can be viewed as more than simply a control and/or decision-making tool. There also may be a role here for the Forest Sovereignty requirements in terms of acting as a guidepost to Forest Sovereignty as metaphor. For these reasons, an alternative governance system is offered in the next section.

Governance System Version 2

Studies have shown that there is a high amount of redundancy within Forest and forest systems (Zhang & Zang, 2021)**.** The same type of redundancy can be seen at the cellular level where each cell within a plant leaf, for instance, has their own system to keep each cell alive i.e., each plant cell has a golgi apparatus (the golgi apparatus processes and sort proteins for transport to their eventual destinations), and there are hundreds, if not thousands of cells on one leaf, and often times there is more than one leaf on a plant or tree, for instance, thus, a high degree of redundancy exists. Taking into consideration the system from which this governance system is looking to govern is critical. This ensures that the governance system matches the ontology of the system it is looking to govern with (i.e., Forest). This, along with adding the Forest Sovereignty requirement, I decided to re-conceptualize a governance system that sought to align more with Forest.

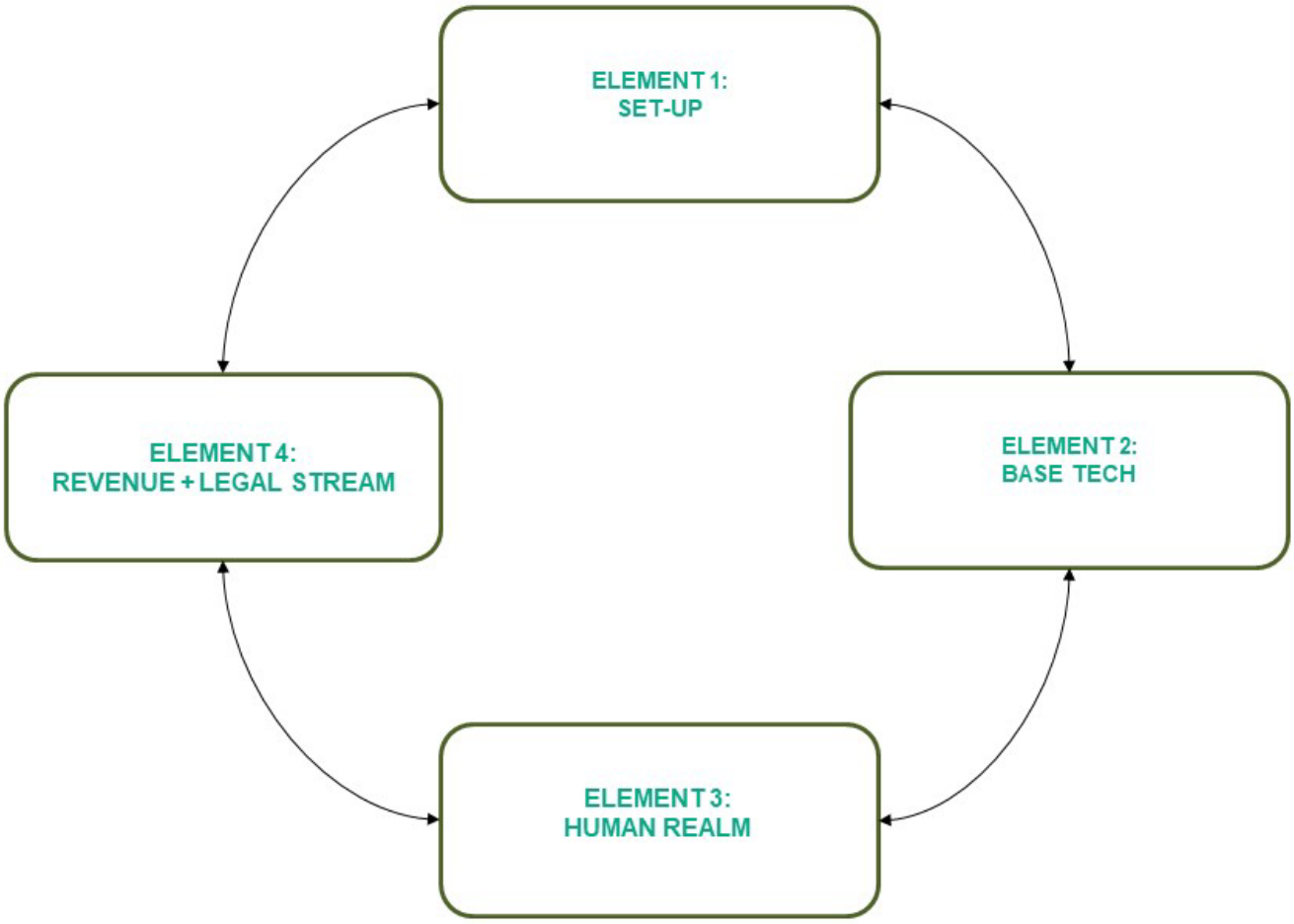

Figure 8: Accountability centres are nested within each governance element. Decisions between governance elements are collaboratively determined. Revenue and Legal governance elements have been merged.

Taking on the lens of matching the governance system with Forest led to several critical shifts. These adjustments are highlighted in yellow in the schematic and are described below:

1. **ELEMENT 1: SET-UP** The first step in the process is to develop a community and shared vision of what the collective is wanting to build around this blockchain-based governance system. Establishing “the how” allows the collective to think about how they are wanting to conduct themselves around the idea of Forest Sovereignty. During this process, as they begin to work together, the collective begins to outline preliminary soft laws that may be employed. Several Indigenous and non-Indigenous stakeholders come together to discuss these specific nuances tied to Forest that need to be considered when creating a structure

for the sovereignty of Forest. Stakeholders must include Forest into this conversation and mechanisms need to be put in place that positions all stakeholders to have **equal power**. Involvement of Forest Communicators to discuss with Forest what role Forest would like humans to play. Forest Communicators is a pre-requisite in being part of the collective. Honest communication on behalf of humans, to Forest, in terms of what their needs are is mandatory. This reciprocal conversation leads to an agreement. To ensure that Forests' needs are being incorporated into the agreements, a live, in-field video streaming of the forest negotiation is made publicly available. A live video streaming of the forest area in discussion is also shown to the public prior to discussions, to give the public a sense of current state of Forest. Final decisions are made through a voting process and can be done on the chain with everyone having equal voting rights and weight. Discussions are livestreamed to Canadian public. Accountability Mandate: maintain the sovereignty of Forest.

2. **ELEMENT 2: Base Forest Tech:** Establishment of base tech required to help understand forest via telemetry system, sensors, lidar, tree and animal stories, and the establishment of animal welfare guidelines to feed into the on-chain tree identification system. This element can be considered as the data collection piece from which decisions could be made. Accountability Mandate: maintain the sovereignty of Forest.
3. **ELEMENT 3: Human Realm - Oracle Maintenance and Decision-Making Cluster for human consumption:**
    a. In-Field Stewards and/or Managers would submit daily reports into the oracle. Oracle information is collected and subsequently reported through an Indigenous and Complexity science lens. Information such as: Soil quality and state; Forest floor quality and state which includes fungal networks; Animal observations and housing; Regeneration cycles; and explicit reporting on how these elements are connected and influence each other based on changes that are happening in the ecosystem. The aim with this approach is that it offers a holistic and responsible view of Forest and to understand Forests' way of being rather than Forest as a source for resources.
    b. Submitting information into the oracle would then follow the process of drafting smart contracts via Microsoft word or any other document processor. Develop smart contracts that bake in responsibilities rather than control mechanisms and enforce responsible decision making based on holistic data i.e., determining what

responsibility each collective member such as who will take on the responsibility of discussing data collection findings with Forest.

c. This document is then sent to a committee consisting of Indigenous and non-Indigenous people from various industries. After review from the committee, it is sent to government contacts. The drafted contracts are run by Forest for modification and/or approval.

d. Negotiations on the drafted contract can happen but there are strict parameters that are established. These contracts include gifts to Forest are also established in order to thank Forest for the resources they agree to provide. Forest Sovereignty is set as a priority and it is the responsibility of the committee to uphold this during negotiations. Once all parties are in agreement, the drafted contracts are then changed into on-chain smart contract and sent to interested partners such as: Timber and logging, Oil and Gas, Transport Canada, Farmers/Food availability, Mining, Furniture stores, Cosmetic/Beauty industry, etc. Accountability Mandate: maintain the sovereignty of Forest.

e. Potential Blockchain-Based Incentive Tools:

    i. Utility tokens that are produced based on forest performance rather than extraction.

    ii. Tokens to incentivize good behaviour among stewards and forest managers that upholds the framework's mission of Forest Sovereignty especially in terms of reporting into the oracle and the smart contract development and negotiations with private sector.

    iii. Determining what can be replaced and traded and what cannot. For instance: a whole forest itself cannot be traded or replaced whereas carbon sequestering can.

    iv. Creation of NFTs geared towards autonomy and sovereignty; that explicitly outlines the do's and don'ts within a specific area of a specific forest.

4. **ELEMENT 4: Establishment of a Revenue Model:** Since there will be costs tied to running this governance model, there will be a requirement to generate revenue. Potential revenue streams could look like:

    a. The establishment of a tax to maintain and update this governance system;

    b. Sale of NFTs on parcels of land with the explicit goal of conservation and protection where buyers of the NFT can get access to exclusive information, tree stories, join

the community and maybe have some voting power. NFT sale would be dependent on what Forest communicates.

c. Sale of stewardship opportunities also an available option here but would require in-field visits, care assessment, and talking to the stewards and managers, following protocols outlined in UNDRIP and UNDA before any sale is done.

5. **ELEMENT 5: Revenue + Legal:** to ensure the distribution of revenue is being allocated appropriately, legal agreements using tools in hard law would need to be developed. Hard laws are established through what unfolded in the soft law process (i.e., element 1). The majority of the legal aspects of this structure deal with some of the proposed revenue streams. In these agreements, the following need to be taken into consideration:
    a. Revenue Stream Option: The establishment of a tax
    Legal Consideration: Need to ensure that the amount of tax and tax spending is held accountable.
    b. Revenue Stream Option: Sell of NFTs on parcels of land.
    Legal Consideration: Need to determine where the revenues will go and ensure accountability for this;
    c. Revenue Stream Option: Sale of stewardship opportunities
    Legal Consideration: need to ensure that stewardship opportunities are following protocols outlined in UNDRIP and that Forest is being consulted in terms of what role this new human would play in the community of Forest.

By including the Forest Sovereignty requirements, there were several updates and adjustments made to the functions of each governance element. The most obvious being that communication and language was included in all of the elements. If you recall, our communication and language requirement discussed our human capacity to develop a forest language which allows human beings to communicate with Forest in much the same way we may communicate with other human beings and other animals. By doing this, two significant changes happen within this design: 1) Forest is always consulted, 2) we begin to see what a governance system looks like that is implementing Forest Sovereignty at the H3 scale. The addition of the Forest Sovereignty requirements also shed some light in terms of how these requirements may be leveraged in developing governance systems themselves. When creating this second version, the requirements acted as a guidepost to ensure that we were working towards Forest Sovereignty in the way that we hoped.

The second biggest modification is the merging of the revenue model with the legal governance elements. These two became linked so that we can ensure accountability not only in terms of revenue allocation but also in terms of revenue generation. The hope with this merger is that we do not lose track of the main objective which is to uphold Forest Sovereignty and not about generating revenue. The only reason why this element was included was to recognize the importance that money plays in the current system as an attempt to bridge old and new governance approaches.

In understanding the role of redundancy in the life of a leaf, and applying this to the governance design, additional insight was developed in terms of how best to organize this structure. In the case of this structure, I would say that the sovereignty of Forest could be considered the “lifeblood” of the cell and therefore needs to be the absolute overarching mission of each of the governance elements. This means that each of the governance elements all have the same accountability mandate along with the appropriate accountability incentives. The aim with this shift is to avoid centralized control into distributed responsibility. The shift to create accountability redundancy also allowed for a particular flow of functions **within** each of the governance elements. These flows of accountability are elaborated on below:

Element 1: Set-up

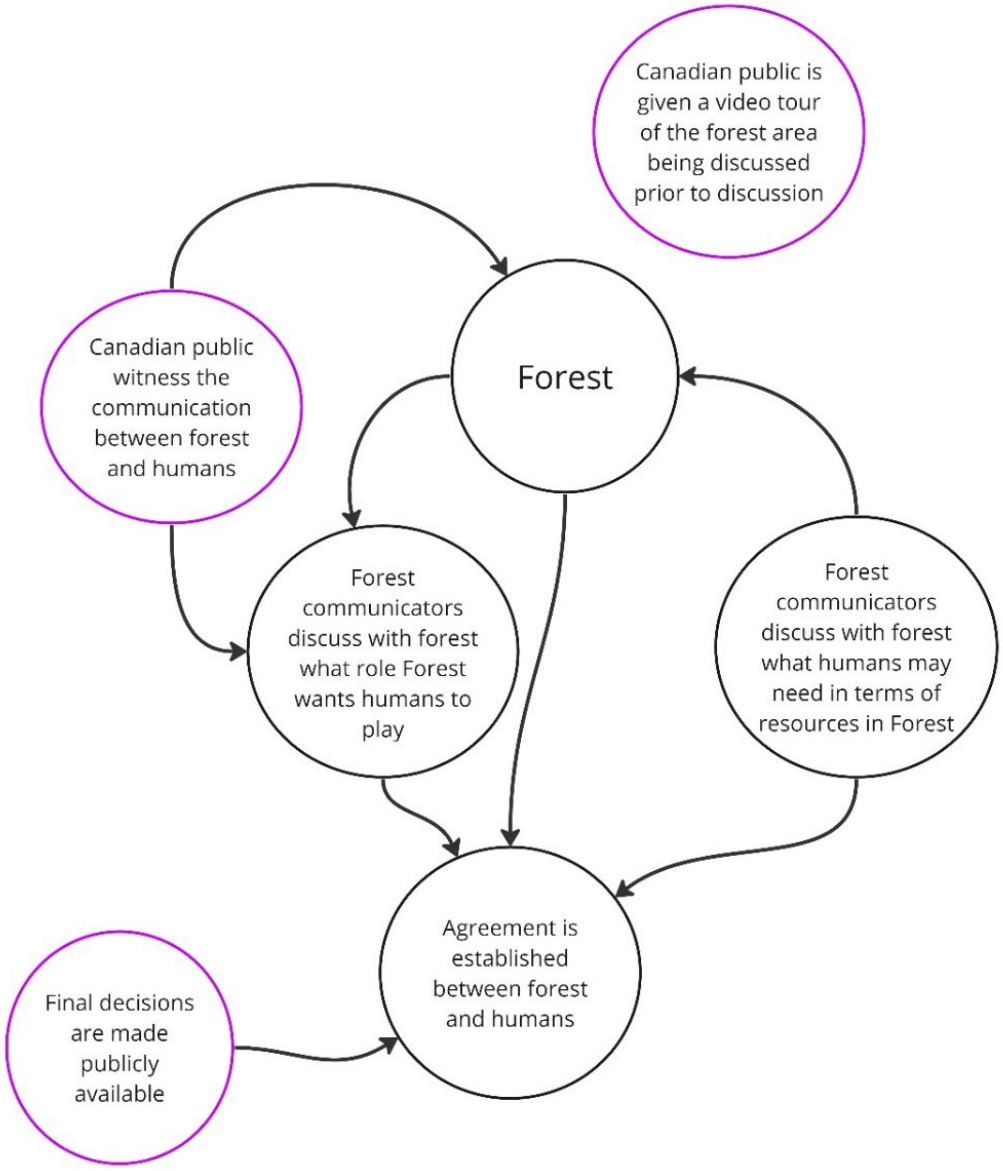

Figure 9: Accountability Schematic for Governance Element 1

Description: Prior to any discussion, the Canadian public/viewers are taken on a video tour of the forest area in discussion. Forest communication is emphasized in order to establish the foundational components of this governance system. Accountability (as indicated by the pink circles) is further emphasized by including the Canadian public to witness the ongoing discussions. Discussion between what Forest needs and honest communication among humans to forest form the basis of the agreement of how Forest Sovereignty would be realized. Including the forest requirements of forest selfhood, control (of self) and communication helped guide this flow of accountability. Final agreements are made publicly available.

Element 2: In-Field Collective

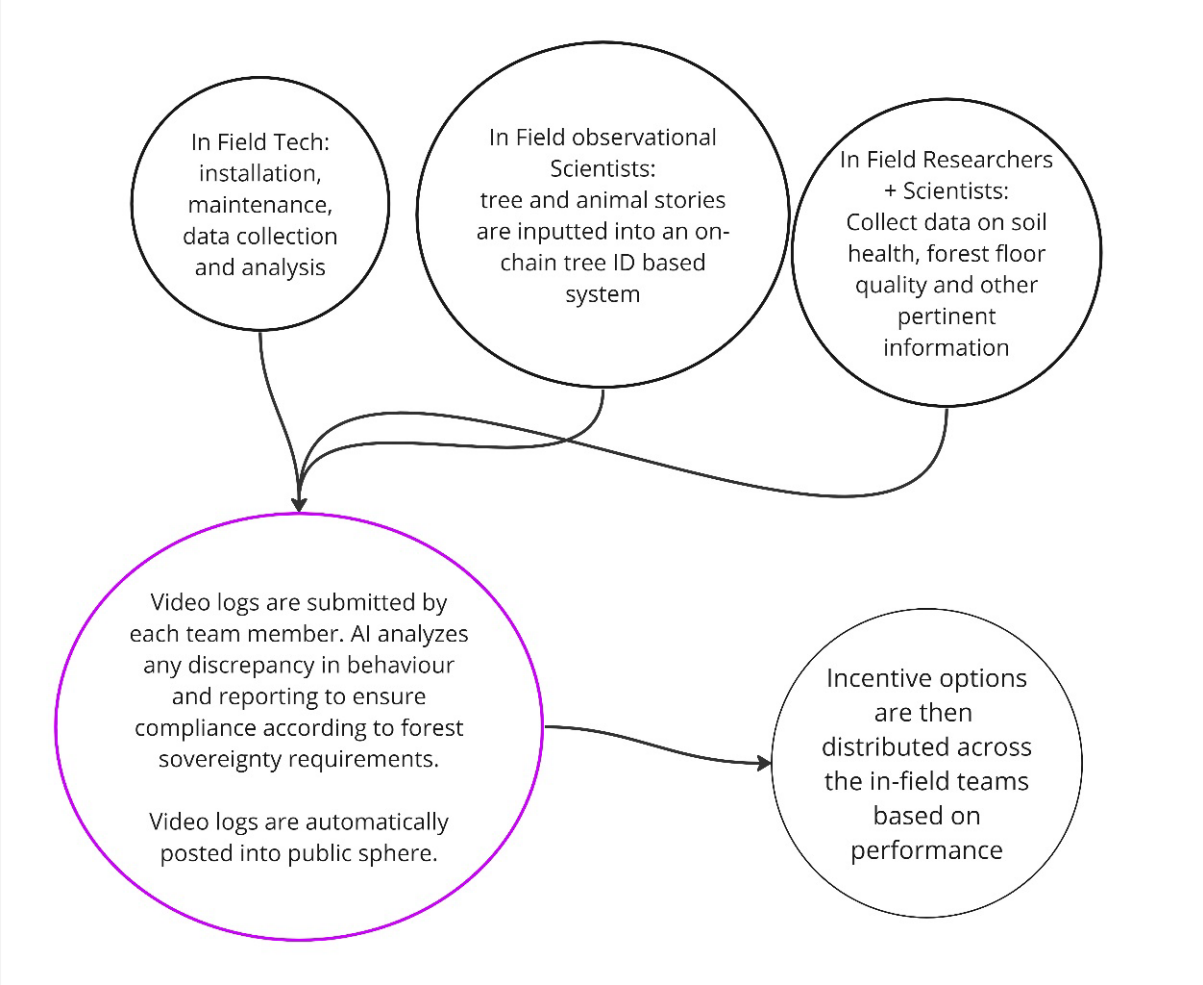

Figure 10: Accountability schematic for governance element 2

Description: The In-Field teams collect data based on their expertise. During their in-field data collection trips, video logs are recorded and inputted into an AI system to analyze data. The AI system seeks to locate any discrepancy between the data being inputted and in-field collective team logs. These video logs are then automatically published on an open-access platform available for public viewing. Once the quality of the data is assessed against the sovereignty of Forest, incentives are then distributed accordingly. Here, AI becomes the holder of accountability as indicated by the pink circle. Communication and Language, Forest selfhood and Ethics are the Forest Sovereignty requirements that are most applicable to this governance element.

Element 3: Human Realm

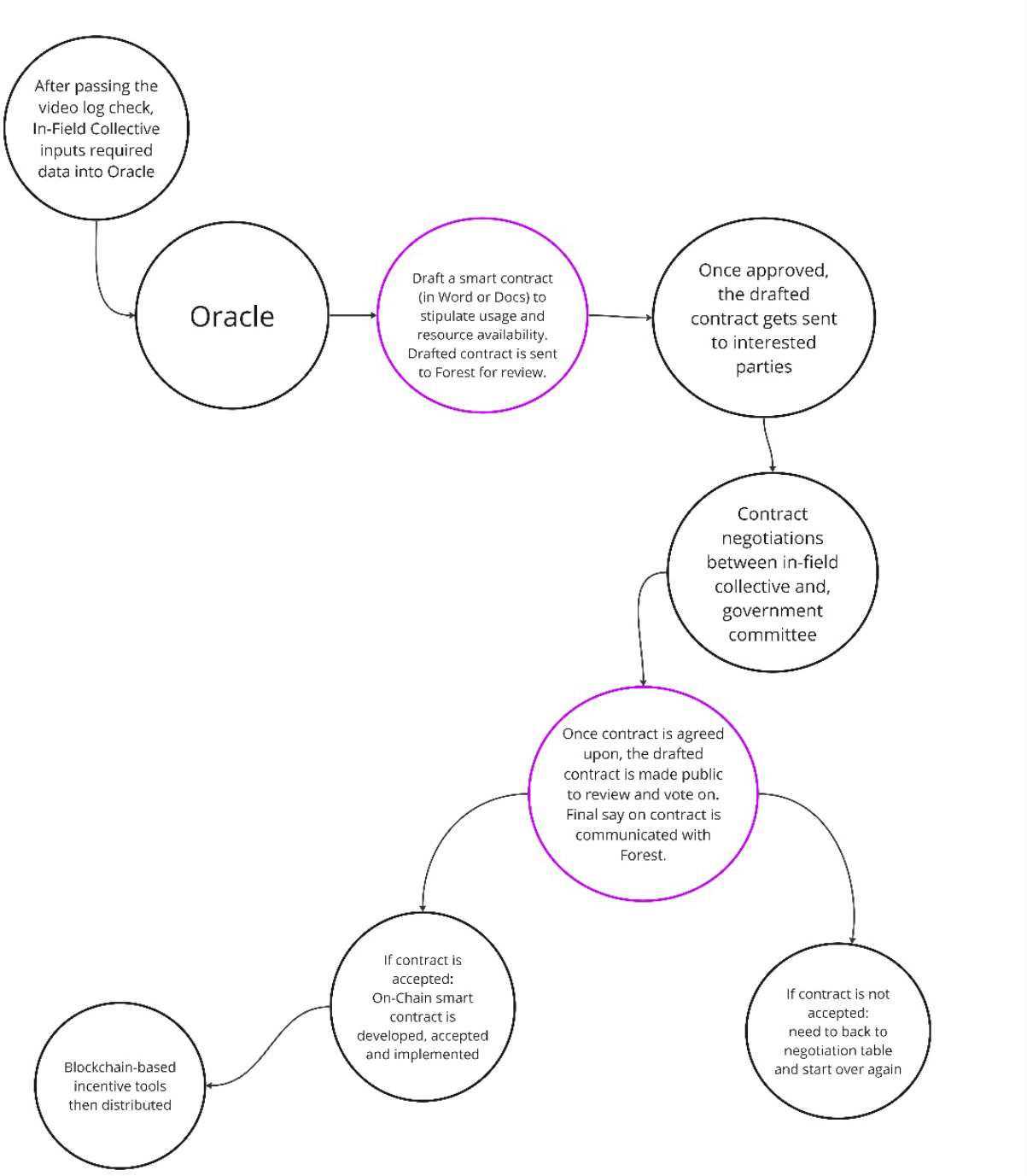

Figure 11: Accountability schematic for governance element 3

Description: Once data is checked in element 2, it is inputted into the oracle. There are two accountability stop points in the process of drafting and confirming contracts and are indicated by the pink circles. The first one is when a contract is drafted, Forest reviews this contract via the Forest communicators. Once this gets approved, negotiations may begin. The second accountability stop point is that once negotiations have ended, the almost-to-final drafted contract is once again reviewed by Forest. Forest makes the final say. In this event, Forest is the accountability check. Forest Sovereignty requirements that are emphasized here are communication and language, forest selfhood, community, and legality to help in developing the contracts.

Element 4: Revenue and Legal

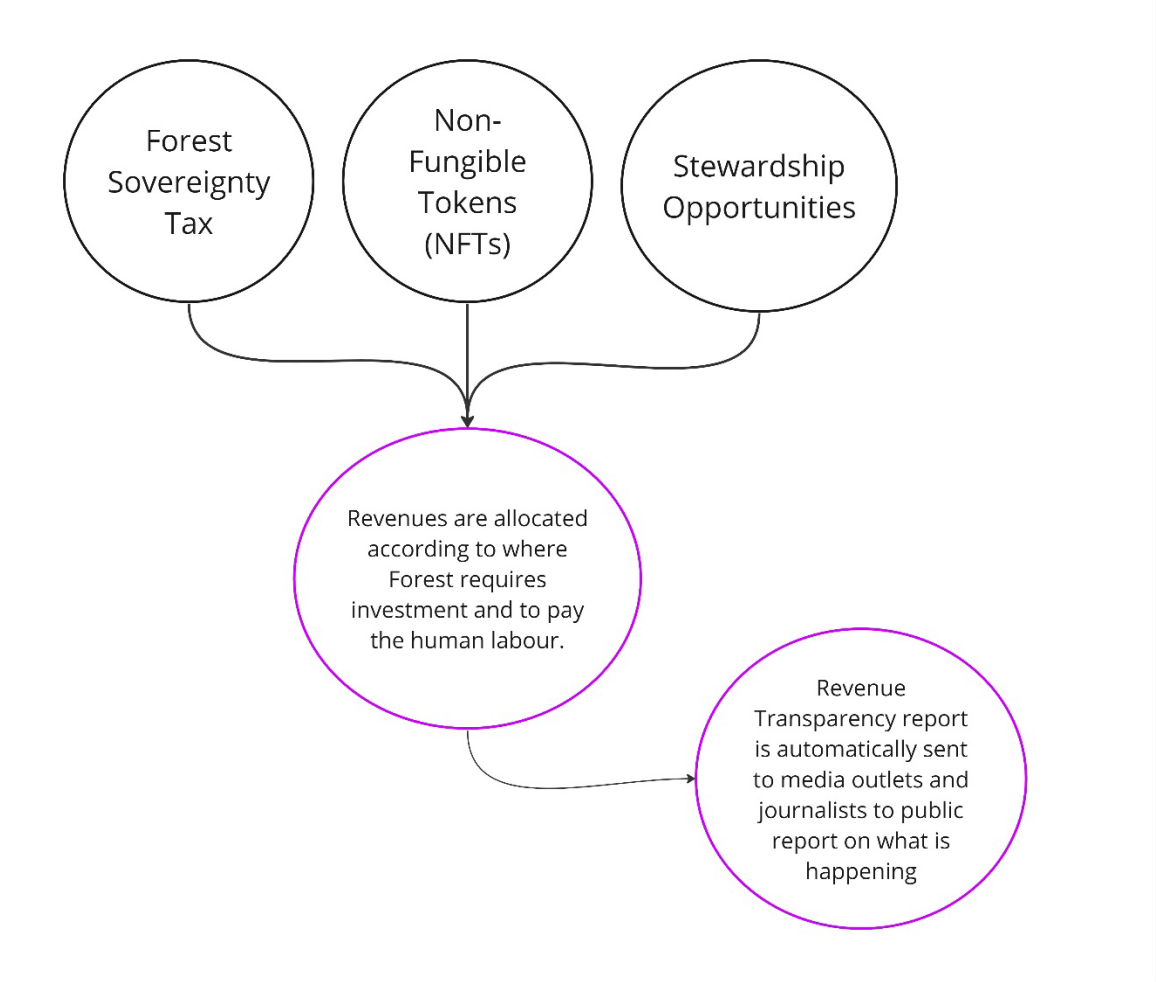

Figure 12: Accountability schematic for governance element 4

Description: All revenue streams become allocated according to Forest needs and human labour. To ensure transparency, revenue allocations are reported and made publicly available. Legal, ethics and communication and language are the Forest Sovereignty requirements most emphasized here. Pink circles represent points of accountability.

In addition to what is happening within the governance elements, there are also critical activities happening between them. Checks and balances of each of the governance elements is implemented at the relationship level (i.,e the arrows). Much like how a tree would give more nutrients to another tree upon receiving a distress signal, the check and balance function is meant to maintain relationship between the elements. This will ensure that the suggested decisions and/or course of action is in alignment to the next step of the governance system. This also allows for more participation in the decision-making process as there are different human communities within each of the governance elements, and, of course, Forest is always consulted and central to the decisions that are made.

The additions of the Forest Sovereignty requirement act as a guidepost in terms of determining how the governance elements may function. Emphasis on particular requirements in each of the governance elements also helps to home in on particular norms and behaviours that may be of particular importance relative to the function of a given element. In addition, the additive component of the Forest Sovereignty requirements also makes it easier to begin to think about how this governance system may turn Forest Sovereignty as metaphor into reality where the former would still create systems that are human-centric but begin to shift worldviews and values and the latter aims to actually make Forest Sovereignty a reality and develop systems and structures that reflect the inherent sovereignty of Forest.

Accountability redundancy in each of the governance elements is meant to replicate the design of a plant cell. While each governance element is not exactly the same as the other, as it would be for a plant cell, the accountability mandate is repeated in each of the governance elements. Each of the governance elements is meant to stand for a plant cell and the accountability mandate and blockchain based incentive tools are there to ensure accountability remains motivating to the human actors so as to ensure and uphold the sovereignty of Forest.

The relationship between Forest and Human are also changed in this system. Control of Self mediates the relationships between Forest and Human in two important ways: the human no

longer imposes their sense of time onto Forest. This ensures that Forest is able to regenerate themselves according to their own time, and the second is the honest communication among humans in telling Forest what they may need from Forest, so that Forest can decide what can be given and what cannot. This practice becomes soft law as it dictates the norms and behaviour of humans rather than humans dictating norms and behaviour onto Forest. Such a system has several implications to the human realm. The implications are explored below and quite speculative. Specifically, it creates high degrees of uncertainties that may make it challenging for businesses to function, at least at first, since they do not have an established schedule of when they may receive their supply. Both business and consumers may be impacted which may cause a change to their practices such as:

Businesses:

1. They cut down on wastage and look for ways they can maximize all of their materials to create an offering – doing more with less.
2. Seek to recycle more to be able to make value out of their waste.
3. Increase their prices which may cause even more inflation in the system.
4. Businesses may seek to develop a value proposition around repair and maintenance of their products rather than of developing new products and services. This may change the way we think about innovation.

Implications on Consumers:

1. It may mean that consumers take more care in preserving their current products so that they do not have to go out and buy more/new items.
2. That they locate alternatives to the product/service they're wanting and/or find a way to give that to themselves (i.e., consumers may begin to create their own products).
3. It may mean that consumers may be more inclined to repair items rather than waiting and hoping for a new supply.
4. It may encourage consumers to exhibit and practice greater control of themselves. i.e., using discernment between their wants and their needs choosing to only make purchases that they need rather than what they want.

A change such as this would also have rippling effects on the geopolitical level. Altering what and when products get traded may also change the basis of trade agreements altogether. Since timber supply may be inconsistent, it may make more sense for countries to form relationships

that are not based on trade but of something else, perhaps grounded in care and kindness, promising one another care in times of difficulties or need rather than on resources that can be extracted. Here, we begin to spread wealth not through trade and money, but rather through care. This allows us to open ourselves up to alternative forms of wealth. The possibilities become endless at that point.

Limitations of Governance System Version 2

The suggestions above could be exciting and feasible if we look to open ourselves up to alternatives, especially in the context of our international relationships. It is clear that seeking to develop systems that uphold the inherent sovereignty of Forest allows us to open ourselves up to alternative possibilities, especially when we begin to move from Forest Sovereignty as metaphor into Forest Sovereignty as reality. That said, however, there are some significant limitations that need to be noted in v2 of this governance system:

Governance Element	Accountability Aspect	Blockchain Limitation and Constraints
In-Field Collective	Video logs analyzed by AI	Here we have a blockchain limitation in terms of data analysis. While the platform has great capacity to log and store data, it lacks in its capability to analyze it which means that additional tech would be needed in order to fulfill the accountability component for this piece. Furthermore, we would need humans to interpret the analysis of the data and thus need to mitigate against biases located in the interpretation of it.
Human Realm	Drafting smart contracts	Because of blockchain's immutable aspect, it is quite difficult to make changes to what is already written, thus, to create iterative documents becomes an issue and would still require regular word processors. Also, changing smart contracts on the same scale of how Forest changes is also critical, and it is unclear as to whether the immutable component of blockchain may help or hinder a necessary iterative requirement. This is an issue in both v1 and v2 of the governance designs but more so in v2. In addition, humans are still required to draft the contracts, develop the legal instruments and the legal documents. While incentives structures are in place to encourage ethical behaviour, that is still a significant loophole. Humans are also still required to negotiate on behalf of Forest, even though Forest is consulted, it is still humans at the helm.

Figure 13: A table listing limitations and constraints of governance design v2

As a result, it would seem that blockchain is a human-centric technology, which, of course, makes sense, however, may pose a problem when we move from Forest as a metaphor into Forest as reality. In general, then, it would seem that blockchain technology *can* facilitate Forest Sovereignty but in a very surface way. It does quite well in traditional governance settings where there is binary, control-type of decisions that need to be made such as version 1 of our governance design, however, when asked to help govern a more organic based governance

system (version 2), we begin to run into some difficulties. This aligns well with the conversations that were had with blockchain developers and professionals. While 3 out of the 6 participants felt that blockchain had no such limitations, the other 3 were very cautious about its use, acknowledging that there are important limitations to the technology itself and explicitly mentioned that it must not be used as a catch-all solution to all the problems we have. The following section will now briefly overview some of blockchain's features and ways in which they may help and/or hinder Forest Sovereignty.

General Blockchain Limitations in upholding Forest Sovereignty

The following is a list of potential barriers we may run into with blockchain itself as we seek to implement Forest Sovereignty through blockchain-based governance.

Hard versus Soft

Blockchain technology would have a difficult time incorporating the "soft" aspects of humanity. For instance, one participant expressed that the smart contracts that are developed relative to Forest Sovereignty should be based on responsibility and not necessarily on what must be done. Based on how the current technology is designed, this makes it difficult to create a contract underpinned by responsibility "smart contracts are currently stipulated as a "must" and responsibility is "I should do this". How do you code for "I should?" The other significant limitation is the idea of flexibility. Forest changes constantly and this change will have an influence on contracts, data, supply and decisions that are made. From what I understand about the technology, it is quite difficult to change a smart contract, in fact, one may argue that this is one of blockchain's value proposition. This feature would make it difficult to stay "in flexibility" with Forest which could end up harming Forest. For instance, if a smart contract is drawn based on available wood supply and then we have a Forest fire that impacts that wood supply, seeking to harvest that same level of supply could end up harming Forest and deprive Forest of needed trees to help recover from the fire. Live, ongoing smart contracts need to be able to adjust based on what is happening in Forest. Ironically, the very feature that blockchain enthusiasts tout (immutability) is the very thing that makes it challenging for blockchain to be the appropriate tool for governance of Forest.

Tokenize Everything…but to what end?

Blockchain technology and the potential of tokenization is often described as a positive development. Many token-enthusiasts suggest that the development of tokens provides a pathway to develop value systems that differ from the ones being emphasized in current mainstream systems. For instance, one of the suggestions given by a participant was to reward based on how much carbon had been stored versus how many trees are cut down. This incentivizes keeping trees intact and therefore offers more carbon storage. The idea is that doing so changes the direction of the incentive system so as to safeguard Forest rather than harm Forest. This provides the opportunity to develop tokens as a pathway to new worlds and value systems. This would be a very good first step, however, it is important to recognize that this route would also require addressing the cascading effects of those decisions that can drastically change lifestyles. Doing so also means that as we seek to keep trees intact, we would need to locate alternatives to replace wood-based products. This is not to say that incentivizing intact trees is a “bad” thing, certainly it should be something we seek to do more of, it just comes with sticky challenges that would need to be addressed as this shift happens.

Another suggestion provided by the research participants was to tokenize the more-than-human world as a way to include them in governance conversations and political discourse. The thinking behind this was so that human actors within the governance system could become conscious of the fact that there are other factors to consider outside of what is typically measured in terms of forest health and wellbeing, as a way to bring into consciousness this more-than-human world into the human realm. Here, tokenization was suggested to be an incentive in order to motivate human beings to think about the overall ecosystem health of Forest. The challenge with this approach becomes about limitation: to what end? (i.e., how granular does one become with the representation of the more-than-human world in token form?). This challenge speaks to a larger concern some have voiced with respect to tokenization generally, and it is the rise of anarcho-casino-capitalism.

Stephen Dial’s critiques of Web 3.0 states that “the apotheosis of capitalism where the market now provides a financial token game for every meme, every celebrity, every political movement, and every bit of art and culture—with each tribe competing against each other in a war of all against all for the hyper-financialization of all human existence.” (Diehl, n.d.) **.** Essentially, a consequence of tokenizing the more-than-human world becomes an exaggerated perpetuation of our current financialized economy – it doesn’t create new pathways, it simply morphs into a

larger monster. It is also worth noting that the concept of anarcho-casino capitalism comes from the right-libertarian movement who seeks freedom from state and relies heavily on the private property systems (Lielacher, 2018). I find this to be very interesting as it would appear that there are many human groups and communities seeking sovereignty from the state, however, the motivations and approaches appear to be different. Emphasis on private property as a tool towards sovereignty, frankly, does not sound too different than what is currently being employed and given how it has been articulated in this and in many other works that the current systemic infrastructure appears to be causing more harm than good to Forest, it may be wise to pause on tokenization. This means that many of the incentives being offered in version 1 and 2 of these governance designs, to promote and encourage behaviours that will prioritize Forest health, may need to be re-thought. In essence, blockchain does not have the mechanism that can help us think about the more-than-human realm in meaningful ways.

To Trust or not to Trust

Blockchain enthusiasts tout that the technology itself does not require trust among individuals to work. This appears to be absolutely false across participants I talked to. Humans still require coming together and articulate their shared visions, goals, rules, ways of being in community – all this still requires trust across people regardless of how secure the technology is. The matter of trust is even more prevalent when it comes to the relationship between Forest and Humans – trust is required to ensure that the needs and consultation provided by Forest are embedded in every action taken. Despite the technology's claim, it does not eliminate the requirement of trust.

Is it *really* Decentralized?

Decentralization was something that was consistently brought up across all 6 blockchain participants. In fact, the majority of them described how decentralization was a key motivating factor behind why they were so excited about the potential for this technology. Decentralization appears just as much of a *value* than a feature of the tech. After learning a bit more, I can understand why this is such an exciting feature. It allows any community that has come together around a shared vision and/or mission and creates space for them to make their own rules, ones that do not depend on top-down governing structures. It becomes a space where all members of the group contribute equally and no decisions are made unilaterally. **Where self-determination is made available.** Decentralization in co-operative models to govern natural resources is also something that is considered to be a "good thing."

Decentralization also offers opportunities to share data without being tied to any major tech company such as Google. One research participant describes this as “being able to come up with standards on a specific blockchain use case with data and anyone can create a website/content on this data, they can develop their own story from said data and display it in their own way. The data is open and free.” In this way, the research participant thought of blockchain as a “storehouse for raw potential” which allows “other people to determine what is valuable for and to them” as opposed to being told what should be valuable. Decentralization seems to offer people and communities the space to explore facets of a shared vision in their own ways; it provides autonomy and agency within the community and for each individual; the rules are not made up for them, they are able to make the rules for themselves – they have *sovereignty*. They have *self-determination*. If the decentralized capabilities within blockchain can offer human people and human communities this autonomy and agency, can it do the same for Forest? To answer this question, we must also investigate what decentralization exactly means in the blockchain space.

If one is deciding to store all their data on blockchain, this essentially means that you are *centralizing* where your data is, which in itself goes against the notion of decentralization “but unlike on a web server where the developer can choose their own software stack and migrate the data if they want to use a different stack, if someone were to disagree with how a blockchain project is being run, the best they could do is to try and fork it, and convince enough nodes to use their fork to keep the network running. Once you are tied into a particular blockchain, it’s not meant to be easy to leave — that’s the whole value proposition for the holders of the cryptocurrency tokens that users of the chain need to buy. The promise of decentralization is just a veneer — blockchain is in fact the worst kind of vendor lock-in.” (Stalker, 2021). In these ways, decentralization does not quite seem to reflect the level of sovereignty and self-determination that, frankly, many of us may be seeking.

The matter of data ownership is also an issue. In chatting with a blockchain entrepreneur working at the intersection of forest and blockchain, the data generated by community appears to be still owned by the start-up company themselves (or so it seemed, I wasn’t able to get a clear response) and while there was mention that moves towards data sovereignty will be made, at this time, data is owned by the company rather than the people generating it – this doesn’t

sound decentralized to me, at least in its truest sense. So the question becomes: how many degrees of freedom from the absolute understanding of “decentralized” are we?

The idea of decentralization seems to be more important for human communities than it is for Forest. Investigations into how Forest may or may not reflect this notion of decentralization is critical. It is elaborated on in the next section. This lack of clarity in terms of how and what decentralization means appears to be an ongoing pattern and theme within space.

What’s What?

The final thing I would like to mention about blockchain’s ability to facilitate Forest Sovereignty is the sheer lack of clarity that is amidst this space and how this is of concern if we are attempting to leverage this technology to facilitate Forest Sovereignty. When chatting with some of the research participants, I, personally, felt a high degree of uncertainty in terms of how blockchain might do the things that some of the participants were claiming the technology could do. For instance, upon asking one blockchain participant how we may go about embedding spiritual values into blockchain, I received the response of “if there is financial infrastructure to fund this, we can do it” but the details of the *how* seemed out-of-reach. The participant’s response suggests to me that experimentation in that space (in terms of attempting to embed spiritual values in blockchain systems) will only happen if funding is available, which seemed contradictory to the premise of blockchain which was initially to develop a piece of technology that sought to create more space for self-sovereignty and self-determination (Hellegren, 2020). In other words, in an environment that actually carved out space for reality to reflect one’s own values and beliefs, you would think that one would prioritize carving out space to embed spiritual values regardless of financial contribution, if that was of importance.

Another point of confusion is what is meant by blockchain itself. When combing through the literature, I located various use cases for which blockchain was being tested. What became clear to me was that there seemed to be a discrepancy between what a blockchain system actually means and looks like. For instance, Estonia is known for implementing a blockchain-based system to govern the entire country. The country has been working quite hard at making everything digitized from a digitized ID system as replacement to a social insurance number, down to requiring the use of digital signatures on important documents. The technology securing all of this personal information is blockchain technology (Walt, 2017), however, there appears to be debate about how blockchain-ny the blockchain system of Estonia actually is and

the answer to this debate normally depends on who you're asking. The uses of blockchain in the Estonia use case appears to serve more towards institutionalized structures, and the blockchain system itself is closed meaning that citizens do not actually have access to the system (i.e., it is not decentralized). Blockchain users who identify as crypto-anarchists are likely to feel that this is *not* blockchain and only just a system that perpetuates the states' power whereas those who are using blockchain as a way to "avoid power centralization problems on the Internet, tackle corruption, and increase governmental transparency", also referred to as crypto-institutionalists, would feel that Estonia's use of blockchain is in line to what blockchain *is* (Semenzin et al., 2022). These dichotomies and contradictions found within the blockchain space persist and are reflected in my conversations with blockchain participants.

All research participants expressed that there are essentially two camps in blockchain: the wild wild west finance bros (normally the former and latter combine) and those who are trying to understand and explore the tech's capability in scaling more grassroots-based initiatives. The former group tends to have unlimited optimism towards the technology's capabilities whereas the grassroots groups appear to be more pragmatic and are simply trying to understand the technology. These attitudes were also showing up across 6 of my research participants. 3 out of 6 participants were from industry and/or entrepreneurial spaces. These participants tended to be quite optimistic about the technology – when asked whether blockchain could do something, the answer was always yes, but upon probing *how*, the answer was always vague. The other 3 out of the 6 participants were from community initiatives and/or academia. This group of participants, while excited about the tech, were also the ones who gave me, what I felt to be, more realistic and honest answers about blockchain. I have concluded then, that the level of optimism around a particular technological product (i.e., blockchain in this case) appears to be an important factor in terms of assessing use-case-fit.

At least from my findings, it appears that those who have invested their time, resources and attention towards creating a business (in the typical sense) out of the tech are more likely to feel that blockchain can address literally anything you throw at it, whereas those who step into the space with an exploratory mindset or those who teach about it seem to be more open and honest about the limitations inherent in the technology. This distinction is critical especially when it comes down to implementation. Nothing is wrong with optimism, but optimism as a replacement for practically can prove to be problematic. A lack of **pragmatic** optimism would prevent a designer from building a system that seeks to mitigate and compensate for the

limitations of the technology in responsible ways. Unfounded optimism may also create barriers when it came down to implementation: **sheer optimism may propel someone to persist even when it's not the best choice.** This would be a significant problem if we attempt to apply blockchain onto Forest and especially as we try to leverage blockchain to facilitate the sovereignty of Forest.

It is also not lost on me that the genesis of blockchain was initially founded on the notion of anarchism. This work has also eluded to peaceful rebellion as a catalyst for change and we are also looking to discuss how we may use blockchain, which was initially meant to be a tool to gain freedom from the state, to facilitate sovereignty of Forest. Yet surprisingly, the two do not appear to be compatible. Perhaps because blockchain is focused on attaining sovereignty for humans and sometimes at the expense of natural entities like Forest. This suggests to me that the orientation of sovereignty and self-determination matters: you can have two groups aiming for the same thing but have *very* different visions, conceptions and approaches of how to get there which can essentially make the two movements completely incompatible. This points to the fundamental reality of identifying values and determining which values will guide your technological design – perhaps this is where the Forest Sovereignty requirements may fit in.

In summary, the use of blockchain does not replace or eliminate the fundamental realities of what it means to live in a world, on a planet, that is inherently connected (i.e., needing to feel trust and belonging with the more-than-humans and humans you may be working with/coming together with in community), only that blockchain makes it, perhaps (?) easier to coordinate these wide-ranging activities. And if that is the case, if we are using blockchain to only simply coordinate activities, then that is how we should be referring to it and avoid inflaming the tech. It is also still very unclear to me as to how blockchain technology would consider an important sub-question of this work which is: how we may bring in other-than-human-beings into our governance structures and political discourse. The tool itself appears to be heavily human-dependent. The development of the tech still requires human beings to code the contracts and therefore gives significant amount of power to those who are coding them, despite our attempts to incorporate Forest consultation. The approaches used to code one thing can range between coders, therefore, the biases, perspectives, values and beliefs of any one given coder will have significant effects in the ways in which Forest Sovereignty is ultimately implemented despite embedding our Forest Sovereignty requirements into the design. **This human-centricity can subsequently keep us stuck into Forest Sovereignty as metaphor rather than helping us**

move along into Forest Sovereignty as reality. This is an important realization. If our intention is to move a narrative along in a particular trajectory, then we need to be able to use technology today that would facilitate that (i.e., applying foresight). Given what has been discussed about blockchain, it would seem that blockchain may create barriers from making real our H3 vision, which is quite problematic. And we only know what questions we need to be asking because we established a vision of the future – the future can help guide us to preferred futures. This is critical as we seek to address climate change.

I also want to discuss blockchain's need to be merged with other pieces of technology as was described in version 2 of our governance design. While it can be considered to be a good thing for a piece of technology to have such compatibility across various other technologies like AI, we must understand the web of complexity that begins to emerge as we add more and more layers of tech onto one another: "Yet when we talk about the moral hazards of crypto assets, it's terribly important to criticize the destructive parts of the technology that actually put the public in harm's way. Household ammonia and chlorine bleach are both legal and useful everyday cleaning products by themselves, but put them together you can produce chlorine gas, a truly horrific chemical weapon that was rightly banned by the Geneva Protocol. The same (albeit less drastic) logic applies to mixing blockchains with social media and FOMO to produce empty speculative asset bubbles to arbitrage securities regulation. The combination of the two is what we should be concerned about from a public risk perspective, not Merkle trees or hash functions applied to everyday data management problems" (Diehl, n.d). Essentially, **it matters what technologies you're mixing with other technologies** and frankly, not enough thought is put towards understanding the implications of doing so.

Re-Asking the Question: Can Blockchain Technology Lead us to Forest Sovereignty?

Given the above context, I think it is worth taking some time to re-ask our research question:

Can blockchain technology lead us to Forest Sovereignty?

At this time, on its own, and in the way that we have conceptualized Forest Sovereignty: **no.**

The tech is showing itself to be too rigid in terms of being able to provide a governance system that is flexible enough to compliment Forest and forests' sovereignty especially as we move from Forest Sovereignty as metaphor into Forest Sovereignty as reality. Blockchain could suit a governance system underpinned by control and command but the moment you push blockchain technology to be anything outside of itself ie., analyzing data, adjusting to changing circumstances, factoring in non-binary conditions (i.e., rules and ideas that are difficult to code for), it starts to breakdown and *more* technology is requested, be it in the form of AI, Internet of Things (IoT) and other Web 3.0-based technologies. In addition, blockchain still needs to use Web 2.0 apps such as google docs or Microsoft Word to coordinate activities even when blockchain is being used as a traditional governance structure. **So unfortunately, I do not think blockchain technology will solve the very really challenges of forest governance and may actually inflame them. Blockchain will not solve all of our problems and I would go further to say that computer-generated technologies will not solve our problems.**

Acknowledging that blockchain or any other technology for that matter is **not** the solution is especially relevant in the ways in which we are choosing to go about addressing climate change. It seems to me that all we tend to do is seek to create *more* technology, using *more* scarce resources, but not *actually* solving any of our problems. Developing technological products requires mining of key minerals and materials that we are frankly running low on. I find it quite contradictory to be turning to the development of technologies that require these key materials in the name of fighting climate change. Exacerbating the issue is that not enough time or space is given to understanding the implications of converging tech with climate, and specifically, looking to tech to manage/govern our natural resources in hopes that it may do a better job than humans. As an attempt to understand some potential implications of merging tech, specifically blockchain with Forest, the following speculative future exercise was created to

get a sense of **one** possible future that may emerge should we continue this process of blockchain-forest convergence.

The Matter of Convergence

If you have not yet realized, a fundamental underpinning of what my research question is asking is to understand the type of **relationship** that may emerge when we put blockchain and Forest together. This entire inquiry into whether blockchain technology could lead us to Forest Sovereignty *is* a question about relationship just as much as it is about blockchain's technical capability in governing Forest (surprise, surprise). It is about acknowledging that what is being proposed here is essentially a merger between tech and Forest; a biodigital convergence, if you will. Policy Horizons had introduced this concept in 2020 where they described this convergence as the melding of tech into biological systems (i.e., implanting a chip in a dragonfly so as to control the dragonfly's movements), technology's capability of advancing biological understanding (i.e., CRISP-R) and finally a conceptual convergence wherein the unpredictability inherent in nature becomes *more* predictable once they converge with something digital which tends to be more predictable (Policy Horizons, 2021) . Policy Horizons makes a strong case based on trends and signals that this convergence will not only happen but is actively in the works. Yet it is important to critically examine motivations behind this convergence. Many of the test cases for this convergence appear to be grounded in the desire to *control* natural systems for the benefit of human beings, thus, this convergence isn't really about merger more so than it is about controlling. That is not a relationship, **that is manipulation**. Furthermore, it is particularly worrisome that this convergence is being used to tame the unpredictable nature of nature – this goes to further make the case that blockchain technology would be not able to keep up with the changes that happen in forest. Given this, the following convergence scenario was developed:

Convergence Scenario

In this work specifically, we are essentially looking at the convergence between Forest and blockchain. If given free reign, blockchain, with the help of AI, would most likely end up reflecting many of the control-based relationships we often see when human-made tech comes together with nature. This was demonstrated in v1 of the blockchain-based governance design and explained how this tendency to control and remain rigid would prevent the evolution of Forest Sovereignty into H3 reality. Had the work continued on v1 and/or v2 of the governance design offered, we may see a convergence that looks like the following:

Blockchain-AI system becomes gatekeeper of Forest, particularly it is the accountability centre that becomes this gatekeeper, dictating who can enter Forest, who has access to Forest resources, and the ways in which Forest resources are harvested. Blockchain-AI-governance system morphs into the absolute steward of Forest. Through sensor and lidar technologies installed in Forest, AI is able to communicate with and update/adapt the blockchain governance system so that it remains sensitive to Forests' changing conditions. Through mounting evidence and pattern recognition, the blockchain-AI-governance system also begins to predict when forest fires may emerge and sends out notice to media channels to alert for any potential evacuation orders. The system also evolves the oracle in a way that allows for a Forest chatbot to be developed. This advanced Forest chatbot is able to answer questions from the human realm about Forest. The central mission of the now Blockchain-AI gatekeeper is to value Forest life, survival and thriving. The Blockchain-AI system self-decides to develop lasers around Forest so as to prevent any unwanted intruders into the space.

Yet, Forest has its own intelligence and consciousness and grows tired with the algorithm that dictates the ways in which the Blockchain-AI system governs its ontology. The laser system that the blockchain-AI system has developed has blocked out other-than-humans that are actually quite beneficial and helpful to Forest in ways that the blockchain-AI system does not understand. It is also blocking humans which has perpetuated further separation between Forest and humans. There are generations of human beings now who have never stepped foot in a non-urban forest. Furthermore, the chatbot that has emerged is only able to communicate through patterns found in the data and is therefore not Forest, it is a *representation* of Forest. Thus, Forest is **not** sovereign or self-determining since the decisions that are being made are the decisions of the AI-blockchain system and not of Forest themselves. Forest does not have ultimate authority over itself. What is deciding what Forest looks like and how it gets treated is not derived from Forest directly, rather, is derived from the ways in which the blockchain-AI system is *interpreting* and understanding pieces of data it is collecting through more human-made technologies like sensors and lidars. Forest has an entire underworld that blockchain-AI doesn't know about but must be taken into account when caring for Forest. Furthermore, Forest has connection to Water. Water and Forest are in fact intertwined. The blockchain-AI system does not consider this relationship because there is no blockchain-AI system for Water. The humans are attempting to remedy

this but this would mean that all natural entities would end up with this blockchain-AI system that will be interpreting our way of being…forever? For all natural entities? To what end?

Forest feels chained to blockchain.

While the initial benefits of the convergence appears to be exciting and interesting, its implications are particularly worrisome. Admittedly, I am speculating on ways in which Forest may perceive this convergence, absolutely. And this is just *one* scenario. There are many futures that can arise. Though there is much about the ways in which a Forest works that we, humans, don't actually fully understand and/or comprehend and as such, our capacity to design a piece of technology that will ensure the sovereignty of Forest (i.e., allowing Forest to simply be in its being), is really quite limited. Even without technology, we are clearly incapable of letting Forest be. We feel inclined to intervene and intrude all the time even though we do not actually need to. How can we possibly expect to develop **human-made** technology that aims to facilitate Forest Sovereignty when we cannot do it ourselves? Furthermore, this imagined biodigital convergence would not be possible without AI. Blockchain technology, as it stands today, does not have the appropriate capabilities to organically develop on its own without human coding – it is simply too rigid of a technology. It would simply not suffice.

Based on the above, we may wonder what *could* be an appropriate governance tool that can facilitate Forest Sovereignty? I would like to offer an alternative scenario to the matter of convergence but not between digital and biological but between inter-species biology:

> Humans have taken the time to control themselves; their needs and desires. In this process, they have also sought to learn how to communicate with Forest. To enhance this communication, they have created Forest-Human tattoos. The tattoos are derived from a special ink primarily made from Forest soil, and forged in super secret rituals. In order for the tattoos to work, they must be tattooed in a specific way. The strength of the tattoos is enhanced through the consumption of forest material. For instance, the consumption of particular mushrooms, plants and bark found in the forest alters and changes the capability of the tattoos. The tattoos *become* the piece of technology that is used to help steward the Forest in the way Forest wants. It is the artifact of this human evolution.

The idea here is to reduce the amount of “middle” layers that sit between Forest and human. This also helps us think a little further on what our next stage of evolution may be – perhaps we may become forest-human-sapiens. We may already be on that track. Particular drugs that come from specific Forests have been said to give human beings temporary capabilities to understand Forest in deeper ways. In How Forests Think, Kohn articulates how drugs given to dogs allow human and dogs to communicate on the same plane (Kohn, 2013)**.** Interestingly, one of the blockchain research participants pointed out a convergence they see occurring between psilocybin users, Forest, and the Regenerative Finance (ReFi) community “Regenerative finance (ReFi) on the blockchain is the estimation of the value of natural assets based on their regeneration and preservation properties. Unlike traditional finance, asset values aren't based only on the resultant cash flows from utilizing the assets” (Blockdata, 2023). I would suggest that these particular drugs and the consumption of them appear to be linking many people to the natural world in different but important ways. Perhaps our evolution to becoming forest-human-sapiens are already underway.

In this event, we would not need computer-based technologies. There appear to be more direct technologies at our literal fingertips that allow human beings to understand Forest in important ways. This pathway also does not require us to use more of Earth’s resources to create new forms of gadgets – sometimes what’s best is to leverage what we already have rather than making something shiny and new.

PART 3: CONCLUSION:

Summary

There are many complexities in forest governance. Through this work, the following challenges were highlighted:

1. The forest governance space is made up of overlapping actors, stakeholders, desires, wants and needs diluting accountability and making Forest a site of politics and not a Forest.
2. Since both Forest and Humans are land-based, Humans create structures that tend to compete with Forest rather than work with it.
3. There are narratives, particularly the one that suggests Canada is a country that treats Forests well, that may be enabling bad behaviour.
4. Innovation and experimentation is happening within these spaces but these innovations are either financially precarious and/or lack any political will to scale preventing these transformations from having large scale influences.
5. Finally, and most important, is that there appears to be absolutely no recourse to prevent rolling back conservationist and protectionist policies, laws and legislation and therefore Forest is subject to changing political ideologies.

There is a certain level of urgency to address these issues given the fact that we are in the middle of a climate crisis. The act of imagining alternative futures is desperately needed. As a way to address these challenges, and working towards building alternative futures, this work sought to imagine what it might be and look like if we could created structures that facilitated the sovereignty of Forest. The thinking here is that many humans (not all but man) have shown incapable of truly helping Forest in meaningful ways and if we are able to let forests be, perhaps we can start to make meaningful headway towards addressing our climate emergencies.

The notion of Forest Sovereignty was used in two ways: 1) Forest Sovereignty as metaphor which worked within human systems to shift worldviews and values and 2) This shift in worldviews and values is thought to then allow the concept of Forest Sovereignty to evolve into actual reality where we could begin to truly create systems and structures that respect the inherent sovereignty of Forest and hopefully develop Earth-centric systems rather than human-

centric ones, which, then, are meant to mitigate the challenges identified in this work i.e., you cannot just change rules towards Forest because Forest would be a sovereign entity – doing so would result in a human rights violation, or perhaps a forest rights violation. To help our narrative of Forest Sovereignty move from metaphor to reality, our 6 Forest Sovereignty requirements which emerged from our interviews were categorized based on horizon as a way to help scaffold our process. The 6 requirements being:

1. Control (H1)
2. Legal (H2)
3. Ethics (H2)
4. Community (H2)
5. Communication and Language (H3)
6. Selfhood (H3)

A role for governance was also identified in helping us move to this H3 state. Governance was articulated as a tool that has the potential to take us from status quo into transformation. Governance was chosen as a helpful tool for Forest Sovereignty since a) governance appears in all sorts of systems, according to human perspectives, and b) governance appears to be a complimentary process to the political discourse. Thus, the positionality of governance, and particularly of forest governance appears to be elevated in terms of our systemic structures and therefore has real potential to uplift our worldviews and values towards forest from imposing control onto Forest to working *with* Forest. The act of working *with* Forest creates an opportunity to be in relation to Forest. A process of relationality is thought to better suit the ontology of a Forest rather than that of command and control based on findings from complexity science.

More-Than-Human Relations

One of my motivating forces behind this work was to take some time to understand how we, humans, may begin to seriously take into consideration the more-than-human world into our political discourse. The more I attempted this, the more I found that the politics and process of relationality may help with that process; essentially the process of working *with* Forest. While articulating the details of this is beyond the scope of this work and, I feel, would require a PhD, my supervisor, Michele Mastroeni, reminded me of the relationships that often emerge between human hunters and animals and how our natural inclination to hunt may provide pathways to take more meaningful steps towards saving our forests. The scaredness of such relationships

are also discussed among Indigenous scholars. Hunters have an intimate understanding of their prey: how they behave, where they may dwell, what may scare them etc. Developing this knowledge takes a significant amount of time and requires a relationship to be developed between the non-human and human. The concept of non-human and human relationship form the foundation of many Indigenous ontological realities. Richard Atleo (2004, p. 59) notes that for Nuu-chah-nulth people, “the sacredness of common origin determines the basis of relationships between diverse life forms.” It is understood that existence is composed of one essence, one spirit.” This knowing then dictates the relational protocols that inform day-to-day life *and* politics. It is the responsibility to be in relation with both non-human and human beings because all is from the same spirit. The sacred commonness of life also brought to life through The Nishnabeg protocol between human and their non-human kin. This protocol was dictated by their non-human kin in the following way: “Honour and respect our lives and our beings, in life and in death. Cease doing what offends our spirits. Do not waste our flesh. Preserve fields and forests for our homes. To show your commitment to these things and as a remembrance of the anguish you have brought upon us, always leave tobacco leaf from where you take us. Gifts are important to build our relationship once again.” This protocol outlines the responsibilities of the Nishnaabeg people and the relations between their non-human kin. The Nishnaabeg people are not to “waste flesh” and “preserve fields” **and in return, the people will receive sustenance** – this is the process of life and death, the understanding that all is one; from one essence and spirit (Manson, 2015).

Non-human kin relationships provide hunting guidance to many northern hunting people who “conceive animals as other-than-human persons who give themselves to hunters. By accepting these gifts, hunters incur a debt that must be repaid through the performance of certain ritual practices which could include food taboos, ritual feasts, and prescribed methods for disposing of animal remains, as well as injunctions against overhunting and talking badly about, or playing with, animals” (Nadasdy, 2007). Because the non-human and the human kin are in relationship, this also means that reciprocity does not always lead to “positive” outcomes. There can be “positive” and “negative” qualities that exist within a reciprocal relationship just as what we experience in human-to-human relationships. It has been documented that hunters can engaging in hunting magic as a form of persuasion to the animal to give themselves, and animals, in turn, are believed to be able to install sickness and/or bad luck on the hunter and their family if they do not engage in the appropriate rituals and/or they do not give them proper gifts. In this way, even in terms of non-human-politics, you have a tension between domination

of animal onto human and human onto animal as well as the more positive component of the reciprocal relationship which is the gift giving itself (Nadasdy, 2007). This form of reciprocity informs how the non-human and human treat one another **and contribute equally** to one another's lives. Essentially, reciprocity informs the day-to-day politics between the non-human and human. **The non-human and human are in equal power relationship with one another.**

Control of Self and Power Addiction

And therein lies the crux of the matter. In our current, mainstream, colonial system, humans are seen to be *above* and/or *superior* to literally everything. Our current systemic structures are not currently grounded in the reality that more-than-human-beings have the capability and power to influence humans just as much as humans can influence them. In many instances of this work, we have explored what it would mean and look like for Forest to do things to Humans. What seems odd to me is that despite all of the climate-related events that are occurring, many key decision-makers, like Doug Ford, are not understanding that nature can absolutely cripple human beings and is demonstrating this time and time again – nature, forests, all have influence and power over human beings, whether we like it or not. I believe this notion is quite scary for us small humans. I think there is a degree of perverse comfort that comes with creating systems that seek to control our forests, our natural landscapes. Humans like predictability, we like to know what will happen next. Uncertainty and unpredictability scares us and we are likely to seek control over the things that scare us. Nature is magnificently unpredictable, chaotic and ever changing; it is no wonder that humans seek to control her. Yet in pursuit of this control, we have also lost control of ourselves. We think that since we have conquered nature, there is no reason to conquer ourselves, that we do not need to tame our desires and our consumption, that we do not need to discipline ourselves. Nature, at the moment, is showing us otherwise. Nature is an epic force and can and will leave us vulnerable just as much as Nature also feeds and shelters us. Seeking to impose control on natural entities is simply a desperate attempt at trying to grab hold of something predictable, but this is not sustainable. The only thing that is sustainable is seeking control of ourselves and curbing our desires. This is where our power lies and not power over our environment. I have eluded many times that we have a real issue with power hoarding and addiction, this is because studies show that acquisition of power turn on our reward centres in our brains. I think part of the problem is that power feels really good, and we keep putting people in positions that can't control themselves and seek more and more of this power. This is why the first forest sovereignty requirement of control of ourselves is so critical.

Admittedly, this concept of H3 Forest Sovereignty will be significantly more challenging to bring to life if we are not addressing this power addiction. In attempting to address this, I think it is particularly important for healing men (because most men are in positions of power) who have been in positions of power to talk to other men who are clearly suffering from power addiction. I think that we can actually make real positions that seek to rehabilitate men and I think that this needs to be taken seriously. I would also recommend having some sort of screening process before someone is elected into office and have a plan in place in the event that the candidate voted in does not pass this screening process. Of course there are many things to consider in the design of this before implementing but I believe would be a worthwhile pursuit. Seeking to align *with* nature rather than against it or on top of it is where we need to be heading and we need political leadership who actually have sufficient courage to do so.

Technological Design Considerations seeking to merge with Natural Entities

I believe our desire to control nature is also embedded in the ways in which we go about building our computer-based technologies and, subsequently, seek to apply our world-making capabilities. While computer-based technologies have contributed a significant amount to our growth and development, they have also been designed in a way that constantly seeks to control our environments, and in doing so, has separated us from the natural world and the realities of that world. What we fail to recognize is that as we look to develop these computer-based technologies that work with natural entities, in some way or another, we are creating a relationship between nature and the digital and more often than not, this relationship normally seeks to control the former. The attempt in this work was not necessarily to examine the technical capabilities of blockchain but was more to understand what type of relationship blockchain would end up having with Forest. What was discovered was that the more we sought to create space for the sovereignty of Forest in real ways, the more that blockchain technology was unable to keep up, and the need to add *more* technology to manage the complexity of Forest was required. This resulted in the development of a blockchain-AI-governance system rather than simply a blockchain-based system. While current convention would suggest that it is actually a good thing that blockchain is compatible with different types of technologies, we do not understand that real implications of adding more and more layers of technology, especially doing so when that computer-based technology is seeking to do something with natural entities.

Einstein said that the sign of madness was doing the same thing over again and expecting different results. We appear to want to layer technology over technology to deal with the natural complexity in nature yet we are finding that this is simply not working, but we continue to leverage this approach, we persist, and frankly, not in a good way. And what's worse is that we are mining for critical minerals to build these technologies in a bid to *save* our Earth…? What, I believe, we need in this moment of time, is to pause on building computer-based technologies and seek to develop more organic forms of technologies; turn the project of development on ourselves rather than on the world. "Once humans separated from other creatures and began deliberately to use their world-making powers to modify their environments they assumed responsibility for natural systems and other animals. But now, in the Anthropocene, the fate of the Earth has become entwined with the fate of humans and our responsibility is of a new kind, risen to another level. Before our own welfare, our virtues, and our duties to one another, our inescapable responsibility for the Earth defines us as moral beings" (Blok, 2022).

One of the things that became clear to me while pursuing this question of whether *blockchain technology can facilitate Forest Sovereignty* is the importance of having a clear vision of where we may want a piece of technology to go. If my H3 had not been articulated in any sort of way, I would not have been able to apply any foresight to how blockchain would fare as we sought to evolve the concept of Forest Sovereignty from metaphor to reality. Without the Forest Sovereignty requirements, I would not have been able to seek to evolve the governance design that was more in line with our conceptualization of the sovereignty of Forest and assess whether and *how* blockchain may be able to go about fulfilling these requirements. Most importantly, without understanding that I was seeking to essentially develop a relationship between Forest and blockchain, I would not have been able to speculate what that relationship might look like given the nature of the technology itself, as it stands today. **Here we see how the concept of Forest Sovereignty allowed us to look at technology design not in terms of function but rather in terms of relationship.** As such, I think that when we are seeking to design computer-based technologies that work with natural entities in any sort of way, we require:

1. A clear vision of the future: what do we want this technology to be doing 20, maybe even 30 years down the road? What is the state of the natural environment we want to see in that time and how do we hope this technology will help us get there?
2. Who is interacting with this technology: Is the technology easily accessible to all or does the design of the technology depend on a specific skillset? Does access to the technology depend on having a laptop and/or a computer? What barriers are caused for

people who are unable to access that technology (i.e., the digital divide)? What harm might be caused if we pair a piece of inaccessible technology with a natural entity?

3. Guiding Principles: what are the guiding principles we are wanting to embed into this piece of technology and what do we want these principles to do for our natural environments and for the technology we are designing?
4. The Relationship: based on how the technology is designed right now, what sorts of speculative futures arise between the natural entity and the technology itself when we extrapolate into the future? How might the features of the technology help and/or hinder the natural entity in the future? What sort of state will the natural entity be in, in the future, given these features?
5. Control of Self: in what ways might this technology feed into human desires? What might we need to mitigate in the future as these desires are fed? Is this technology *imposing* control onto the natural entity in any way and how can we re-focus the design of the tech to control ourselves? What sorts of biases, worldviews and values is one embedding into the code/in the approach that may perpetuate control over nature and how can I mitigate against this?
6. Humble Tech: what are the honest claims we are making about this technology without engaging in over-hype? (G'sell & Martin-Bariteau, 2022) What do the claims actually mean? When is a claim not a claim?

The Role of Futures and Foresight

In articulating the above considerations that absolutely need to be discussed and worked out before implementing and even building any sort of computer-based technology that will do anything with a natural entity, I realize the critical role that futures and foresight played in this process, that helped me not only articulate the above considerations, but informed how and what I assessed in blockchain's capability as well as how I organized this entire work. The importance of the futures in designing anything is fundamental, especially at this point in time, to ensure that we are either reducing harm to Earth or altogether mitigating against it. Leveraging a framework, such as the 3 Horizon Framework, proved to be essential in being able to anchor and make concrete something very abstract like Forest Sovereignty, to my westernized, colonial mind, into reality. What the framework helped me do is basically organize steps that can be taken towards this vision of the future and work out what would be needed in order to reach that vision *as it was articulated*. Therefore, clarity in the vision is critical to understanding what you

may want or not want in your vision. This is not to say that the vision and articulation of it will not change as one journeys to achieve their futures, certainly it will, and this is part of the process, however, it is important to start off with this clarity. It is also important to note and acknowledge that I started off with one vision, one future. Many futures are worthwhile and worth pursuing. Perhaps I simply focused on one vision of the future because, just like the research participants, I too prefer a future where we are able to create systems that do not require human systems to make natural entities sovereign or to have to use oppressive systems to legitimize the sovereignty of natural entities or more-than-humans or other human beings for that matter.

Liberation, Sovereignty and Self-Determination

It is not the place of any human to *grant* sovereignty. We are all inherently sovereign yet the current systemic structure we live within covertly prevents us from being so while attempting to convince us that we are. What was interesting about this work was that we all appear to be on some sort of journey to achieve liberation and this is the case across ideologies. While the approach may differ significantly from one another, as well as motivation, the desire for liberation from the current systemic structures is growing day-by-day. The bounds of this colonized system are getting tighter and tighter and we are seeking for ways out. There are growing instances of people choosing to live off the grid completely in order to achieve some semblance of independence and choice in terms of how they want to live. For many of us, I think that there are natural entities literally calling to us; to come back to. As this grows, the grip of colonization becomes more clear to us. What is that story of a Lobster? The Lobster begins to shed its shell when it starts feeling uncomfortable and tight in its current one. I think that many human beings are in that process right now. I was also curious to see that if we are able to create sovereignty for a currently marginalized community, Forest, then would achieving such sovereignty help us create less oppressive systems for other marginalized human beings? In other words, if we manage to create systemic structures that uphold the sovereignty of Forest who, I would argue, is among the most marginalized community, could this then inform how we may go about designing systems that free marginalized human communities? I suspect that it may just do that. For instance, one of the main turning points in being able to move Forest Sovereignty from metaphor to reality was the human ability to take time to *get to know Forest. To understand Forest and find ways to communicate with Forest.* This capability formed the basis of each governance structure – to ensure humans were aligning with what Forest needs and wants and taking steps to honour those needs and wants. The same thing applies with human beings. Communication,

listening and the *willingness* to honour the needs of another are foundational to creating spaces and places that are open to *all*. Prioritizing the needs of the Forest also helps inform how we, humans, may go about altering our, human realm's, legal orders and approaches that sought to uphold the sovereignty of Forest. Based on how Forest Sovereignty was conceptualized in this work, by creating systems of Forest Sovereignty, that meant that **real rules** needed to be put in place that not only prevented roll back of conservationist and protectionist politics simply based on political whim, but also that prevented humans getting in our own way – that is to say, to trust Forest and its processes in being able to regenerate itself without humans feeling the need to intervene on the process. The same applies to marginalize human communities: BIPOC folks know exactly what is needed and right for them, systemic structures simply need to get out of the way and stop assuming that white people know better.

What I feel these shifts will ultimately lead to is freedom for each more-than-human and human-being to decide how *they* wish to govern wish to govern *themselves within the context of a larger society.* Afterall, no one can be sovereign and self-determining if there are others who are not. I believe that what I'm seeing in this space of relational forms of governance is that either: centralized forms governance and institutions are going to become absolutely irrelevant and/or governance and the practice of politics will be distributed. Perhaps some sort of centralized coordination function may be needed/required but I believe that everyday decision-making and power over the course of our own lives will be largely left up to us. Doing so will likely have an effect on our natural entities, like Forest. What may happen is that portions of Forest end up being distributed across communities, much like how it may have been prior to European contact in Canada among Indigenous Nations. I think that by doing so, this will also have effects at the geopolitical level. I think that by creating systems that make space for our own sovereignty would make trade agreements nearly irrelevant. I think that there is an opportunity here to re-define that types of relationships we hold with other countries as we re-define our relationship with Forest and ourselves to uphold our respective sovereignty. I want imagine agreements with countries that are based on fun and care. What a world it would be if we created agreements between countries that prioritized welcoming people into their homes to experience fun and play and care in culturally-dependent ways – here is an opportunity to explore alternative forms of wealth building that go beyond profit. This is not to say that there will be actors who seek to cause harm and disregard the sovereignty of other beings, in favour of their own needs and desires, but I imagine there will be some collective, coordinated role to manage and mitigate these issues. It seems to me that people are tired of the current system and I think that by moving towards a

future where we see Forest Sovereignty as a reality will also lead us into a world where we have achieved our *own* sovereignty in a truer sense, where we aim to focus controlling ourselves rather than our natural entities because as we know, our natural entities, Nature, certainty has significant amount of power over us puny humans.

The Benefits of Forest Sovereignty

I feel it is important to explicitly outline the benefits of enacting this concept, one of which being was the space this concept provided to imagine what sorts of other relationships we, humans, would be able to develop if we simply get out of our own way. Personally for me, I would love to develop a kinship with a Forest and I would feel honoured by this opportunity. I am also excited by the possibility of being able to evolve my own human technologies to communicate with more-than-human beings. It makes me wonder what other facets of my own self are locked away.

At a more systematic level, attempting to seriously leverage the concept of Forest Sovereignty, while challenging, felt quite freeing. It helped me answer questions and re-frame approaches in a way that I would not have otherwise. Working with the concept of forest sovereignty naturally led me down the path of alternatives. Although there were many things about Forest Sovereignty as a reality that I don't quite have figured out (i.e., what does this look like on a day-to-day? How do we structure lives around Earth rather than humans, etc), it did the job of stretching my thinking which I believe is what we need.

Attempting to leverage this concept also provided insight into considerations that may need to be discussed when attempting to design a piece of technology that is meant to be overlaid atop a natural entity. As we have an inclination to leverage technology as a way to solve each and every one of our problems, I believe we need to begin to approach this space not as a technical issue but rather a matter of relationship. Taking some time to understand Forest through a complexity lens made improvements to my governance design and allowed me to construct a speculative future contemplating how a relationship may progress across time between blockchain, AI and Forest. Without the concept of Forest Sovereignty and the Forest Sovereignty requirements, I may not have been able to think about the potential downsides that may arise from such a merger.

Finally, thinking about the sovereignty of Forest allowed me to naturally think about the time onto which Forest lives. Here, I was able to take some time to begin to think about what effects it would have on our systems if we slowed everything down – how our experiences of life may change. Doing so made me think what it means to experience time that is perceived to be of more feminine nature – slower, gradual but steady and solid, like a forest. What happens when we step out of the rush of masculine frenzy and into the grace of slower time? This would give enough time to think, to think before taking significant or insignificant action, it would give our brains enough time to process fully what was happening, to be able to think of an alternative.

Having the opportunity to at least preliminary work with the concept of Forest Sovereignty and attempting to seriously apply it creates a container for the alternative, for the other. And within this travel, I found enrichment and possibilities that I believe we so desperately need in order to address our climate challenges. We do not need more gadgets. We just need more presence.

This is not a Zero-Sum Game

I also want to mention something important that I have not included in the work above. I think that one of the other barriers that come along with enforcing conservationist and protectionist policies is the notion that if we protect our forests, we, humans, have to sacrifice a significant amount. And this is certainly the picture I have painted in various scenarios. But this actually does not *necessarily* need to be the case. Studies looking at marine protected areas (MPAs) have shown that biomass *increases* **and** helps surrounding areas that are not classified as MPAs, assuming that fishing outside of MPAs remains constant. This suggests that protection does not *have* to lead to sacrifice (Sala et al., 2021). It's not one or the other. Sala suggests that the idea is to protect the areas that need the most protection and this protection will benefit surrounding areas without having to change a significant amount, it would be simply more of an adjustment (Baker, 2023). This is an important point to keep in mind, though this research has not been integrated above because it still seeks to make comfortable the human being. I understand its validity in terms of a behavioural change perspective and could be considered as an H1 strategy.

List of Recommendations

Given the above insights, I now share a list of recommendations:

1. There needs to be rules and process set in place that prevent rolling back conservationist and protectionist policies of our natural entities, especially if it's based on political ideology. This needs to be done now. We are in the middle of a climate crisis.
2. There also needs to be rules and processes and guidelines that prevent those already in power to hoard more power. This needs to be done now. We are in the middle of a climate crisis.
3. Rules and access to the rules need to be distributed across a spectrum of non-human and human beings; with differing worldviews.
4. Mandatory training and work towards learning control over ourselves.
5. The development of a symptom sheet listing signs of power addiction.
6. The creation of a support group that seeks to steward men who are exhibiting signs of power addiction, away from critical seats of decision making, essentially a ritual of death. Implementation of this certainly has its challenges and the design needs to be carefully built around this.
7. Mandatory psychological screening for potential political candidates. Implementation of this certainly has its challenges and the design needs to be carefully built around this.
8. Seek to solve the problem by attempting to evolve and mature ourselves through developing inherent forms of technologies instead of always turning to computer-based technologies.
9. If seeking to overlay technology onto a natural entity, consider the design questions that have been posed above and/or study the natural entity carefully and engage with communities who have a relational tie with this entity before designing the technology. Be willing to let the technology go if it's not working.
10. Humans need to get out of their own way. Allow natural ecosystems to restore themselves on their own. Humans do not need to be involved and intervene in every single thing.
11. Develop a clear vision of the future because this is what will anchor you.

Final Thoughts

First of all: I am mindful that perhaps my left-ist political bias may be shining in this work and may, subsequently, turn off a certain set of readers. This is not the aim. In fact, I do believe that this conceptualization of Forest Sovereignty can be a bridge. Many on the left side of the political spectrum may not like the idea of encouraging hunting, or even trophy hunting, but

programs in Africa are showing that *controlled* hunting is proving to provide some economic incentive to *keep forests intact* AND to involve community (Whitman et al., 2004). This is a hard thing for me to discuss or even write about but if we take time to actually understand Forest and to seriously learn how to communicate with Forest, we may find bridges and pathways *across* ideologies without harming Forest. We do not need to destroy forest ecosystems to pursue our liberties, in fact, I would argue, that destroying our forests *creates* barriers to our liberties, sovereignty and self-determination. It's simply a matter of how we are going about it but there is an opportunity to find harmony.

Secondly: Producing this work was challenging. Attempting to think about how we may go about creating structures that did not result in anthropomorphizing forest was very difficult and what my supervisor ended up advising is that we, unfortunately, need to acknowledge that Forest and all natural entities are currently under the control of human-centric systems and that perhaps an approach to move towards Earth-centric systems may need to begin with focusing on human-centric ones first. While this was not my ideal, doing anything else would have simply been not feasible for me given time resources. In an ideal world, I would have produced a work that created a vision of a Forest-Centric governance system, that did not have to rely on human systems to legitimize it or required any sort of anthropomorphizing. Perhaps in my next work.

Third: My intention is not necessarily to bring blockchain technology down but to look at it objectively. There are many reasons why I selected this piece of technology, largely because the technology appears to be associated with institutional-level initiatives, it is being tested in very important ways, both as a way to perpetuate status quo and also as a tool to bring change, for instance its association to end nation-level corruption (i.,e the Cypherpunk movement that deeply opposes censorship and monitoring government policies and practices). Blockchain's tie to crypto-technology also offers its users a level of anonymity that has potential either wreak havoc on society (G'sell & Martin-Bariteau, 2022) or help it (i.e., the use of crypto technology has been seen in large-scale whistle-blowing cases like Snowden) (Hellegren, 2016). As I see the use of blockchain attempting to be applied in various scenarios, I felt it important to take some time to understand how it may work with our natural resources, and in this particular case, I did not feel the technology was sufficient.

Finally: In all honesty, some of the implications that have been identified in this work felt daring for me. To actually suggest that in order for Forest Sovereignty to work, we have to change how

we function at the international level, felt other-worldly to me even as I was writing it. Can we really expect the world order to shift their trade agreements so that we are designing huge international supply systems to fit Forest and Forest time rather than human time? Can we really expect to believe in a future that creates relationships with other countries not necessarily based on business and trade but rather care and support? Maybe even fun and/or joy? Can we really see a future that necessitates politicians and policy makers to spend a significant time in Forest before they design their policies and make decisions *with* Forest rather than *for* Forest? Or to even see a future where our political system is comfortable with themselves to allow for a Forest and a group of people who can communicate with Forest to **tell them** what they can and can't get from Forest? Or see huge corporations telling their customer base "sorry we don't have our main product offering because Forest wasn't ready." These possibilities seem absolutely outlandish but, because they feel outlandish also feel equally important. Perhaps these are the edges we need to explore and seek to work out *because* of how ridiculous and outlandish and unrealistic they seem. One thing I've learned about Futures and Foresight work is that if we limit ourselves to only a certain set of "realistic" possibilities, we will remain within the confines of what we *think* we are *allowed* to do, which, essentially means we are stuck. To pursue the ridiculous is to pursue the alternatives, the shifts, the change.

I would like to see a future where human beings stop intruding Forest and Water and all more-than-human-beings. I want to see a future where human beings feel comfortable and strong enough to let others be and to design our lives in alignment to Earth rather than separated from it. I genuinely feel that concepts like Forest Sovereignty may help us get to that, and I do not think that I'm the only one that feels this way. All participants I had the opportunity to chat with felt that this was a future they would like to strive for. Was it unrealistic? I asked them. "Yes", they all responded. But in the same breath, they also said "but at least it's something to strive for."

Part 4: REFERENCES

Arrieta, P. M. (2013). Limitations of the Community Forest Agreement as a framework for community foresty in British Columbia. *UBC Open Collections*. https://doi.org/:http://dx.doi.org/10.14288/1.0075564

Baker, A. (2023, August 24). One Man's Quest to Heal the Oceans—And Maybe Save the World. *Time*. https://time.com/6307205/enric-sala-ocean-conservation/

Barkham, P. (2022). Talking to whales: Can AI bridge the chasm between our consciousness and other animals? *The Gaurdian*. https://www.theguardian.com/environment/2022/sep/18/talking-to-whales-with-artificial-enterprise-it-may-soon-be-possible

Blake, E. (2023, June 9). Canadian tourism suffering because of wildfires, smoke. *National Observer*. https://www.nationalobserver.com/2023/06/09/news/canadian-tourism-suffering-wildfires-smoke

Blockdata. (2023, February 8). What Is Regenerative Finance? *Blockdata*. https://www.blockdata.tech/blog/general/what-is-regenerative-finance

Blok, V. (2022). The Ontology of Technology Beyond Anthropocentrism and Determinism: The Role of Technologies in the Constitution of the (post)Anthropocene World. *Foundations of Science*, *28*, 987–1005.

Bolton, M. (2022). A system leverage points approach to governance for sustainable development. *Sustainbility Science*, *17*(6), 2427–2457.

Brady, A. (2023). What Is It Like to Be a Plant? Plants acting with agency, wolf symbolism, therapeutic art, and more books out now. *Scientific American*. https://www.scientificamerican.com/article/what-is-it-like-to-be-a-plant/

Challe, T. (2021, April 22). The Rights of Nature—Can an Ecosystem Bear Legal Rights? *State of the Planet*. https://news.climate.columbia.edu/2021/04/22/rights-of-nature-lawsuits/

Chazdon, R. L., Lindenmayer, D., Guariguata, M. R., Crouzeilles, R., Benayas, J. M. R., & Chavero, E. L. (2020). Fostering natural forest regeneration on former agricultural land through economic and policy interventions. *Environmental Research Letters*. https://doi.org/10.1088/1748-9326/ab79e6

Diehl, S. (n.d.). Web3 is Bullshit. *Stephen Diehl*. https://www.stephendiehl.com/blog/web3-bullshit.html

Diehl, S. (https://www.stephendiehl.com/blog/blockchainism.html). Blockchainism. *Stephen Diehl*.

Dossa, P. A. (1983). Ritual and Daily Life: Transmission and Interpretation of the Ismaili Tradition in Vancouver. *University of British Columbia*. https://open.library.ubc.ca/media/stream/pdf/831/1.0058268/2

Dr. Castleden, H., White, I., & Otoadese, J. (2023). *What We Heard: Perspectives on Climate Change and Public Health in Canada*. Public Health Agency of Canada. https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/state-public-health-canada-2022/what-we-heard-perspectives-climate-change.html#hopes

Edelenbos, J. (2005). Institutional Implications of Interactive Governance: Insights from Dutch Practice. *Blackwell Publishing*, *18*(1), 111–134.

Filotas, E., Parrott, L., Burton, P. J., Chazdon, R. L., Coates, K. D., Coll, L., Haeussler, S., Martin, K., Nocentini, S., Puettmann, K. J., Putz, F. E., Simard, S. W., & Messier, C. (2014). Viewing forests through the lends of complexity science. *Ecosphere*. https://doi.org/10.1890/ES13-00182.1

Force for Good. (2023). *Technology for Secure. Sustainable and Superior Future—Technology as a Force for Good*. https://www.forcegood.org/frontend/img/2023-report/pdf/Technology_as_a_Force_for_Good_Report_2023.pdf

Fortune, L., & Matteis, S. (2023, March 10). Canada, home to a massive boreal forest, lobbied to limit U.S., EU anti-deforestation bills. *CBC News*. https://www.cbc.ca/news/canada/canada-boreal-deforestation-lobbying-1.6773789

Foucault, M. (1991). *The Foucault effect: Studies in governmentality*. University of Chicago Press.

Fusch, P. I., & Ness, L. R. (2015). Are We There Yet? Data Saturation in Qualitative Research. *Walden Faculty and Staff Publications*. https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=1466&context=facpubs

Fuss, Gillian. E., Steenberg, J. W. N., Weber, M. L., Smith, M. A. (Peggy), & Creed, I. F. (2018). Governance as a driver of change in the Canadian boreal zone. *Environmental News*. https://doi.org/10.1139/er-2018-0057

Government of Canada. (2020, June 29). *Canada's forest laws*. https://natural-resources.canada.ca/our-natural-resources/forests/sustainable-forest-management/canadas-forest-laws/17497

Government of Canada. (2023a, May 5). *Indigenous Forestry Initiative*. https://natural-resources.canada.ca/science-and-data/funding-partnerships/funding-opportunities/forest-sector/indigenous-forestry-initiative/13125

Government of Canada. (2023b, July 11). Net-Zero Emissions by 2050. *Government of Canada*. https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/net-zero-emissions-2050.html

G'sell, F., & Martin-Bariteau, F. (2022). *The Impact of Blockchains for Human Rights, Democracy, and the Rule of Law*. Information Society Department. https://rm.coe.int/report-on-blockchains-en/1680a8ffc0

H3Uni. (n.d.). *Three Horizons*. https://www.h3uni.org/tutorial/three-horizons/

Harrison, G. (2022, January 19). Development is capitalist development – violent, coercive and brutal. *African Political Economy*. https://roape.net/2022/01/19/development-is-capitalist-development-violent-coercive-and-brutal/

Hellegren, I. (2016). *Deciphering Cryp-Discourse: Articulations of Internet Freedom in Relation to the State*. ProQuest Dissertations Publishing. https://www.proquest.com/docview/2511165493?parentSessionId=KNMj7Phs2YxHGHf2LXSYtGAiw8vkY3XzMjLma6tvAHU%3D&accountid=15182

Hellegren, I. (2020). Crypto-Discourse, Internet Freedom, and the State. *Oxford Research Encyclopedias*. https://oxfordre.com/communication/view/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-887

Howlett, M. (2009). Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design. *Policy Sciences*, *42*, 73–89. https://doi.org/10.1007/s11077-009-9079-1

Institute on Governance. (n.d.). What is Governance. *Institute on Governance*. https://iog.ca/what-is-governance/

Jabr, F. (2010, July 16). Plants cannot "think and remember," but there's nothing stupid about them: They're shockingly sophisticated. *Scientific American*. https://blogs.scientificamerican.com/observations/plants-cannot-think-and-remember-but-theres-nothing-stupid-about-them-theyre-shockingly-sophisticated/Pla

Jacobs, D., & Utting, B. (2022, April). Forest Governmentality and the Struggle for More-Than-Human Sovereignty. *The Avery Review*. https://www.averyreview.com/issues/56/forest-governmentality-and-the-struggle-for-more-than-human-sovereignty

Kimmerer, R. W. (2021, October 29). Hearing the Language of Trees. *Yes!* https://www.yesmagazine.org/environment/2021/10/29/hearing-the-language-of-trees

Kohn, E. (2013). *How Forests Think: Toward an Anthropology Beyond the Human*. University of California Press.

Ladner, K. L. (2006). Indigenous Governance: Questioning the Status and the Possibilities for Reconciliation with Canada's Commitment to Aboriginal and Treaty Rights. *Natonal Centre for First Nations Governance*. https://fngovernance.org/wp-content/uploads/2020/09/kiera_ladner.pdf

Lagerwall, A. (2015). Jus Cogens. *In Obo in International Law*. https://doi.org/10.1093/obo/9780199796953-0124

Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., Postel, J., Roberts, L. G., & Wolff, S. (2009). A Brief History of the Internet. *ACM SIGCOMM Computer Communication Review*, *39*(5). https://groups.csail.mit.edu/ana/A%20brief%20history%20of%20the%20internet%20-%20p22-leiner.pdf

Lidder, K. (n.d.). *The Local Planning Appeal Tribunal—Shaping Your Community*. https://chandsnider.com/the-local-planning-appeal-tribunal-shaping-your-community/

Lielacher, A. (2018, October 13). Blockchain and the Utopia of a Anarcho-Capitalist Society. *Cryptonews*. https://cryptonews.com/exclusives/blockchain-and-the-utopia-of-a-anarcho-capitalist-society-2763.htm

Light, M. (2020, July). Colonialism, Hegemony, and the Environment. *Climate Just Collective*. https://www.climatejustcollective.co.uk/colonialism-hegemony-and-the-environment

Lindhal, K. B., Sandström, C., & Sténs, A. (2017). Alternative pathways to sustainability? Comparing forest governance models. *Forest Policy and Economics*, *77*, 69–78. https://doi-org.ezproxy.library.yorku.ca/10.1016/j.forpol.2016.10.008

Louw, D., Graham, K., & Franklin, S. (n.d.). Bill C-92 is before the Supreme Court of Canada, where does this leave First Nations? *MNP*. https://www.mnp.ca/en/insights/directory/bill-c92-is-before-the-supreme-court-of-canada-where-does-this-leave-first-nations

Madurai, V. (2018, February 17). Web Evolution from 1.0 to 3.0. *Medium*. https://medium.com/@vivekmadurai/web-evolution-from-1-0-to-3-0-e84f2c06739

Manson, J. (2015). *Relational Nations: Trading and Sharing Ethos for Indigenous Food Sovereignty on Vancouver Island.* University of British Columbia.

McLendon, R. (2012, November 4). 7 examples of animal democracy. *Centre for Biological Diversity*. https://www.biologicaldiversity.org/news/center/articles/2012/mother-nature-network-11-04-2012.html

McNeil, K. (2007). *A Brief History of our Right to Self-Governance—Precontact to Present*. Centre for First Nations Governance. https://fngovernance.org/wp-content/uploads/2020/05/Self-Governance_Right_CFNG.pdf

Meadowcroft, J. (1997). Planning for sustainable development: Insights from the literatures of political science. *European Journal of Political Research*, *31*, 427–454.

Meadowcroft, J. (2007). Who is in Charge here? Governance for Sustainable Development in a Complex World. *Journal of Environmental Policy and Planning*. https://doi.org/10.1080/15239080701631544

Meadows, D. (n.d.). Leverage Points: Places to Intervene in a System. *The Donella Meadows Project: Academic for Systems Change*. https://donellameadows.org/archives/leverage-points-places-to-intervene-in-a-system/

Meadows, D. (1999). Leverage Points: Places to Intervene in a System. *Sustainability Institute*. https://1a0c26.p3cdn2.secureserver.net/wp-content/userfiles/Leverage_Points.pdf

Michel, M. (2023). Indigenous Self-Government and Criminal Law: The Path Towards Concurrent Jurisdiction in Canada. *Dalhousie Law Journal*, *46*(2). https://digitalcommons.schulichlaw.dal.ca/cgi/viewcontent.cgi?article=2210&context=dlj

Nadasdy, P. (2007). The gift in the animal: The ontology of hunting and human–animal sociality. *American Ethnologist*, *34*(1).

Nagrika. (n.d.). Governance as a Concept. *Nagrika*. https://www.nagrika.org/nagrikalarticles/governanceconcept

Natural Resource Canada. (2022). *The State of Canada's Forests Annual Report 2022*. https://natural-resources.canada.ca/sites/nrcan/files/forest/sof2022/SoF_Annual2022_EN_access_(4).pdf

Nelson, H. (2008). Alternative Tenure approaches to achieve sustainable forest management: Lessons for Canada. *Sustainable Forest Management Network*. https://era.library.ualberta.ca/items/0695da45-fb42-4186-8be2-7b8624a34aab/view/95a409a9-9ab8-48b8-9768-a2c3c50599e0/Nelson_Alternative_Tenure_Approaches.pdf

Norquay, G. (2022, November 30). *Canada's Growing Problem with Trust in Government* [Canadian Politics and Public Policy]. https://www.policymagazine.ca/canadas-growing-problem-with-trust-in-government/

Oberhauser, D. (2019). Blockchain for Environmental Governance: Can Smart Contracts Reinforce Payments for Ecosystem Services in Namibia? *Frontiers in Blockchain*, *2*. https://www.frontiersin.org/articles/10.3389/fbloc.2019.00021/full

Open Case Studies. (n.d.). *Progression of Community Forest Agreements in British Columbia Through Social and Political Pathways: A Study on the History of CFAS with Context from a Specific Coastal Case* [The University of British Columbia]. https://cases.open.ubc.ca/progression-of-community-forest-agreements-in-british-columbia-through-social-and-political-pathways-a-study-on-the-history-of-cfas-with-context-from-a-specific-coastal-case/#cite_note-35

Park, G. K. (2020, October 29). Animism. *Encyclopedia Britannica*. https://www.britannica.com/topic/animism

Pentassuglia, G. (2002). State Sovereignty, Minorities, and Self-Determination: A Comprehensive Legal View. *International Journal on Minority and Group Rights*.
Philpott, D. (2020). *Sovereignty* [The Standford Encyclopedia of Philosophy]. https://plato.stanford.edu/entries/sovereignty/

Piper, L. (2007). The emergent practice of governance and its implications for the concept of politics. *South African Journal of Philosophy*, *26*(3), 289–305. https://doi.org/10.4314/sajpem.v26i3.31481

Policy Horizons. (2021, July 29). What is the biodigital convergence? *Policy Horizons Canada*. https://horizons.gc.ca/en/2021/07/29/what-is-the-biodigital-convergence/

Pote, B. (2022, July 2). The 6th planetary boundary is crossed: The freshwater cycle. *BenPote*. https://bonpote.com/en/the-6th-planetary-boundary-is-crossed-the-freshwater-cycle/

Province of Ontario. (2020). *Provincial Policy Statement. Under the Planning Act*. https://www.ontario.ca/page/provincial-policy-statement-2020

Province of Ontario. (2023a). *Environmental Assessment Act*. https://www.ontario.ca/laws/statute/90e18/v17#BK59)

Province of Ontario. (2023b, January 9). *Proposed Changes to the Ontario Heritage Act and its regulations: Bill 23 (Schedule 6)—The Proposed More Homes Built Faster Act, 2022*. https://ero.ontario.ca/notice/019-6196

Province of Ontario. (2023c, March 3). *Crown land management. What Crown land is and how it is managed.* https://www.ontario.ca/page/crown-land-management

Province of Ontario. (2023d, March 3). *Forest management: Cultural heritage*. https://www.ontario.ca/page/forest-management-cultural-heritage

Province of Ontario. (2023e, March 23). *Environmental assessment requirements for forest management on Crown lands in Ontario*. https://www.ontario.ca/page/environmental-assessment-requirements-forest-management-crown-lands-ontario

Rifkin, M. (2017). *Beyond Settler Time Temporal Sovereignty and Indigenous Self-Determination*.

Rodhan, N. A. (2014, February 28). The neurochemistry of power has implications for political change. *The Conversation*. https://theconversation.com/the-neurochemistry-of-power-has-implications-for-political-change-23844

Rotherham, T., & Armson, K. A. (2016). The Evolution of Forest Management in Canada: Management Paradigms and Forest Tenure Systems. *The Forestry Chronicle*, *92*(4). https://doi.org/10.5558/tfc2016-071

Ruddle. (2016). Repackaging colonialism: Good governance, democracy, globalization and cognitive platitudes as assumed basic values in tropical small-scale fisheries development. *TRADITIONAL*. https://www.researchgate.net/publication/301815432_Repackaging_colonialism_Good_governance_democracy_globalization_and_cognitive_platitudes_as_assumed_basic_values_in_tropical_small-scale_fisheries_development

Sala, E., Mayorga, J., Bradley, D., Cabral, R. B., Atwood, T. B., Auber, A., Cheung, W., Costello, C., Ferretti, F., Friedlander, A. M., Gaines, S. D., Garilao, C., Goodell, W., Halpern, B. S., Hinson, A., Kaschner, K., Kenser-Reyes, K., Leprieur, F., McGowan, J., … Lubchenco, J. (2021). Protecting the global ocean for biodiversity, food and climate. *Nature*, *592*(e). https://www.nature.com/articles/s41586-021-03371-z

Seidler, P., Kolling, P., & Hampshire, M. (2016). *Terra0 Can an augmented forest own and utilise itself?* Berlin University of the Arts. https://terra0.org/assets/pdf/terra0_white_paper_2016.pdf

Semenzin, S., Rozas, D., & Hassan, S. (2022). Blockchain-based application at a government level: Disruption or illusion? The case of Estonia. *Policy and Society*, *41*(3), 386–401. https://doi.org/10.1093/polsoc/puac014

Sharpe, B. (2020). *Three Horizons*. Triarchy Press.

Shelton, D. L. (2008). Soft Law. *Routledge Press*.

Shrinkhal, R. (2021). “Indigenous sovereignty” and right to self-determination in international law: A critical appraisal.". *AlterNative: An International Journal of Indigenous Peoples*, *17(1)*, 71-82. https://doi.org/10.1177/1177180121994681

Simard, S. W. (2021). *Finding the Mother Tree*. Penguin UK.

Simchon, A., Brady, W. J., & Bavel, J. J. (2022). Troll and divide: The language of online polarization. *PNAS Nexus*, *1*(1). https://doi.org/10.1093/pnasnexus/pgac019

Sinclair, P. R. (2006). Forest Politics: Contested Issues and Governance in Forest Management for Newfoundland's Great Northern Peninsula. *Newfoundland Studies*. https://journals.lib.unb.ca/index.php/nflds/article/view/10150/10449

Sliwa, K. (2019, June 12). *Bill 108, More Homes, More Choice Act – unpacked*. https://www.dentons.com/en/insights/alerts/2019/june/12/bill-108-more-homes-more-choice-act-unpacked

Smyth, J. H. (1998). The First Nation Forestry Program. *The Forestry Chronicle*, *74*(3). https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc74343-3

Sossin, L., & Wiltenberg, C. van. (2021). The Puzzle of Soft Law. *Osgoode Law Journal*, *58*(3). https://doi.org/10.60082/2817-5069.3713

Souza, M. D. (2021, June 22). Ontario, Alberta get failing grades for conservation efforts. *The Narwhal*. https://thenarwhal.ca/canada-conservation-targets-cpaws-report-card/

Stalker, R. (2021, November 13). Web3 is not Decentralisation—It's a Ploy to put Crypto Bros in Charge. *Medium*. https://medium.com/@rossstalker_5939/web3-is-not-decentralisation-its-a-ploy-to-put-crypto-bros-in-charge-c791752e2bb6

Starblanket, T. (2008). Treaties: Negotiations and rights. *Our Legacy*. https://digital.scaa.sk.ca/ourlegacy/about

The UN. (1966). *United Nations General Assembly*. http://www.worldlii.org/int/other/UNGA/1966/28.pdf

The UN. (2019). *Canada's Forest-related Contributions to Sustainable Development. A Report to UNFF in support of the UN Strategic Plan for Forests 2017-2030 and the Sustainable Development Goals under Review in 2019*. https://www.un.org/esa/forests/wp-content/uploads/2019/05/Canada-good-practices.pdf

Thejaswini, S., & Ranjitha, K. R. (2021). Blockchain for Management of Natural Resources Using Energy Trading as a Platform. *International Conference on Communication, Computing and Electronics Systems*. https://doi.org/10.1007/978-981-33-4909-4_36

Thorn, S., Seibold, S., Leverkus, A. B., Michler, T., Müller, J., Noss, R. F., Stork, N., Vogel, S., & Lindenmayer, D. B. (2020). The living dead: Acknowledging life after tree death to stop forest

degradation. *Frontiers in Ecology and the Environment*, *18*(9), 505–512. https://doi.org/10.1002/fee.2252

Thurton, D. (2023, August 15). Ottawa using 'creative accounting' on its 2 billion tree pledge, environmental watchdog says. *CBC*. https://ici.radio-canada.ca/rci/en/news/2003295/two-billion-trees-environmental-sustainability

Tree That Owns Itself. (2023, July 27). [Wikipedia]. https://en.wikipedia.org/wiki/Tree_That_Owns_Itself

UNESCO. (n.d.). Concept of Governance. *UNESCO - International Bureau of Education*. https://www.ibe.unesco.org/en/geqaf/technical-notes/concept-governance

Wall Street Journal (Director). (2022). *Why Some See Web 3.0 as the Future of the Internet*. https://youtu.be/OEJGQD1OuKA

Walt, V. (2017, April 27). Is This Tiny European Nation a Preview of Our Tech Future? *Fortune*. https://fortune.com/2017/04/27/estonia-digital-life-tech-startups/

Westerlaken, M. (2020). *Imagining Multispecies Worlds*. Malmö University.

Whitman, K., Starfield, A. M., Quadling, H. S., & Packer, C. (2004). Sustainable trophy hunting of African lions. *Nature*, *428*, 175–178. https://www.nature.com/articles/nature02395

Winfield, M. (2023, August 17). Doug Ford's Greenbelt scandal: The beginning of the end of his years in power? *The Conversation*. https://theconversation.com/doug-fords-greenbelt-scandal-the-beginning-of-the-end-of-his-years-in-power-211629

Yarhi, E., & Regehr, T. (2023, August 11). Dominion Lands Act. *The Canadian Encyclopedia*. https://www.thecanadianencyclopedia.ca/en/article/dominion-lands-policy

Zhang, S., & Zang, R. (2021). Tropical forests are vulnerable in terms of functional redundancy. *Biological Conservation*, *262*. https://doi.org/10.1016/j.biocon.2021.109326

Ziai, A., & Schöneberg, J. (2020, August 14). "Development" False promises, questionable term. *D+C Sustainable Development Requires Global Awareness and Action*. https://www.dandc.eu/en/article/term-development-makes-false-promises-and-perpetuates-colonial-dominance-thinking