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Mining versus Indigenous Protected and Conserved Areas: Traditional Land Uses of the Anisininew in Red Sucker Lake First Nation, Manitoba, Canada

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Abstract: Indigenous traditional land uses, including hunting, fishing, sacred activies and land-based education at Red Sucker Lake First Nation (RSLFN) in Manitoba, Canada are impacted by mining. Traditional land use maps and interviews were undertaken with 21 Indigenous people from RSLFN, showing many traditional land uses are concentrated on greenstone belts**.** The interviews revealed that mining exploration has resulted in large petroleum spills, noise distress, personal property destruction, wildlife die-offs and animal population declines, which negatively impact RSLFN's traditional land use practices, ecosystem integrity, and community health. Red Sucker Lake First Nation (RSLFN) people want their territories' land and water protected for traditional uses, culture and ecological integrity. Towards this goal, their Island Lake Tribal Council sought support for an Indigenous-protected and conserved area (IPCA) in their territory outside of existing mining claims, but without success. Governments need to partner with Indigenous nations to reach their biodiversity targets, particularly considering northern Canada's peatlands, including those in Island Lake, surpassing the Amazon forests for carbon storage. Critical minerals and gold's role in renewable energy and geopolitics have colonial governments undermining Indigenous rights, climate stabilization and biodiversity. With extractivism prioritized, the environmental impacts of mining extend to not only the mines but also the extensive development required to facilitate extraction including roads, hydro and ports to ship the minerals with proposals for a national Northern Corridor to run nearby.

Keywords: mining impacts; Indigenous knowledge; traditional land use; land conservation; land-back; *Mino Bimaadiziwin*

1. Introduction

Should pristine Indigenous territory, be reserved for gold mining or Indigenous protected and conserved areas? Indigenous people have protected four-fifths of global biodiversity and a third of old-growth forests, despite making up only one-twentieth (6%) of the world's population [1–3]. This biodiversity concentrated on Indigenous-protected land demonstrates the effectiveness of Indigenous peoples as environmental guardians [2,4]. By observing Indigenous protocols and natural laws, Indigenous peoples' ecosystems have operated within ecological limits for millennia [5,6]. This paper documents the Red Sucker Lake First Nation's (RSLFN) traditional land uses in their Indigenous territory in the Anisininew's Island Lake area of Manitoba, Canada considering the impact of the competing land use of mining.

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Indigenous peoples' role in adapting and mitigating the biodiversity and climate change crises is deemed critical [3,7] for human survival on earth. Permanently passing the "survival target" of 1.5 °C is close at hand with record heat waves, forest fires, droughts, storms and water scarcity in 2023. That year, temperatures averaged 1.48 °C and 1.5°C for 12 consecutive months till February 2024 [8]. If global warming surpasses 1.5 °C, concurrent heatwaves with droughts, compound flooding, and/or fire weather, in many regions is predicted [1]. Climate change and land use changes are the largest extinction threats [9]. Biodiversity loss threatens one million species with extinction, many at risk over the next few decades [3,7]. Nature is on the verge of collapse with 50% biomass reduction and 40% of plants endangered. The United Nations global biodiversity target has each country striving for the ambitious conservation target of 30% by 2030 which cannot be done in Canada without Indigenous people actively protecting Native land [10,11].

Mitigating the root causes of climate change, biodiversity and ecological collapse requires addressing its colonial roots, according to Indigenous people [12]. Colonial power dynamics have shaped climate change and biodiversity loss so that a shift from carbon to renewables will not solve the crisis [12]. Despite an increased renewable electricity share greenhouse gas emissions reached a new record high in 2023 [12]. Colonialism is when a foreign power controls economic, political, social, and cultural over people from the colonized nation [13]. Settler-colonial states largely ended during the national liberation movement era post-World War II but not for Indigenous people in Canada and in several other countries. Indigenous people continue to struggle for self-determination and Native land protection against colonial intrusion, including critical mineral development in RSLFN's ancestral territory [14,15}.

This paper explores the role of self-determination and traditional land uses [16] for biodiversity and conservation in the RSLFN territory, through a two-eyed seeing approach [17–21]. Self-determination, two-eyed seeing, and traditional land uses are explained as the core elements of this paper. Then, we examine if Indigenous protected and conserved areas (IPCAs) can protect biodiversity and traditional land uses [22]. The impacts of mining and other extractive industries [23], including the resource curse brought to First Nation people [23] are explored. The RSLFN's remote location, Anisininew culture and economic hardships are profiled [24]. In the method, the two-eyed-seeing process of how stories and traditional land use are collected, mapped and analyzed is adopted. Interviews and maps reveal the importance of the land and the impacts of mining in the findings. Finally, we analyze the intersection of mining and traditional land uses and what that means for self-determination and biodiversity before concluding.

Indigenous Self-Determination

Both International Covenants on Civil and Political Rights and Economic, Social and Cultural Rights state in Article 1: "All people have the right to self-determination." Self-determination is defined as: "the right to live a particular way of life, to practise a specific culture or religion, to use own languages, and the ability to determine the future course of economic development" [25] (p.1). Indigenous peoples possess the right to define and govern their knowledge, social, economic, ecosystems and cultural systems [5]. The RSLFN people's Anisininew word for a good life, as defined by the creator is *Mino Bimaadiziwin* [6]. Self-determination is a way of life determined by the creator, not one dictated by colonial government [6].

The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) affirms Indigenous peoples' rights to self-determination of their lands, territories, resources, and cultural identity [26]. In 2007, UNDRIP was signed by 144 countries [27]. Three years later, in 2010, UNDRIP was signed by the settler-colonial states of Canada, the United States, Australia, and New Zealand [27]. Specifically, Article 3 of UNDRIP, states: "Indigenous peoples have the right to self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development" [26]. Rather than the United Nations conferring implementation of UNDRIP to Indigenous people,

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problematically UNDRIP's devolution of power is to nation-states. In Canada, the colonial state is tasked with UNDRIP's progress on Indigenous self-determination [28], which conflicts in many ways with national interests.

Free, Prior, and Informed Consent (FPIC) of Indigenous people is affirmed in UNDRIP. UNDRIP reads: "States shall consult and cooperate in good faith with the Indigenous people concerned through their representative institutions to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them" [26]. Consultation with Indigenous people is to occur before development or using resources on Indigenous territory [29,30]. UNDRIP Articles 26-1,2 declares Indigenous people have a right to control their land and resources: "Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired…[and] the right to own, use, develop and control the lands, territories and resources"[26].

Self-determination principles apply to Indigenous research. Research partnerships with Indigenous people and nations must apply self-determination principles in an ethical process. Self-determination requires ownership, control, access, and possession (OCAP) of data and research by the First Nations engaged in the research [31]. Self-determination for Indigenous people, and coexistence, necessitates researching how to shift colonial policies, which benefits from a two-eyed seeing approach [32].

Two-eyed seeing

Two-eyed seeing harnesses the insights of Indigenous and Western ways of knowing in a complementary fashion [16–18]. L'nu Elders Drs. Albert and Murdena Marshall conceived of the two-eyed seeing approach in research to decolonize research and advance the self-determination of First Nation communities [16]. Two-eyed seeing shifts the narrative from subjugating and colonizing Indigenous knowledge to the co-existence and integration of different knowledge [16–18]. Indigenous and Western systems have distinct values, purposes, protocols, methods, data collection and outcomes that offer different insights[16–18].

Western knowledge has long been considered universal knowledge, obliterating other ways of seeing the world [16–18]. Western knowledge has Euro-centric values, and worldviews [33,34]. Western knowledge makes philosophical assumptions guided by theories, power structures and hierarchies. Western science tends towards a narrow view by isolating factors and disciplines [33]. The view is often over a short timeframe [33]. Hill [5] calls Western knowledge "industrial knowledge" with its focus on serving capital accumulation and modernization.

Indigenous knowledge operates within the Indigenous cosmovision that the world is alive and sacred [5]. Indigenous knowledge is learned from stories, language, culture and the land [34,35]. Place-based, experiential knowledge and spirituality are valued and considered a core aspect of Indigenous identity and health [34]. Ecosystem integrity and human well-being are not isolated within different disciplines but are considered inseparable [36]. Through ancient knowledge of their ecosystem, Indigenous land protocols and traditional land uses were aligned to follow natural laws [5]. This ecological knowledge values a stewardship relationship with land and wildlife, rather than an extractivist view [3,5].

Traditional Land Uses

Through traditional land uses, Indigenous people continue to derive many of their basic needs from the land, including food, water, and medicines [2,5,6]. Traditional land uses are undertaken in a sustainable, regenerative way [5,6,32]. Traditional land uses include hunting, gathering, farming, fishing, ceremony, spirituality, education and land stewardship [14,15].

Traditional land uses, such as wildlife harvesting and ceremonies, represent Indigenous spiritual and physical connection with the land. These practices heal trauma and protect biodiversity [6,36]. However, Indigenous land stewardship systems and traditional land uses have been under attack for centuries by colonial policies negatively impacting culture, ecosystem integrity, land access and human health [5].

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Elders blame the skyrocketing rates of addictions and suicides on spiritual and physical disconnection from the land [36].

Land stewardship and other traditional land uses represent Indigenous peoples' cultural identity. From the land, sustenance requires knowledge of traditional foods [6]. Teaching youth about traditional land uses including food harvesting, storage, and processing is typically done within the family [6]. However, this intergenerational knowledge transfer of traditional land use and food was disrupted by the Canadian government taking children away from their families, culture and communities to residential schools [36–38]. At residential schools, Indigenous children were indoctrinated into settler society and often abused [36–41]. Households with adults affected by residential schools have a significantly higher rate of severe food insecurity for the residential school attendees, their children and their grandchildren, with elevated rates of 10%, 9% and 5%, respectively [39,40]. Residential schools are partly blamed for the high prevalence of food insecurity and diminished traditional land use among First Nation people, which is creating a population-level health crisis and cultural genocide [39–41].

The drop in traditional foods is also caused by the lack of access to land. Colonial land uses for settlement and extractive industries conflict with traditional land uses, reducing wildlife [41,42]. The traditional food decline results in First Nation peoples having higher rates of heart disease, obesity, diabetes, cancer, osteoporosis, infections, and tooth decay [41,42]. These negative outcomes of the extractive industry are part of the resource curse that befalls Indigenous communities.

Resource Curse

A resource curse is defined as the largely negative impacts felt by a community proximate to abundant natural resources if extracted by outsiders [23,42]. Also known as the "paradox of plenty", a resource curse occurs when mainly negative impacts are felt by local people from resource extraction [23]. The resource curse most often befalls isolated or remote marginalized communities [42,43]. Isolated and marginalized describes many First Nations in Canada, including RSLFN. However, the racialized legislation of the Indian Act is what makes First Nation communities particularly vulnerable [28]. This racialized law results in inequitable human rights, services and infrastructure. For example, most First Nations lack hospitals with only one hospital in 63 First Nation communities in Manitoba. Further, 122 First Nation communities without all-season access roads [47,48].

The Indian Act makes First Nation communities highly vulnerable to the resource curse [23]. The Indian Act in 1876 made First Nations' people wards of the state, thereby placing Native lands and resources under the Crown's trust laws [28,44]. In this way, the Crown trustee gained legal authority over land, resources and people [28,44]. The Crown permits industrial extraction and settler development on Native land: "Provincial and federal authorization for extraction and development on Indigenous territories take place without Indigenous consent [44] (p.44)".

Resource wealth from Native land does not flow to First Nations people [23,45,46]. Since Canada's confederation, the Crown usurped billions in profits from Native land, timber, energy, gold and other resources [23,45]. For example, the Crown collected $50 million in energy royalties from oil patch activity as the trustee of the Bearspaw First Nation territory in Alberta [45].

Canadian courts limit the power of First Nations to protect or benefit from Native land: "First Nations are radically constrained in negotiations for their rights and by the oppressive socio-economic structures of settler society, where industry interests often drive politics [44] (p.13)". This explains why the fight of First Nation people for the environmental protection of their territory has been a losing battle. First Nations people's injunctions against the Canadian government and corporations were mostly denied, with only 18% granted [44]. Corporation's injunctions against Native peoples are successful at four times higher rates (76%) [44]. For example, in 2019, Coastal GasLink Ltd was granted an injunction against Wet'suwet'en members protesting pipeline construction on their Native land [23]. A 2013 example occurred in the RSLFN territory when the RSLFN chief delivered an eviction notice to the mining company at Monument Bay, but in response, the mine was granted a court injunction, which effectively evicted RSLFN. Despite Monument

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Bay being part of RSLFN's territory, the Manitoba Court of Queen's Bench authorized the mining company to arrest anyone obstructing, trespassing, or creating a nuisance or "engaging in any act which interferes with the operations of the Monument Bay project" [49].

Mining

Mining extracts non-renewable geological resources for industrial purposes. Minerals, particularly critical minerals, are considered essential for modern industrial society for the green and digital economy, which creates strong government support for their development [50–52]. Mining is connected with nation-building and wealth generation[50]. With renewable energies dependent on critical minerals for generation and storage, critical minerals are replacing oil, to define geopolitics [53]. Critical minerals are considered to be the new oil and gas [53].

A rapid global energy system transition to renewable energy from fossil fuels is deemed necessary to prevent catastrophic climate change [52–56]. That demands massive amounts of critical minerals. Critical minerals include tungsten, cobalt, copper, lithium, nickel, and rare earth elements. These critical minerals are required for photovoltaic cells, electric vehicles, batteries, wind turbines, and electrical grid connectivity [57–59].

Mineral demand has skyrocketed with the shift to renewable technologies from fossil fuels. Since 2010, minerals required per new unit of power generation capacity increased on average by 50% as renewable shares grow [54]. Wind farms, electric vehicles (EVs) and solar photovoltaics (PVs) take more minerals to build than their fossil fuel-based counterparts. An EV takes six times more minerals than a conventional energy vehicle and nine times for onshore wind over a gas-fired plant [57,58].

Mining requires massive development to create the necessary infrastructure to operationalize the mine, providing a burst of short-term employment [55,60,61]. Industrial mining projects generally require utility corridors, access roads, transfer stations, site preparation (e.g., draining of lakes), flying skilled workers in, and tailing ponds [62]. For example, to facilitate mining extraction and export in Canada, a northern multi-modal corridor is proposed to transport resources to six ports [63–65]. Industry and the Canadian Senate Committee support the Northern Corridor idea to access greenstone belts in Island Lake and the Ring of Fire as well as oil and potash mines to transport to six ports. Greenstone belts are a geologic term for an ore deposit associated with high concentrations of precious and critical metals. This proposed northern corridor nominal route crosses many greenstone belts and many areas proposed as Indigenous Protected Conservation Areas (IPCA), including in the Island Lake region, near RSLFN. An IPCA was proposed by the Island Lake Tribal Council to protect lands.

Indigenous Protected and Conserved Area (IPCA)

An IPCA designation is described as "lands and waters where Indigenous governments have the primary role in protecting and conserving ecosystems through Indigenous laws, governance and knowledge systems [66] (p.4)". The IPCAs are different than typical state-run parks and conservation initiatives. State-run parks have historically denied Indigenous people a role in land management decisions, resulting in their dispossession and exclusion [10,11,22].

Canada has advanced a colonial narrative about land management and conservation. This narrative disregarded Indigenous knowledge, purporting that traditional land uses harm natural habitats [11] Oppositely, IPCAs, recognize the reciprocal relationships that Indigenous people have with their lands and water[10]. The IPCAs recognize under an Indigenous cosmovision that traditional land uses of harvesting, hunting, ceremony, education, living and sustainable industrial activity are beneficial [10,22]. Thus, IPCAs fulfill Indigenous people's cultural, educational and spiritual purposes as well as Canada's conservation goals. Youth mentored by traditional knowledge keepers are employed as Indigenous Land Guardians to monitor and manage environmental programs, providing jobs, biodiversity protection and knowledge transfer [66,67].

The Intergovernmental Panel on Climate Change (IPCC) found that land rights for Indigenous peoples are vital for biodiversity, land protection and climate mitigation [68]. The IPCC recognized that securing

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Indigenous tenure is highly cost-effective in reducing deforestation and improving land management [68]. Particularly effective are land-titling efforts, "particularly those that authorize and respect indigenous and communal tenure" [68] (p.6), which improves the management of carbon-dense forests.

In Canada, Indigenous-led conservation initiatives have made the biggest advances in protecting land and water [68,70]. The Łutsël K'e Dene First Nation protected 26,376 km^2 in the Northwest Territories called Thaidene Nëné ("land of the ancestors") under Dene laws [68]. Thaidene Nëné is one of the largest protected areas in North America. This IPCA managed by the Dehcho First Nations is a partnership with Canada [68].

Without Indigenous leadership in biodiversity conservation, Canada will fall short of this global UN biodiversity goal. From 2010-2020, Canada achieved 12.2% of land and inland water in protected areas, falling short of its 17% goal [68]. Reaching 25% of protected areas by 2025 requires speeding up the process, to more than double existing protected areas by 2025 [69]. Canada has recognized and turned to IPCAs to fill gaps. In June 2023, Environment and Climate Change Canada funded studies related to 59 Indigenous-led conservation area proposals but only recognized three, across Canada [70]. Many more proposals than the 59 were not funded, including Island Lake Tribal Council which includes Indigenous territory of RSLFN, despite having many at-risk species in an intact ecosystem, with rich peatlands. Indigenous people are wanting to commit to IPCAs and conservation but Canada is reticent. Despite global recognition of the positive role that IPCAs play in biodiversity conservation and climate change, Canada remains slow to commit [3,4,7].

The three established IPCAs are in the boreal forest and have rich peatlands. Peatlands are critical wetlands for mitigating climate change and preserving biodiversity among other ecological roles [70]. Peatlands constitute the largest natural terrestrial carbon store, holding more carbon than all other vegetation types in the world combined and representing up to 44% of all soil carbon [70]. Canada's 25% of the global peatlands store at least five times more carbon than tropical forests for 50 to 100 times longer, at 10,000 years for peat, compared to 100 to 500 years. Canada is the largest reservoir of carbon in peat, with the richest peat stored in the northern boreal forests of Ontario and Manitoba. Canada's peatlands are a priority for protection as damaged peatlands are a major greenhouse gas emitter, responsible for almost 5% of global anthropogenic CO_2 emissions [70].

Red Sucker Lake First Nation Community Profile

Red Sucker Lake First Nation (RSLFN) is one of four Anisininew Island Lake communities in northeast Manitoba. The 953 people living in RSLFN are a young, fast-growing population, with one-third of its population below the age of 15 years [24,71]. The RSLFN community is in the pristine Hayes River Watershed, which is one of two watersheds in Manitoba that flows naturally without water control structures or dams. The RSLFN territory is covered in boreal forests and peatlands [70]. The Canadian Shield is the oldest volcanic mountain range in the world, worn down by time and rich in minerals with many greenstone belts identified in the Island Lake region. Figure 1 shows that RSLFN is located near the Manitoba-Ontario border with many mining claims, including the very large claim at Monument Bay in Manitoba.

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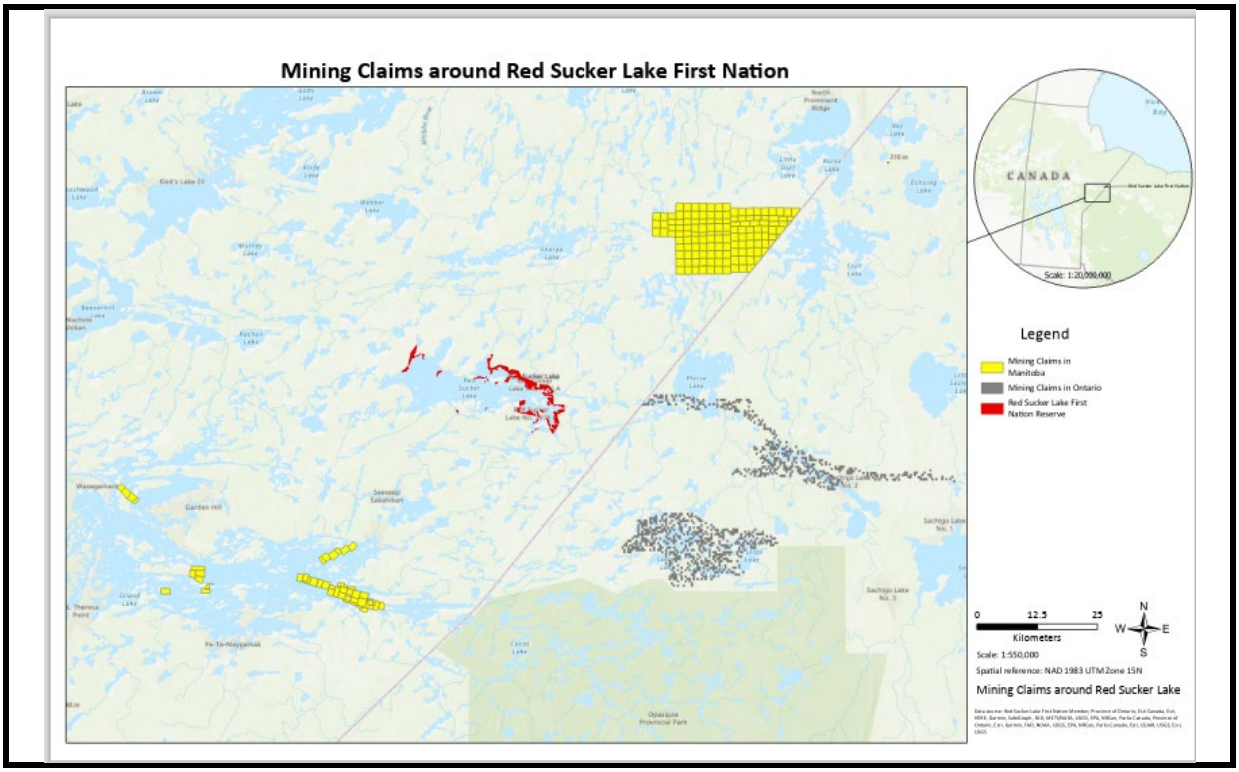

Figure 1. Map showing mining claims within the Red Sucker Lake First Nation traditional territory. **Data Sources**: ESRI Canada, Province of Manitoba, Province of Ontario, 2023.

Red Sucker Lake First Nation is isolated, without any access road to service centres. The community is located 350 air kilometres (km) northeast of Winnipeg and 285 air km southeast of Thompson. The community lacks services, without any hospitals, banks, college or retail options.

The limited infrastructure and services creates regional unemployment and a lack of opportunities. Table 1 shows many depressed indicators that RSLFN has compared to Manitoba and other First Nations, despite having a billion-dollar gold mine on its territory. Table 1 shows the high rates of overcrowding housing with the average household size in RSLFN is 4.4 people compared to 2.5 for the total Manitoba population [71]. Houses are often overcrowded, due to the colonial government's underfunding of First Nation housing. In RSLFN, the education attainment is very low with 5.3% of RSLFN members, over 15 years of age, having a post-secondary degree and 20% graduating from high school [71]. 43.5% of RSLFN people, over 15, have no certificate, diploma, or degree [71], which is seven times lower than for Manitoba. The unemployment rate in RSLFN stands at 23%, which is five times the unemployment rate in Manitoba of 4.6% [71]. Employment rates, at 36%, are roughly half that of Manitoba at 63% [71]. The RSLFN rates are much worse than for the average First Nation in Canada, as well.

Table 1. ***Comparison of Economic and Educational Indicators for Red Sucker Lake First Nation compared to Manitoba and all First Nations in Canada***

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	Manitoba General Population	Red Sucker Lake FN	First Nations In Canada
Average household size (number of people)	2.5	4.4	3.7
Population without formal education (%)	6.8%	43.5%	28.9%
Employment rate (%)	63.1%	35.6%	46.8%
Unemployment rate (%)	4.6%	22.5%	18.0%

Note. Statistics Canada, 2022

2. Materials and Methods

A two-eyed seeing approach applied Indigenous and Western knowledge to the RSLFN case study of traditional land use. In Figure 2, a two-eyed seeing process displays a process to bring Indigenous and Western knowledge together, despite their differences. In this research, Anisininew knowledge keepers, primarily the late Elder Norman Wood, and Bruce Harper, the community coordinator, guided this research. They defined how research would be conducted, following an approved ethical protocol based on the Indigenous community's consent. Bruce Harper served as the community coordinator, translator, researcher and protocol expert, participating in guiding the interviews.

The two-eyed seeing journey began with a request from Norman Wood to Dr. Shirley Thompson to help with traditional land use mapping. Dr. Thompson had worked with Island Lake communities, including RSLFN, on other projects and was able to obtain the matching funding, required by the funder, Yamana Gold Inc. Two-eyed seeing demanded the academic researchers, who were newcomers to Canada, to undertake a large learning curve, having limited experential knowledge of RSLFN land, culture and language.

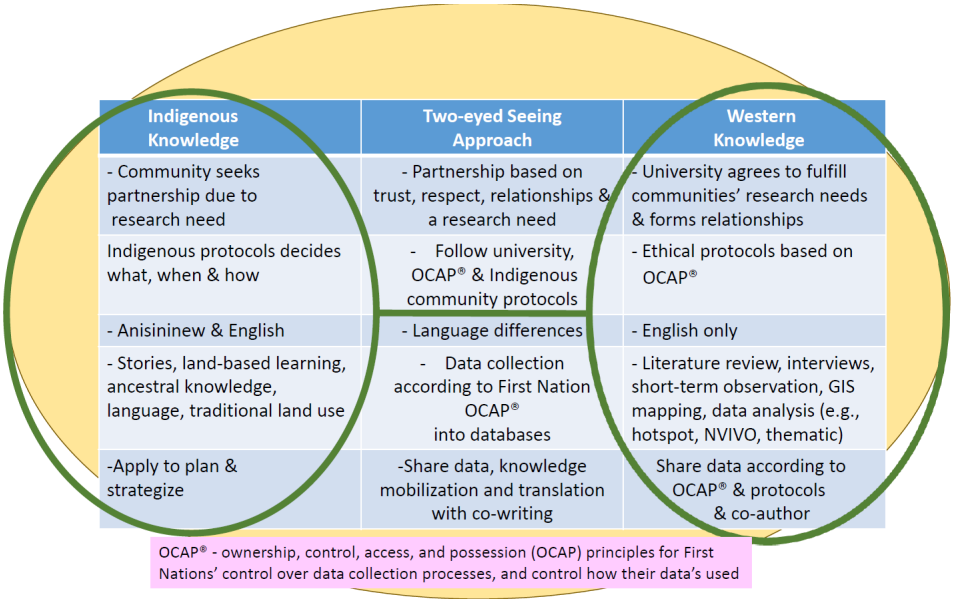

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Figure 2. Two-eyed seeing approach to bring Indigenous and Western views together.

Ownership, control, access, and possession (OCAP) principles were applied. First Nations had control over data collection processes and controlled how their data was applied. The First Nation representatives approved Onyeneke's master thesis content [72], after presentations and receiving the content, which this paper presents. The database with all the information, the Excel data and maps have been on a protected, shared Teams site, accessible by community members and their GIS experts at Maawandoon.

Indigenous knowledge research, specifically traditional ecological knowledge (TEK) interviews and traditional land use mapping was undertaken with RSLFN from September 22nd to 24th, 2023. Thompson, Onyeneke, Harper and Thapa documented the traditional land use interviews with 21 Indigenous people. Each RSLFN participant's shared stories, mapping, and photos provided Indigenous knowledge of the land. This data was recorded on maps and videos or audio tapes, based on the participant's preferences [72–74]. Territorial maps of Manitoba and Ontario at the 1:50,000 scale were used.

Interviewees were asked questions about mapping, hunting, fishing, berry picking, medicinal plant gathering, timber harvesting, community/recreational areas, cultural/sacred sites, and youth training areas. An interview guide and protocol with 64 questions were adopted, as had been approved previously by RSLFN and the Island Lake Tribal Council (ILTC) [15,72]. The interviews were recorded and transcribed. The periods for interviews ranged from one to three hours. The interviewees consisted of 16 males and five females. All participants were adults over 18 years of age, and three were Elders 65 years of age or older. Interviews were coded to provide confidentiality to participants [72].

The Canada Impact Assessment Registry [62] was reviewed on Feb 10th, 2024 to determine potential mining impacts. Assessed sites similar to RSLFN were chosen to review the impacts of mining. These sites considered were those with gold mining in the boreal forest of Northern Canada with nearby Indigenous people.

Western Science

Western science approaches were used to analyze the data. Onyeneke transcribed the audio recordings of the participants' interviews using artificial intelligence (AI) by Otter.ai to generate transcripts, which were corrected by relistening to the audio [72]. NVIVO's description-focused coding method was used with the final transcripts. During the coding process, information related to the research objectives was identified and placed into nodes/containers in NVIVO to categorize these codes into themes and sub-themes [72,75].

Interviewees' land use data were digitized on ArcGIS Pro, applying the North American Datum 1983 (NAD 83) Universal Transverse Mercator (UTM) Zone 15 projection system. We applied the ESRI geographical information system (GIS). A map biography for each interviewee was prepared using shapefiles from the digitized maps [72–74]. Data from all 21 interviews were mapped into thematic maps, hotspot maps, density maps and summary maps [15,72]. The spatial analysis tool calculated aerial distance for different land-use locations [72,76].

We overlapped GIS layers for the traditional land uses with mining greenstone belts and claims layers [72,77,78]. Further, the kernel density formula [72,79] and hotspot function [72,79,80] were applied to land use data and mapped with greenstone belts. The kernel density mapping approach was applied to analyze the density of traditional land uses. The kernel function created regular density areas from all the traditional land use point data in raster form. Mapping [72,81,82] applied the following Kernel function formula:

$$\text{Kernel function } f(x,y) = \frac{1}{nh^2}\sum_{i=1}^{n} K\left(\frac{di}{h}\right)$$

where h is the bandwidth, d_i is the distance of the variable from the center in the bandwidth, k is the kernel density function, and n is the number of observations [72,79,80]

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Optimized hot spot mapping was applied, using the hotspot function to identify whether the distribution of land use spots is random or statistically significant at the 95% level. The null {H_0} and alternative {H_1} hypotheses were:

H_0: The distribution of land use features of the 21 RSLFN members was random.

H_1: The distribution of land use features was statistically significant.

he optimized hot spot analysis uses land use spots, to create a map of statistically significant high TLU and medium TLU spots using the Getis-Ord Gi statistics [72,76,79,80].

3. Results

3.1. Land Use of Red Sucker Lake First Nation Community Members

Many traditional land use activities occur throughout the large RSLFN territory. Land use activities of 21 RSLFN members include bird/egg harvesting, cultural sites, fishing, hunting, overnight stay, plants/wood/earth material harvesting, sacred sites, and trapping. In Figure 3, the summary map biography, all traditional land uses from the 21 interviewed community members' map biographies are compiled. The many land use locations are only a tiny fraction of the entire community's land use sites, being only 21 out of the 953 community members [72]. If more people were interviewed more traditional land use sites (TLUS), covering a wider region, would have resulted as indicated by the 2018 RSLFN study [81]. The 2018 study in RSLFN involved 14 different community members and showed many different lakes with TLUS. Traditional land use areas peculiar to the 2018 study include Namapanis Lake, Moose Lake, Mistune Lake, Sakwasi Lake, Robson Lake, Errin Lake, York River, Mukataysip Lake, and Jeffers Lake. Both studies recorded different TLUS around the same lakes, namely: Kistigan Lake, Pierce Lake, Seeber Lake, Rorke Lake, Sharp Lake, Richardson Lake, Stull Lake, and Lenover Lake [81].

Hunting, fishing and gathering is a way of life for the Anisininew people. The land was described as a source of irreplaceable medicines, food, teachings and healing, by an Elder:

Aside from traditional food, berries, medicine, being out on the land has healing from the problems that we face because of Western or European influence. Being out in the wild brings healing. Healing of the mind, tranquility, if we're getting problems and you recoup, you can build yourself up. Having peaceful scenery.

Indigenous people learn from the land, which requires Indigenous-led land conservation to glean the messages from the creator to sustain their culture and well-being. The land provides both sustenance and traditional teachings that bring wisdom, according to another Elder:

It (The land) provides sustenance. The traditional teachings...work smart, not hard. My grandfather and uncles used to teach us how to do things, how to set snares, how to trap, how to hunt moose. I mean you don't just go to the bush and make some noise to scare everything away. The teachings are in the land.

The land is important to the 21 RSLFN interviewees in diverse ways. Many expressed having a spiritual connection. The land was considered priceless and alive like a baby to be cared for and loved—not to be sold or harmed. An RSLFN member talked about how the creator had given them this land to protect:

Because it was given to me...it was given to my family. Man did not give it to us- God gave it to us. That's why it's important to me. And it's a gift, we can't put price on it...we can't put value on it in terms of money thinking. It's the same thing as you getting a gift. If you get a new baby from your wife, can you sell him- your baby? Can you imagine making a baby so that I can sell it. It's the same thing- it's given to us, not to sell. We have to take care of it. And all the animals. the trees, is not given to us but we are entrusted as caretakers. No man gave it to me, God gave to me- my land, my language, my heritage.

Everyone emphasized the importance of the land for food and other sustenance. One Elder explained that living off the land was the healthiest way to live:

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It's a way of providing sustenance, food…There are no organic materials that are better than the animals that are here.

Another Elder explained how he got all his meat from the land, not the

food store:

I don't really buy any meat from the Northern store because I mostly use wild food. That's the number one important thing.

The TLUS of the 21 RSLFN members encircle lakes and rivers. Figure 3 signal the importance of pristine water for trapping beaver, fishing, water birds and moose for sustenance of the RSLFN people. Cabins on the trapline are always located adjacent to water bodies to haul water for drinking, cooking, and cleaning. Also, lakes and rivers are their primary travel routes, using canoes, motorboats and float planes.

People travel great distances to reach harvesting and cultural sites. Figure 4 shows an aerial map of RSLFN members' travel within their traditional territory for traditional land uses. Aerial distances of 90 km from the reserve were travelled for traditional land use in the 43.65^0 NE direction. Due to the many bends in the river and portages, the distance travelled in canoes or motorboats is much longer.

Without access roads, RSLFN people typically travel to their traditional home by canoe when the rivers and lakes are free from ice. One of the interviewees narrated how canoeing took several days from RSLFN, through Pierce Lake, to Ponask Lake (both in Ontario) and back home with their canoe heavy-laden with harvests:

I remember when we took the boat to Rorke Lake. Oh, from Red Sucker Lake to Pierce Lake to Richardson, Twin Lakes, then to Stall Lake…there's Kistigan River, then to Rorke Lake. That portage is about 6 miles. We took a boat, gasoline, food, guns, and our clothing. It took three days to get to our destination.

The ability of community members to traverse the land in their territory without access roads indicates their deep knowledge of the land. Their long trips to harvest food and visit often required overnight stays. On the land, they would stay in cabins, tents, other camping structures, or under the stars.

Traditional land uses of RSLFN people cross the Ontario border. The spatial distribution of land use sites extends beyond RSLFN's reserve areas, traplines, and provincial boundaries to the North Prominent Ridge. The territory goes into Ontario beyond Monument Bay, and Stull Lake in the north-east direction and beyond Ponask Lake near Sachigo Lake area in the south-east direction. Banksian River runs towards Island Lake in the south-west direction. Figure 4 shows the spatial extent of traditional land uses, going 84 km aerially to Sachigo Lake in Ontario. These measures show the large traditional land use area, with RSLFN harvesting fish "all over" their traditional territory.

3.1.1. Traditional Land Uses Heavily Impacted by Exploration and Mining Activities

Mapping greenstone belts layered with traditional land uses show a lot of overlap. Figure 5 shows overlap of many traditional land uses nearby or on greenstone belts. This proximity or overlap shows a conflict of uses particularly in Manitoba. RSLFN participants described their way of life being impacted, and wildlife negatively effected. Figure 6 shows the distances to the currrent major mining or exploration areas in operation.

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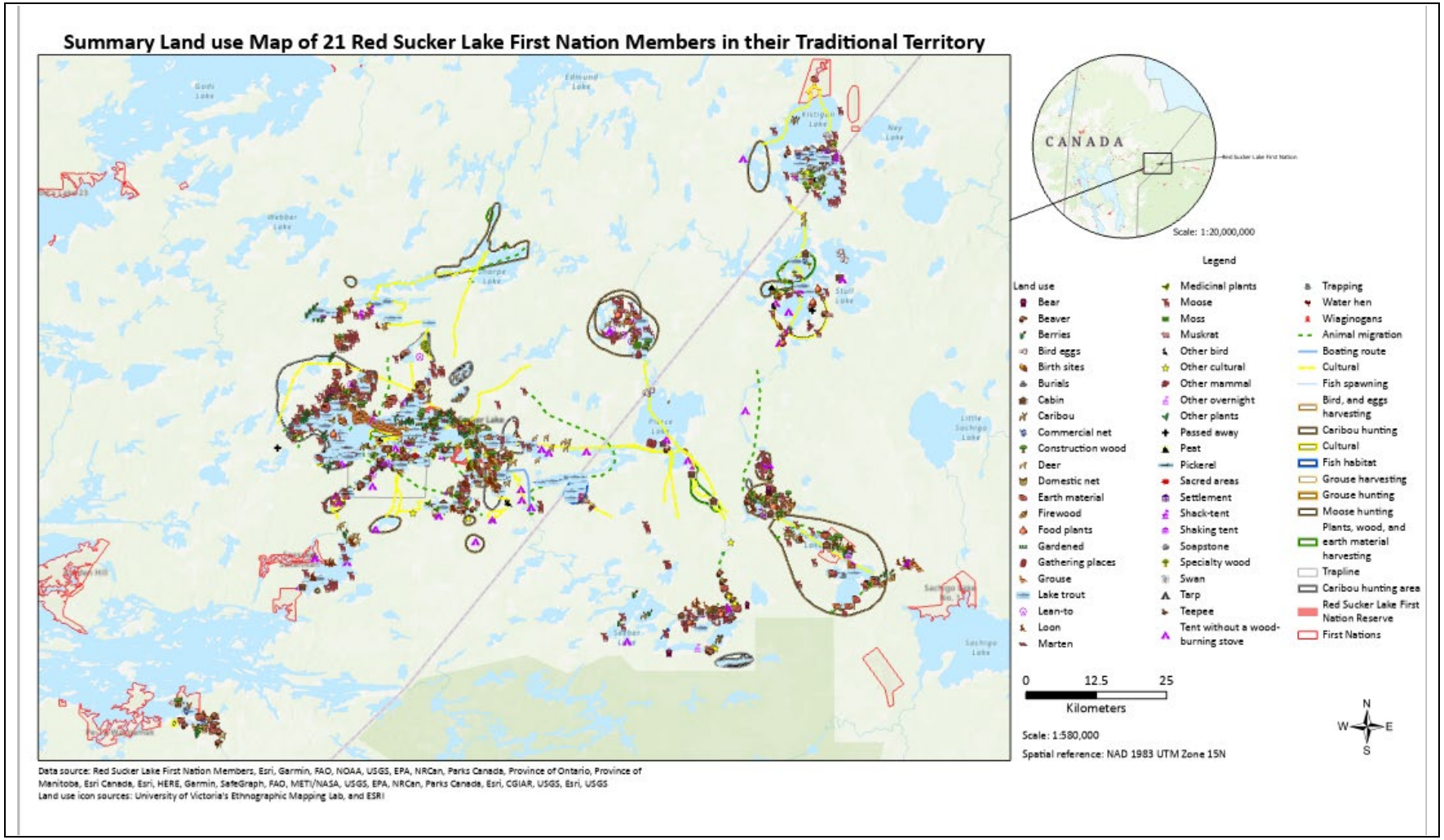

Figure 3. Summary map showing land use activities of 21 Red Sucker Lake First Nation members in their traditional territory.

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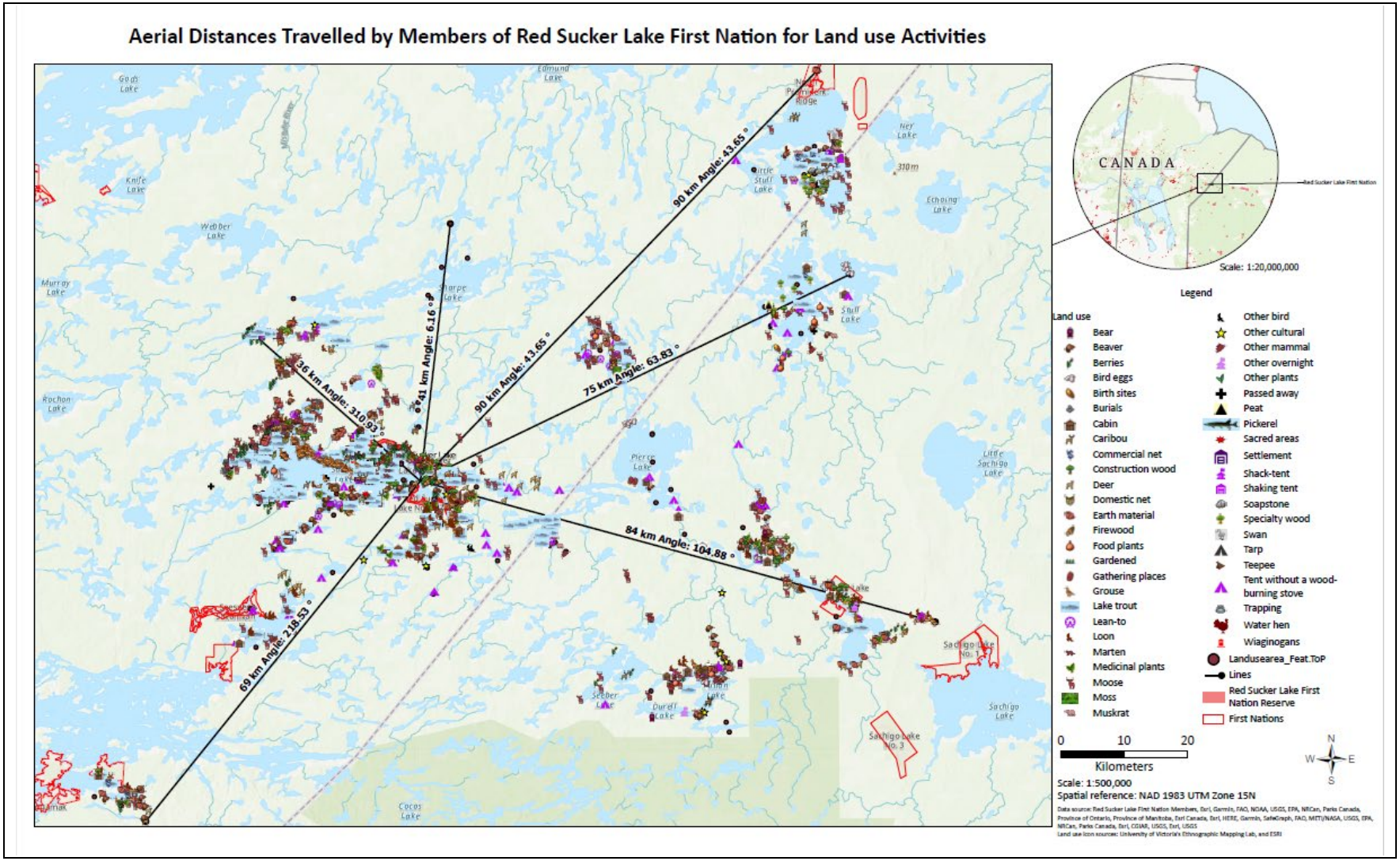

Figure 4. Aerial distances traveled by 21 Red Sucker Lake First Nation members in their traditional territory.

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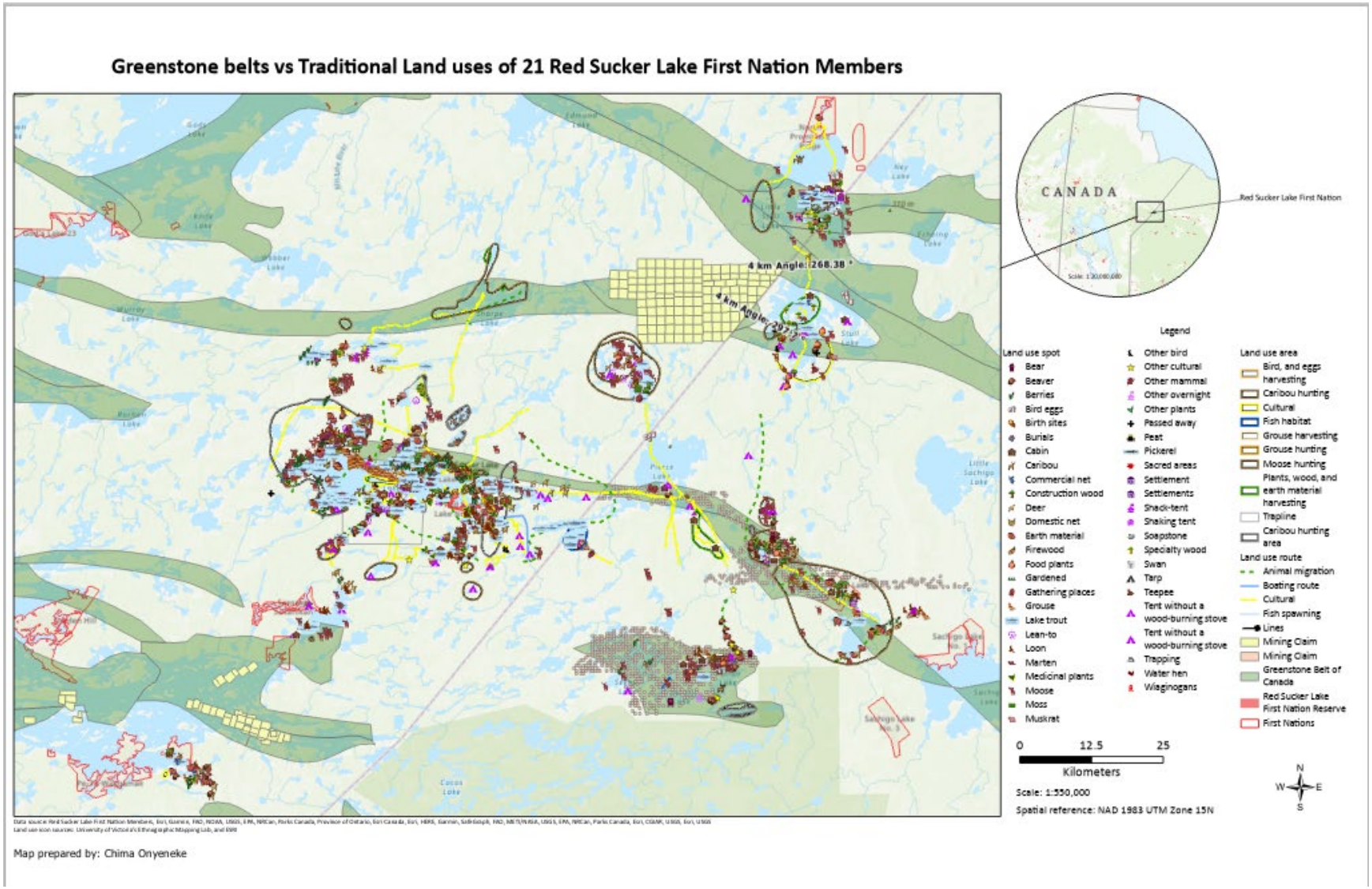

Figure 5. Greenstone belts concentrate traditional land use of 21 Red Sucker Lake First Nation members.

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The RSLFN people reported mining reduces wildlife populatons and undermining wild food procurement. The frequent flights of exploration and mining helicopters and float planes at the RSLFN airport and mining explosives disrupts wildlife behaviour and traditional land uses. People complained about moose and other wildlife being driven away by the constant noise of the helicopters flying back and forth shipping goods, fuel, and people. This affects the availability of traditional food, according to a RSLFN Elder:

So much disturbing the land by this mining. Yamana [now Agnico Eagle], they had choppers going from here to Lingman and Twin Lake. I remember that winter all the moose were coming from the north side heading south. That trail to Pierce Lake, there was a track of moose… They were heading south...away from the sound. I remember last year when they were flying from here to Lingman Lake I don't think they killed nothing there when they went moose hunting. Then at Pierce Lake, Irene's camp, there's been a lot of disturbance from the choppers hauling their equipment for the mining.

Explosives from mining exploration and operations are also disrupting hunting. A community member complained about the large noise and disruption made my mining explosives, which waged war with animals:

There was a lot of prospecting, and they would fly [explosive]materials there. There is a lot of it I've seen, even in the deep-water areas, and the problem is when they're heated. And then explode, they make a loud noise. And that would scare the animals away. And it's just all over.

A male Elder, when asked about the impacts of mining in his community, described the great loss of wildlife due to mining impacts:

So, all that scares away the animals- moose. So, there's not much. There used to be a lot of moose there before. ...The birds too- ducks and geese, and beavers die there on the water. We pull them [the dead carcuses] out of the water because they'll damage the river.

Another respondent opined that mining would result in the land being destroyed and lost:

Well, like if this mine starts up…I know for a fact that we are going to lose the whole area. People are going to come in and destroy...So, it'll be flights in and out. It will be oil, gas. It'll be maybe hydro development.

Talking about the environmental pollution impact of mining on the community, another respondent talked about a spill of oil he discovered and that spills were common:

Yes, and you don't know where they [mining explorers] left maybe gas or other materials and it's leaking out into the land....Animals take that up…. I remember we were hunting...and we checked and there were [gas] barrels there. Rechecked next day, and there's a spill there, needing clean up.

Another RSLFN member shared his experience of diesel from mining contaminating whole areas:

I used to work for a mine. Twin Lake. I do not want any kind of mining or development in this area, because I've seen how they do things. They bring in these big bladders for diesel. They fly in these big bladders and sometimes those bladders are on the ice...these little barriers....it wouldn't contain the spill. It will just contaminate the whole area. One of those bladders ruptured. No, I don't want anything like that around here.

Mining in RSLFN territory is changing intergenerational use of land, and wildlife abundance. The people of RSLFN are impacted by Monument Bay, which is 60 km northeast and Lingman Lake, which is 57 km southeast (Figure 6). Moose used to be abundant but no longer. An Elder described killing his first moose at age 17, compared to his son at age 35. The Elder attributed this difference in the 'first moose kill age' to a decrease in wildlife abundance due to industrial development. As killing a moose in Anisininew culture is a sign of manhood and maturity, these rights of passages are slowing or dying. The interviewees' perspectives concerning land protection priorities were unanimous. All 21 community members wished that their entire traditional lands be protected from all forms of industrial development, which is clearly stated by one RSFLN member saying:

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In future, where my grandchildren, I would like to see a protection of all this- all around Red Sucker. All this territory. Another person said he wanted 'everywhere' in RSL terrritory protected.

RSLFN people's perspectives towards mining varied from person to person, especially between age groups. The Elders unanimously disapproved of mining, concerned about the negative impacts of mining. The youths had mixed views of mining, without awareness of their impact on the land [90]. However, nobody wanted mining on their RSLFN traditional territory. This is summarized by one interviewee saying: "I don't think anybody wants their traditional lands to be disturbed, you know, to be destroyed, or altered in any way".

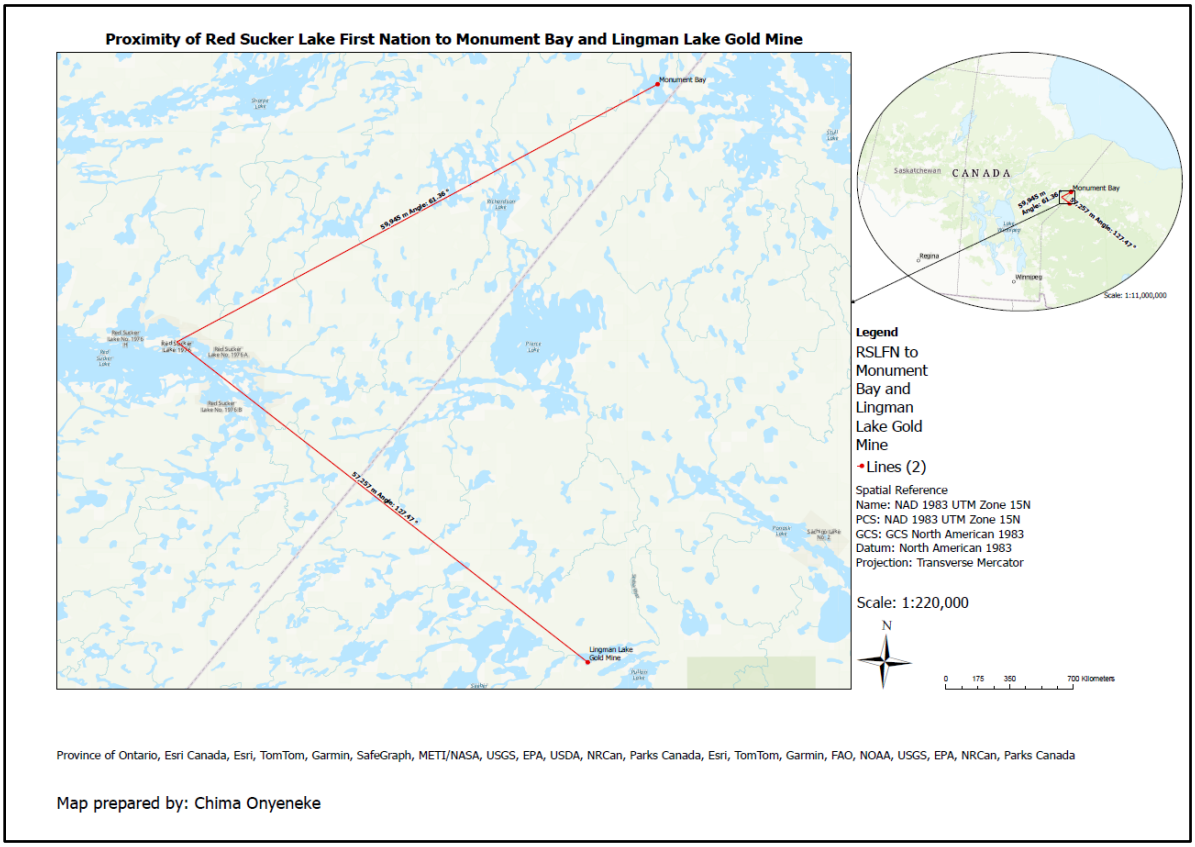

Figure 6. Map showing the proximity of Red Sucker Lake First Nation community to the gold exploration site at Monument Bay (60km away) and the gold mine at Lingman Lake owned by Signature Resources Ltd. (57km away). **Data Source**: ESRI Canada, 2024

3.1.2. Overlap of Traditional LAND use Hotspots and Greenstone Belts

Figure 7 shows that most high density TLUs spots are located on greenstone belts. Figure 7 indicates where land use of the 21 RSLFN members are concentrated relative to greenstone belts. Figure 7 shows highest density regions as yellow to lime green to purple for moderate density. All but one of these medium to high density areas are on greenstone belts. Figure 7 reveals high land use density around Red Sucker Lake, Rorke Lake, Lenover Lake, and Ponask Lake. Land use density around Richardson Lake, Stull Lake, Sachigo Lake, Banksian River, Angling Lake, Seeber River, Pullan Lake, and Durell Lake is moderate density.

The optimized hot spot map in Figure 8 identified statistically significant land use locations on/within greenstone belts. Significance levels with 90%, 95%, and 99% confidence, whether high or medium traditional land use spots, imply non-random land use. Statistically significant clusters of high and low

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incident counts of land uses are identified by lime green output features, while fuchsia pink output features represent medium traditional land use spots.

Figure 9 shows that statistically significant traditional land uses were all on lakes in greenstone belts. These lakes were: Red Sucker Lake (high), Pierce Lake (medium), Stull Lake (medium), Seeber Lake (medium) and Angling Lake (medium). High traditional land use spots were statistically significant for bird/egg harvesting, fishing, hunting, plants/wood/earth materials harvesting, and trapping.

All the land and traditional land use areas are considered to be culturally and environmentally significant. "Not statistically significant" does not mean "not traditionally important or significant". The summary land use map (Figure 3) shows many culturally and traditionally important land uses occur in areas not considered to be significant hotspots. The "not significant" spots refer to incident counts (of land use activities other than travel routes) that are not statistically significant based on False Discovery Rate (FDR) correction for multiple testing and spatial dependence. The small sample size of this research means the traditional land uses do not represent the entire community and miss many hotspots. Also, we cannot be sure the research captured all of the traditional land uses, as community members may withhold information on certain landscapes/land use [83,84]. Documenting the land uses of more community members would have produced higher land use densities and much more statistically significant output clusters, as evidenced by the 2018 TLU study.

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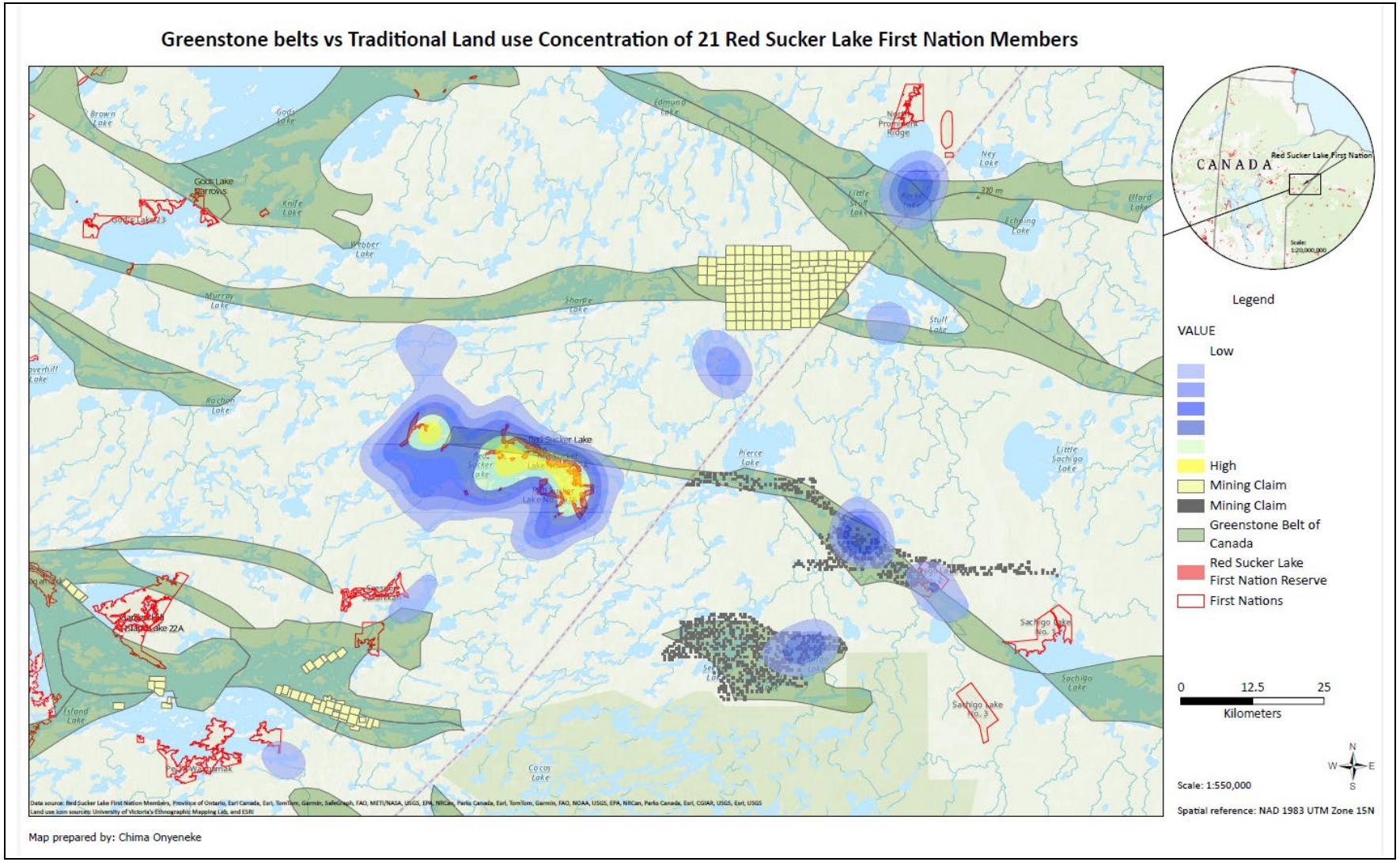

Figure 7. Summary heat map of land uses of 21 Red Sucker Lake First Nation members.

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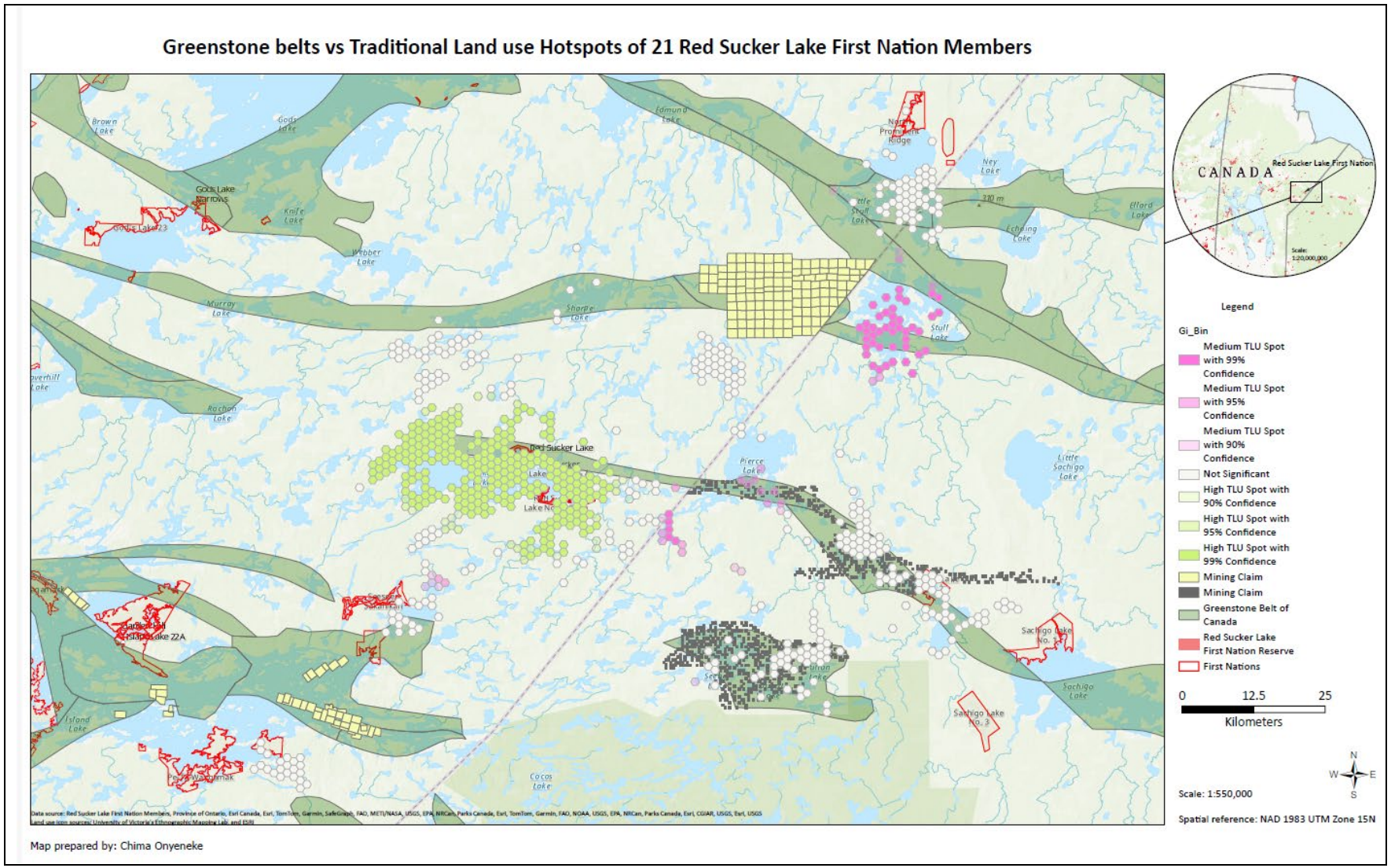

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Figure 8. Traditional land use hotspots of 21 Red Sucker Lake First Nation members on greenstone belts.

Mining versus protection

The RSLFN territory and land uses includes Monument Bay. Monument Bay in Island Lake has a high-grade gold-tungsten, with tungsteen being a critical mineral [59,60]. High-grade gold-tungsten ore at Monument Bay is worth an estimated one billion dollars [59]. The mining claims at Monument Bay are owned by Agnico Eagle Mines Limited (previously Yamana Gold Inc. until 2023), a Canadian-based multinational company. These claims are in a large greenstone belt, with Island Lake containing many greenstone belts. Canadian mineral tenure law and Manitoba's Planning Regulations dictate that mining is the only land use designation possible for greenstone belts [82] and neighbouring land. Even where no mining claims exist, greenstone belt areas and their surrounding lands are deemed ineligible for IPCA funding or protection by Canada's colonial governments.

Referring to the territory of RSLFN's traditional land that he wishes to protect, one of the interviewees simply said- 'everywhere'. Community members also revealed that the duty to consult was not respected by the mining companies, contractors, explorers and colonial governments. According to UNDRIP [27,28], RSLFN community members have the right to free, prior, and informed consent (FPIC) to developmental activities but that right is not being respected, creating conflict and discord [82].

An Elder also commented on prospectors' camps in the RSLFN territory as having many negative impacts. The respondent called prospectors "invasive" as prospectors invade their territory:

Invasive… that's prospecting. We don't like it. It's not appreciated. It [prospecting] is like walking into somebody's house and sitting down... turning on the TV, without permission. This trapline…nobody should be there at all when we are not there unless they ask. They need to get permission first.

When asked if the community was consulted before such prospecting activities, he answered 'no':

No, they don't[ask or consult] but we see those camps. There is supposed to be consultation… But they don't do that.

Mining claims and greenstone belts overlap TLU hotspots at Monument Bay and Lingman Lake overlap. As a result, mining is in direct conflict with RSLFN's traditional activities and the livelihoods of RSLFN people and already created exclusion zones. At Monument Bay, RSLFN Indigenous people have a court injunction keeping them from using this territory. As RSLFN's territory reaches over two provinces with different regulators, the policy implications extend to both provinces and the federal level of the Canadian government. Mining puts RSLFN's traditional land uses, culture and ecosystem integrity at risk.

The RSLFN people want their land unspoiled by industrial developments, including hydro development and mining. The view is that the land is perfect the way the creator made it. The RSLFN people intend to fulfill their sacred role as guardians of the pristine nature of their forests and lakes. Their wish is to create land-based education to teach youth to live on the land while monitoring wildlife abundance, quality of environmental media, and natural cycles.

A review of the Impact Assessment Agency of Canada [62] database listed mining impacts for gold mines near First Nation communities. The many negative environmental impacts of mining provide the potential risks for mining development at RSLFN [62]. Mining impacts watersheds during site preparation and operation with heavy water usage, causing groundwater drawdown and impacting surrounding wetlands. Mining worsens water quality through sediment loading, erosion of suspended solids, acid mine drainage and metal leaching, including leaching of radioactive metals such as uranium. Mining operations use massive equipment that contributes to noise and toxic pollution, which lowers air quality. Potential spills from mining operations pose safety and health challenges to humans and wildlife, altering the availability and acceptability of traditional food [62].

Mining destroys natural habitats [62]. Mining causes environmental pollution, biodiversity loss and decimation of wildlife, including species at risk of extinction [62]. Mining also reduces the

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abundance of valuable species to Indigenous people by destroying habitat, important breeding sites, migration paths and poisoning wildlife [62]. Changes in terrestrial and wetland environments alter landscapes, upset ecosystem dynamics, reduce biodiversity and diminish the abundance of species at all levels of the food web, including species at risk [62].

Mining development and operations negatively impact human health and Indigenous rights in many ways [62]. Mining encroaches on Indigenous rights by curtailing or limiting fishing, hunting, trapping, medicinal plant harvesting, cultural, educational, and economic aspects with the ceremonies and local language aspects [62]. Mining eliminates the availability of nearby freshwater bodies and land for traditional food production and harvesting [62]. Opportunities for Indigenous knowledge sharing and community interactions diminish due to habitat destruction and land use changes from mining-related activities[62]. Mines also result in an increasing loss of traditional food choices. An inability to maintain food sustenance undermines Indigenous food sovereignty and leads to a continual decrease in food security [62]. Mining also creates inequity between genders, by employing mainly settler males, which has resulted in gender violence toward Indigenous women. The benefits of mining projects for Indigenous communities are often conditional, including potential employment, training and some funding to the First Nation, if a negotiated benefit agreement occurs [62].

Mining requires massive supportive infrastructure including rail, roads and reliable energy access, with a big ecological footprint. A proposed multi-modal right-of-way encompassing road, rail, pipelines and transmission lines [63] is proposed that is connected with mining and trade [63–65]. The Canadian Senate Committee on Banking, Trade and Commerce clearly endorses, based on enhancement of commerce and trade, this Northern Corridor as indicated by their title ‘National Corridor Enhancing and Facilitating Commerce and Internal Trade’. The nominal route (Figure 9) follows greenstone belts to facilitate their extraction and export to six different ports. The route is not designed to provide access roads to those 122 First Nation communities lacking access roads, being nearby to only seven First Nations. This route is 25 km from the three Island Lake Anisininew communities (Manitoba) North Spirit Lake and Cat Lake First Nations, which are nearby to greenstone belts and many mining claims.

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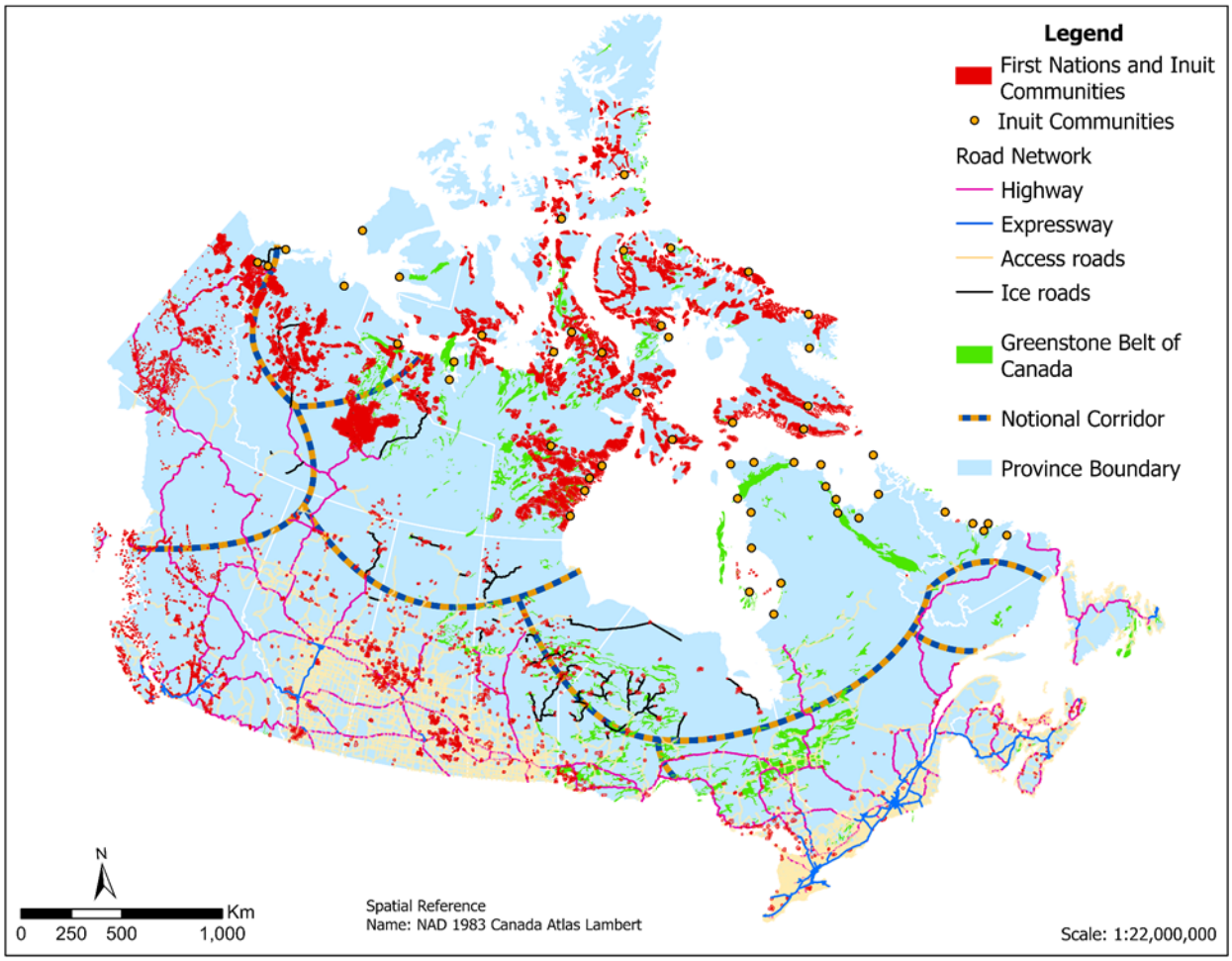

Figure 9. Map showing that the notional northern corridor route is geared toward resource extraction.

Island Lake Tribal Council with RSLFN applied for an IPCA funding application. This area propsed for an IPCA is in Figure 10 marked in green. Their IPCA proposal purposely avoided mining claims to follow the only criteria listed that the land must be free of claims. This IPCA funding application [83] reads:

The Island Lake Anisininew leaders and communities are dedicated to keeping their aki (land) sacred as the Creator made it. We want to protect the Hayes Watershed in the Island Lake region (3 million hectares) but focus this proposal on ecosystem conservation of 500,000 hectares (Figure 10) for preserving our aki, culture, biodiversity, sustainable livelihoods, and threatened species. The overall aim is to protect aki according to Anisininew ways, with Indigenous-led land-based conservation education and protocols. Through this project, the four Island Lake First Nations will educate to protect their traditional territory to sustain the benefits of conservation and traditional land use for future generations.

The IPCA aimed to foster land stewardship by Elders teaching youth the ways of the land, according to their application which states:

Elders and elders-in-training will teach the practice and theory of land guardianship, Anishininew culture, language, respect for aki, traditional protocols, and traditional land uses. The community youth hired will be called land guardians and taught to survive on the land, monitor ecosystems, feed the community, and build permaculture camps to monitor and educate others…. [The teachings] will provide Anishininew worldview programming that considers holistic traditional territory protection to achieve mino bimaadiziwin (the good life) for the present and future generations of Island Lake First Nations.

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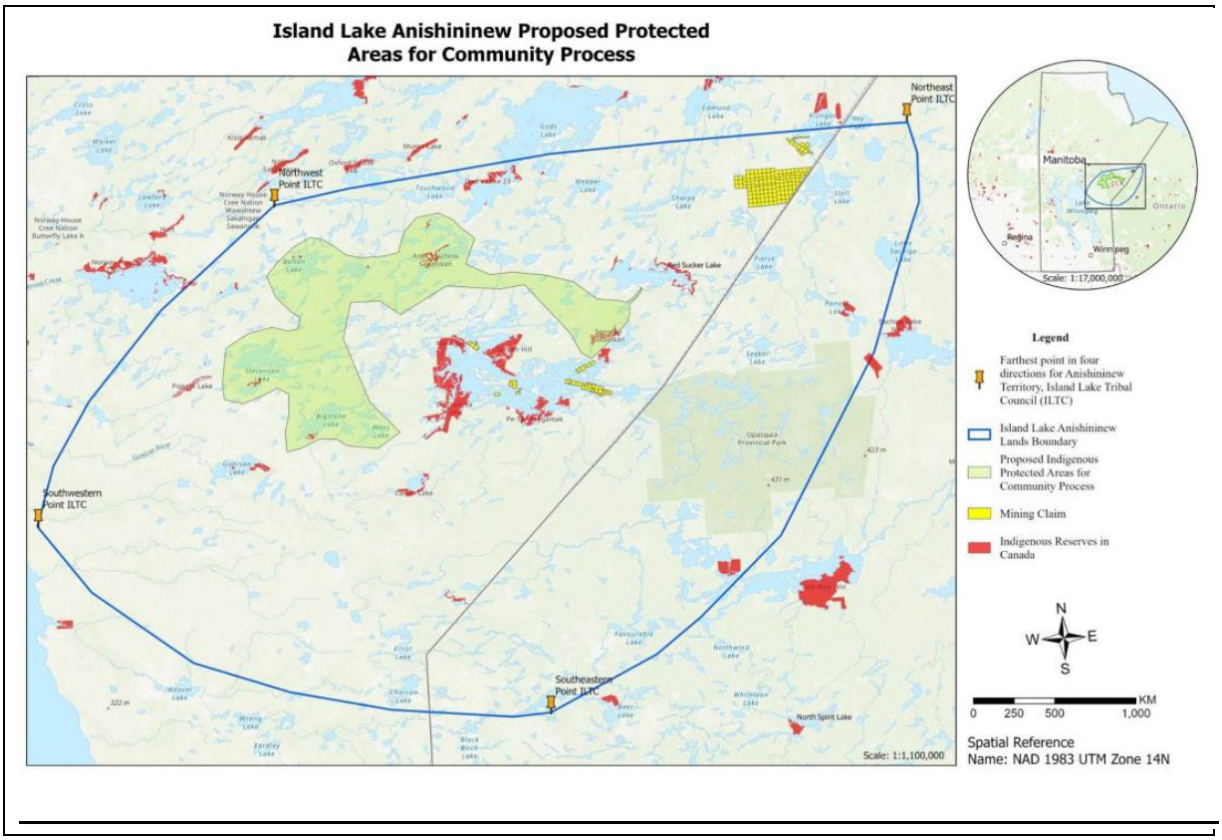

Figure 10. Island Lake's proposed 500,000 hectares protected area for community process.

4. Discussion

Indigenous people in RSLFN and Island Lake want their traditional land uses and land protected. To this end, Island Lake Tribal Council for RSLFN and the other Island Lake communities carefully devised an IPCA area outside of existing mining claims or other incumbrances. Their Indigenous-led land protection approach would prevent biodiversity loss and carbon releases from peatlands [85].

Northern Canada's boreal zone, which includes RSLFN's territory, is the biggest peat storage area in the world. These peatlands require protection to not fuel climate change. Given the pressing issues of climate change and biodiversity loss, this IPCA provides global benefits. Supporting IPCAs for Island Lake and other IPCAs designated by Indigenous governments would advance Canada's target for biodiversity, preserve peatlands, ensure traditional land uses, protect endangered species and restore ecosystem balance [7,86]. More research is required but this Island Lake IPCA appears to meet the requirements for a protected area. However, the RSLFN and Island Lake territory have some IPCAs with critical minerals.

Critical minerals are considered of national importance. Mining, as a result, often trumps other land uses. Although Manitoba and Canada proclaim wanting to conserve biodiversity and peatlands, the Island Lake IPCA was not funded to conduct IPCA research due to mining interests [53]. Regulations dictate that greenstone belts can only be used for mining.

Mining is the polar opposite of an IPCA. Mining creates environmental destruction and obliterates traditional land uses because these are incompatible land uses. The maps show that the greenstone belts near RSLFN overlap with traditional land uses. Most high and medium-density spots were found to be on greenstone belts.

As well as the mine itself, large-scale development of roads and power lines are required. Mining is energy and resource-intensive, requiring large supplies of fossil fuels to melt many metals [53]. Industrial mining also results in mining waste, including process tailings, overburdened waste rock, wastewater and dust [3,62,87].

Many RSLFN complained about mining destroying their livelihoods, wild food supply and traditional land uses [3,62,87]. The RSLFN members tell us about the resource curse they experienced

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during the exploration phase. RSLFN complained about diminished wild game, invasions, intrusions, loss of self-determination including control over Native land and pollution without economic benefits. Large spills and noise impacting wildlife in the exploratory phase foreshadow larger impacts when the mine starts.

Colonial governments support mining, in ways that undermine Indigenous people's self-determination. These colonial governments evicted the RSLFN chief and members from their Native land at Monument Bay and sacked the RSLFN-supported IPCA application, due to mining interests. The Manitoba provincial laws designate greenstone belts for mining purposes only [82]. Manitoba's Land Use Planning Act Regulation 81/2011 dictates that mining comes before all other interests, stating: "the best and only use of greenstone belts is mining" and "greenstone belts . . . must be identified and protected from conflicting surface land uses that could interfere with access to the resources [82] (pp.39-40)". The rich deposits in RSLFN, indicated by greenstone belts, and the Indian Act resulted in a natural resource curse. This resource curse sank their IPCA proposal to safeguard their land for traditional land uses and give their youth jobs as land guardians.

5. Conclusions

A two-eyed seeing approach to research prioritizes Indigenous self-determination. Island Lake Tribal Council and RSLFN proposed IPCAs in their Island Lake and RSLFN territory to protect their land's ecological integrity, cultural uses and their sacred relationship with the land. Island Lake wants to be part of this IPCA movement, having ecological integrity and vast supplies of carbon in boreal forests and peatlands. The IPCA is a way for Canada to meet biodiversity and climate change commitments, through Indigenous traditional ways of environmental stewardship [7,67,89]. Canada's boreal peatlands are considered key for carbon storage and should not be disturbed, and yet will be by mining, with many negative impacts on culture and environment. Most of Island Lake has cultural and ecosystem integrity, with its language and traditions intact in the pristine Hayes watershed. Thus, funding research to show they meet the UN requirements for IPCA is necessary. Except that Island Lake has many greenstone belts.

Existing provincial regulations limit the use of greenstone belts to mining and provide large mining buffer zones. Manitoba's laws state that mining is the best and only "sustainable" use of greenstone belts. This unsustainable land use counteracts Canada's stance as a global leader in the green economy. Mining is counter to the quest for an inclusive, low-carbon, and biodiverse Canada and is a barrier to Island Lakes IPCAs [85,90]. Indigenous planning and self-determination at RSLFN are undermined by these regulations.

Indigenous knowledge from 21 RSLFN members shows that traditional land uses massively overlap with mining claims and greenstone belts. The colonial government's priority for mining on greenstone belts collide with sacred, cultural and livelihood sites in the RSLFN homeland. The rich critical mineral and gold deposits in RSLFN, indicated by greenstone belts, undermined their IPCA proposal to safeguard a portion of their land

Maps and statistics clearly show the overlap of TLUS on greenstone belts in RSLFN's territory. RSLFN members complain about mining's many negative impacts on their TLUS. Mining supplies continuously fly in and out of the RSLFN in helicopters and planes creating frequent noise and disruption without any no-fly zones or times to protect wildlife. Noise from mining-related activities affects moose and other wildlife, thus reducing the availability of traditional food. Mining-related activities and greenstone belts overlapping with traditional land-use sites undermine the sustainability of RSLFN's livelihood. Spills and property damage by contractors and explorers created fear and ongoing tensions. Amidst these adverse impacts of mining activities on the community, RSLFN members are denied meaningful consultation and reasonable economic benefits at the exploration phase for Monument Bay.

Mining impacts are expected to ramp up after the exploration stage, causing more extensive ecosystem damage and impacts to traditional land uses. This onslaught of exploration and mining, with the increased demand for mineral resources, is a heavy burden that is incompatible with traditional land uses and IPCAs. The IEA [52] estimates a six-fold increase in mineral resources (e.g.,

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lithium, graphite, cobalt, etc.) used in 2020 for a global transition to 'net zero' by 2050. Minerals are seen as necessary for the "renewable technology fix".

Increasing global levels of greenhouse gases show that a shift to renewables from fossil fuels, alone, cannot solve these twin crises of climate change and biodiversity. Despite an increased renewable electricity share, greenhouse gas emissions reached record levels in 2023 [53]. Renewables are not replacing fossil fuels but filling further energy demands, due, in part, to energy-intensive mining and renewable production [53]. Climate stabilization and biodiversity require careful planning around renewables and mining to address the resource curse and consider carbon in peatlands and boreal forests. Renewables are part of the solution but so are IPCAs. That most RSLFN people speak Anisininew fluently and engage in traditional land uses in their pristine watershed is rare. For these reasons and others the chosen IPCA land, carefully chosen around existing mining claims needs protection in Island Lake. The IPCAs provide a pathway for self-determination, traditional land uses, climate change mitigation and biodiversity, considering that mining is already heavily impacting their way of life [13]. Two-eyed seeing provides a way for Indigenous knowledge to guide planning for less energy and resource-intensive solutions than only mining, with IPCAs needed to ensure biodiversity and climate mitigation.

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References

1. Indigenous peoples defend Earth's biodiversity—but they're in danger. Available online: https://www.nationalgeographic.com/environment/article/can-indigenous-land-stewardship-protect-biodiversity-(accessed on 23 March 2024).
2. Raygorodetsky, G. Of Swiddens, snakes, and honey. Biodiversity 2018, 19(3-4), 244-247.
3. Vogel, B.; Yumagulova, L.; McBean, G.; Charles Norris, K. A. Indigenous-Led Nature-Based Solutions for the Climate Crisis: Insights from Canada. Sustainability 2022, 14(11), 25-67.
4. IUCN. Journeys to more equitable and effective conservation: the central role of Indigenous peoples and local communities. Available online: https://www.iucn.org/neww/202308/journeys-more-equitable-and-effective-conservation-central-role-indigenous-peoples-and (accessed on 23 March 2024).
5. Hill, S. L. The Autoethnography of an Ininiw from God's Lake, Manitoba, Canada: First Nation Water Governance Flows from Sacred Indigenous Relationships, Responsibilities and Rights to Aski. Doctorate Thesis, University of Manitoba, Winnipeg, Manitoba Canada, 2020.
6. Thompson, S.; Harper, V.; Whiteway, N. Let's keep our Land sacred as the Creator taught us: Wasagamack First Nation Ancestral Land Use. Winnipeg: Manitoba First Nations Education Resource Centre, Manitoba, Canada, 2020; pp. 1-63. Available online: http://ecohealthcircle.com/book-lets-keep-our-land-sacred-as-the-creator-taught-us/ (accessed on 13 July 2022).
7. Webb, J. Indigenous-led conservation in the Amazon: A win-win-win solution. Available online: https://www.amazonfrontlines.org/chronicles/indigenous-conservation-amazon/ (accessed on 22 September 2021).
8. Malcolm M. A deeply troubling discovery: Earth may have already passed the crucial 1.50C warming limit. Available online: https://www.theconversation.com/a-deeply-troubling-discovery-earth-may-have-already-passed-the-crucial-1-5-c-warmking-limit-222601 (accessed on 23 March 2024).
9. Whyte, K. Too late for indigenous climate justice: Ecological and relational tipping points. Wiley Interdisciplinary Reviews: Climate Change 2020, 11(1), e603.
10. Mansuy, N.; Staley, D.; Alook, S.; Parlee, B.; Thomson, A.; Littlechild, D.B.; Munson, M.; Didzena, F. Indigenous protected and conserved areas (IPCAs): Canada's new path forward for biological and cultural conservation and Indigenous well-being. FACETS 2023, 8(): 1-16. https://doi.org/10.1139/facets-2022-0118
11. Nitah, S. Indigenous peoples proven to sustain biodiversity and address climate change: Now it's time to recognize and support this leadership. One Earth 2021, 4. 907-909. 10.1016/j.oneear.2021.06.015.

 doi:10.20944/preprints202404.1458.v1

12. Huseman, J.; Short, D. A slow industrial genocide: tar sands and the indigenous peoples of northern Alberta. The International Journal of Human Rights 2012, 16(1), 216-237.
13. Kohn, M; Reddy, K. Colonialism. In The Stanford Encyclopedia of Philosophy, 8th ed.; Edward, N. Z., Uri N., Eds.; Metaphysics Research Lab, Stanford University, California, United States, 2023. Available online: https://plato.stanford.edu/archives/spr2023/entries/colonialism/
14. Thapa, K.; Thompson, S. Applying Density and Hotspot Analysis for Indigenous Traditional Land Use: Counter-Mapping with Wasagamack First Nation, Manitoba, Canada. Journal of Geoscience and Environment Protection 2020, 8, 285-313. DOI: 10.4236/gep.2020.810019.
15. Thompson, S.; Thapa, K.; Whiteway, N. Sacred Harvest, Sacred Place: Mapping harvesting sites in Wasagamack First Nation. Journal of Agriculture, Food Systems, and Community Development 2019, 9 (1), 1-29. https://doi.org/10.5304/jafscd.2019.09B.017
16. Iwama, M.; Marshall, M.; Marshall, A.; Bartlett, C. Two-eyed seeing and the language of healing in community-based research. Canadian Journal of Native Education 2009, 32(2), 1-6.
17. Martin, D. E.; Thompson, S.; Ballard, M.; Linton, J. Two-eyed seeing in research and its absence in policy: Little Saskatchewan First Nation Elders' experiences of the 2011 flood and forced displacement. The International Indigenous Policy Journal 2017, 8(4), 1-5.
18. Peltier, C. An Application of Two-Eyed Seeing: Indigenous Research Methods with Participatory Action Research. International Journal of Qualitative Methods 2018, 17, 1–12. https://doi.org/10.1177/1609406918812346
19. Kimmer, R. W. Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants. Milkweed Editions, 2013.
20. Kovach, M. Indigenous Methodologies: Characteristics, Conversations, and Contexts. University of Toronto Press: Toronto, Canada, 2009; pp. 2-16.
21. Wilson, S.; Hughes, M. Why Research is Reconciliation. In Research and Reconciliation: Unsettling Ways of Knowing through Indigenous Relationships, S. Wilson, A. V. Breen, & L. DuPre, Eds.; Canadian Scholars: Toronto, Canada, 2019; pp. 5–19.
22. Indigenous Circle of Experts' Report and Recommendation. We Rise Together: Achieving Pathway to Canada Target 1 through the creation of Indigenous Protected and Conserved Areas in the spirit and practice of reconciliation. Available online: https://publications.gc.ca/collections/collection_2018/pc/R62-548-2018-eng.pdf. https://doi.org/10.1139/er-2022-0087 (accessed on 22 November 2023).
23. Thompson, S.; Hill, S.; Salles, A.; Ahmed, T.; Adegun, A.; Nwankwo, U. The Northern Corridor, Food Insecurity and the Resource Curse for Indigenous Communities in Canada. The School of Public Policy Publications 2023, 15(40), pp. 1-44. http://dx.doi.org/DOI-10.11575/sppp.v16i1.76089.
24. Statistics Canada. Census Profile. 2021 Census of Population. Statistics Canada Catalogue no. 98-316-X2021001. Ottawa. Released April 27, 2022. Available online: https://www12.statcan.gc.ca/census (accessed on 11 September 2022).
25. International Covenant on Civil and Political Rights. Available online: https://www.web.archive.org/web/201203030011412/https:/www2.ohchr.org/english/law/ccpr.htm Archived March 3, 2012. (accessed on 09 April 2024).
26. International Covenant on Economic, Social and Cultural Rights. Available online: https://www.web.archive.org/web/20120303114220/https:/www2.ohchr.org/english/law/cescr.htm. Archived March 3, 2012 (accessed on 09 April 2024).
27. United Nations. United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), 2007. Available online: https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf (accessed on 23 March 2024).
28. Indigenous Foundations. UN Declaration on the Rights of Indigenous Peoples. Available online: https://indigenousfoundations.arts.ubc.ca/un_declaration_on_the_rights_of_indigenous_peoples/ (accessed on 10 April 2024).
29. Blacksmith,C.; Thompson, S.; Hill, S.; Thapa, K.; Stormhunter, T. The Indian Act Virus Worsens COVID-19 Outcomes for Canada's Native People. Canadian Yearbook on Human Rights' special issue on COVID-19, 2021. Ottawa: University of Ottawa Centre for Human Rights Press..
30. Fontana, L. B.; Grugel, J. The politics of Indigenous participation through "free prior informed consent": Reflections from the Bolivian case. World Development 2016, 77, 249-261.

 doi:10.20944/preprints202404.1458.v1

31. United Nations for Indigenous people. Free, Prior, and Informed Consent: An Indigenous peoples' right and a good practice for local communities. Available online: https://www.un.org/development/desa/indigenouspeoples/publications/2016/10/free-prior-and-informed-consent-an-indigenous-peoples-right-and-a-good-practice-for-local-communities-fao/ (accessed on 14 October 2023).
32. Schnarch, B. Ownership, control, access, and possession (OCAP) or self-determination applied to research: A critical analysis of contemporary First Nations research and some options for First Nations communities. International Journal of Indigenous Health 2004, 1(1), 80-95.
33. Porter, L.; Barry, J. Planning for Coexistence? Recognizing Indigenous Rights Through Land-Use Planning in Canada and Australia. Routledge, New York, USA, 2016.
34. Mazzocchi, F. Western science and traditional knowledge. EMBO Reports 2006, 7(5), 463–466. https://doi.org/https://doi.org/10.1038/sj.embor.7400693
35. Aikenhead, G. S.; Ogawa, M. Indigenous knowledge and science revisited. Cultural Studies of Science Education 2007, 2(3), 539–620. https://doi.org/10.1007/s11422-007-9067-8
36. McGregor, D. Coming full circle: Indigenous knowledge, environment, and our future. American Indian Quarterly 2004, 28(3/4), 385-410.
37. Lines, L. A.; Jardine, C. G. Connection to the land as a youth-identified social determinant of Indigenous Peoples' health. BMC Public Health 2019, 19(1), 1-13.
38. Marquina-Márquez, A.; Virchez, J.; Ruiz-Callado, R. Postcolonial Healing Landscapes and Mental Health in a Remote Indigenous Community in Subarctic Ontario, Canada. Polar Geography 2016, 39(1), 1-20.
39. Kuhnlein, H.V.; Receveur, O. Dietary Change And Traditional Food Systems Of Indigenous Peoples. Annual Review of Nutrition 1996, 16(1), 417-42.
40. National Report of the First Nations Regional Health Survey. First Nations Information Governance Centre 3(1) (March). https://www.fnigc.ca/wp-content/uploads/2020/09/53b9881f96fc02e9352f7cc8b0914d7a_FNIGC_RHS-Phase-3-Volume-Two_EN_FINAL_Screen.pdf (accessed on 9 April 2024).
41. Chan, L.; Malek, B.; Tonio S.; Tikhonov, C.; Schwartz, H.; Fediuk, K.; Ing, A.; Marushka, L.; Lindhorst, K.; Barwin, L.; Berti, P.; Singh, K.; Receveur, O. FNFNES Final Report for Eight Assembly of First Nations Regions: Draft Comprehensive Technical Report. In Proceedings of the Assembly of First Nations, University of Ottawa, Université de Montréal, Canada, 2019.
42. Chan, L, Malek B; Tonio S., Tikhonov, C.; Schwartz, H.; Fediuk, K.; Ing, A.; Marushka, L.; Lindhorst, K.; Barwin, L.; Berti, P.; Singh, K.; Receveur, O. Corrigendum to the FNFNES Final Report for Eight Assembly of First Nations Regions: Draft Comprehensive Technical Report. November 2021. FNFNES. Available online: https://www.fnfnes.ca/researcher-docs/FNFNES_National_Report_Corrigenda_2021-10-27.pdf (accessed on 28 March 2024).
43. Havranek, T.; Horvath, R.; Zeynalov, A. Natural Resources and Economic Growth: A Meta-Analysis. World Development 2016, 88: 134-51.
44. The Indian Act, "An Act to Amend and Consolidate the Laws Respecting Indians," Ottawa: Government of Canada, 1876, sec 12. Available online: https://nctr.ca/wp-content/uploads/2021/04/1876_Indian_Act_Reduced_Size.pdf (accessed on 29 March 2024).
45. King, H. Land Back: A Yellowhead Institute Red Paper, Yellowhead Institute, 2019, pp. 8-44. Available online: https://redpaper.yellowheadinstitute.org/wp-content/uploads/2019/10/red-paper-report-final.pdf. (accessed on 28 March 2024).
46. Bakx, K. Alberta's Bearspaw First Nation Fighting Federal Government for Right to Manage Own Savings, CBC News. Available online: https://www.cbc.ca/news/canada/calgary/bakx-bearspaw-first-nation-government-savings-1.6117818 (accessed on 27 July 2021).
47. The National Aboriginal Economic Development Board, "Recommendations on First Nations Access to Indian Moneys," 2017, p. 16. Available online: http://www.naedb-cndea.com/reports/recommendations-on-first-nations-access-to-indian-moneys.PDF (accessed on 8 April 2024).
48. Adegun, A.; Thompson, S. Higher COVID-19 rates in Manitoba's First Nations compared to non-First Nations linked to limited infrastructure on reserves. Journal of Rural and Community Development 2021, 16,4.

 doi:10.20944/preprints202404.1458.v1

49. The Free Press: Judge nixes stop work order; miner forges on. Available online: https://www.winnipegfreepress.com/business/2013/07/05/judge-nixes-stop-work-order-miner-forges-on (accessed on 30 March 2024).
50. IPCC. AR6 Synthesis Report: Climate Change 2023; IPCC: Geneva Switzerland, 2023. Available online: https://www.report.ipcc.ch/ar6 syr/pdf/IPCC_AR6_SYR_SPM.pdf (accessed on 3 January 2023).
51. USEPA. Using a Total Environment Framework (Built, Natural, Social Environments) to Assess Life-long Health Effects of Chemical Exposures Request for Applications (RFA); U.S. Environmental Protection Agency: Washington, DC, USA. Available online: https://www.epa.gov/research-grants/using-total-environment-framework-built-natural-social-environments-assess-life (accessed on 13 April 2023).
52. IEA. World Energy Outlook. IEA: Paris, France, 2022. Available online: https://www.iea.blob.core.windows.net/assets/830fe099-5530-48f2-a7c1-11f35d510983/WorldEnergyOutlook2022.pdf (accessed on 3 January 2023).
53. Thompson, S. Strategic Analysis of the Renewable Electricity Transition: Power to the World without Carbon Emissions? Energies 2023. Vol. 16 (17), 6183. https://doi.org/10.3390/en16176183
54. IEA (2021). The Role of Critical Minerals in Clean Energy Transitions, IEA, Paris. Available online: https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions, Licence: CC BY 4.0. (accessed on 8 April 2024).
55. Davies, M.; Swilling, M.; Wlokas, H.L. Towards New Configurations of Urban Energy Governance in South Africa's Renewable Energy Procurement Programme. Energy Res. Soc. Sci. 2018, 36, 61–69. [CrossRef].
56. Viebahn, P.; Soukup, O.; Samadi, S.; Teubler, J.; Wiesen, K.; Ritthoff, M. Assessing the Need for Critical Minerals to Shift the German Energy System Towards a High Proportion of Renewables. Renew. Sustain. Energy Rev. 2015, 49, 655–671. [CrossRef].
57. Seibert, M.K.; Rees, W.E. Through the Eye of a Needle: An Eco-Heterodox Perspective on the Renewable Energy Transition. Energies 2021, 14, 4508. [CrossRef]
58. Michaux, S.P. The Mining of Minerals and the Limits to Growth; Geological Survey of Finland: Espoo, Finland, 2021.
59. Manitoba's mineral industry: Exploration and development highlights 2014. Available online: https://www.gov.mb.ca/iem/industry/exp-dev/highlights2014.html (accessed on 23 March 2024).
60. Tükenmez, M.; Demireli, E. Renewable Energy Policy in Turkey with the New Legal Regulations. Renew. Energy 2012, 39, 1–9. [CrossRef].
61. Ackah, I.; Graham, E. Meeting the Targets of the Paris Agreement: An Analysis of Renewable Energy (RE) Governance Systems in West Africa (WA). Clean Technol. Environ. Policy 2021, 23, 501–507. [CrossRef].
62. Impact Assessment Agency of Canada. Government of Canada. Available online: https://www.canada.ca/en/impact-assessment-agency.html (accessed on 23 March 2024).
63. Sulzenko, A.; Fellows, G.K. Planning for Infrastructure to Realize Canada's Potential: The Corridor Concept. The School of Public Policy Publications 2016, 9(22). https://doi.org/10.11575/sppp.v9i0.42591.
64. Fellows, G. K.; Tombe, T. Gains from Trade for Canada's North: The Case of a Northern Infrastructure Corridor. The School of Public Policy Publications 2016, 10(2). https://doi.org/10.11575/sppp.v11i0.43342.
65. Tombe, T.; Munzur, A.; Fellows, G.K. Implications of an Infrastructure Corridor for Alberta's economy. The School of Public Policy Publications 2021, 14(1). https://doi.org/10.11575/sppp.v14i.70651.
66. Mansuy, N.; Staley, D.; Alook, S.; Parlee, B.; Thomson, A.; Littlechild, D.B.; Munson, M.; Didzena, F. Indigenous protected and conserved areas (IPCAs): Canada's new path forward for biological and cultural conservation and Indigenous well-being. FACETS 2023, 8(): 1-16. https://doi.org/10.1139/facets-2022-0118
67. Nitah, Steve. Indigenous peoples proven to sustain biodiversity and address climate change: Now it's time to recognize and support this leadership. One Earth 2021, 4. 907-909. 10.1016/j.oneear.2021.06.015.
68. IPCC, 2019. Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. Available online: https://www.ipcc.ch/srccl/ (accessed on 2 April 2024).
69. Ginger, G.; Ford, R.; Firelight Group. Implementing Indigenous Protected and Conserved Area Agreements in Canada: A Review of Successes, Challenges, and Realities. Available online: https://makeway.org/wp-content/uploads/2023/05/Firelight-Makeway-IPAs-April-28-2023.pdf (accessed on 2 April 2023).

 doi:10.20944/preprints202404.1458.v1

70. Wildlife Conservation Society Canada. Northern Peatlands in Canada. An Enormous Carbon Storehouse. Available online: https://storymaps.arcgis.com/stories/19d24f59487b46f6a011dba140eddbe7 (accessed on 10 April 2024).
71. Indigenous and Northern Affairs Canada. Red Sucker Lake First Nation Detail. AANDC. https://fnp-ppn.aadnc-aandc.gc.ca/fnp/Main/Search/FNMain.aspx?BAND_NUMBER=300&lang=eng (accessed on 25 February 2024).
72. Onyeneke, C. Mining impact and Indigenous protected and conserved areas. Master's thesis, University of Manitoba, Manitoba Canada, 2023. https://mspace.lib.umanitoba.ca/server/api/core/bitstreams/a15289fe-a9b1-427c-b922-b4c974808d62/content
73. Olson, R.; Hackett, J.; DeRoy, S. Mapping the digital terrain: towards Indigenous geographic information and spatial data quality indicators for indigenous knowledge and traditional land-use data collection. The Cartographic Journal 2016, 53(4), 348-355.
74. Thapa, K. Indigenous land rights and Indigenous land use planning: Exploring the relevance and significance to Wasagamack First Nation, northern Manitoba, Canada. Master's thesis, University of Manitoba, Manitoba Canada, 2018.
75. Blair, Erik. A reflexive exploration of two qualitative data coding techniques. Journal of Methods and Measurement in the Social Sciences 2015, 6 (1) 14-29.
76. Esri Canada. Optimized Hotspot Analysis. Available online: https://www.pro.arcgis.com/en/pro-app/latest/tool-reference/spatial-statistics/optimized-hot-spot-analysis.htm (accessed on 26 February 2023).
77. Ministry of Northern Development and Mines. Available online: https://www.ontario.ca/page/ministry-mines (accessed on 20 May 2023).
78. Integrated Mining and Quarrying System. Available online: https://web33.gov.mb.ca/imaqs/ (accessed on 11 October 2022).
79. Shafabakhsh, G. A.; Famili, A.; Bahadori, M. S. GIS-based spatial analysis of urban traffic accidents: Case study in Mashhad, Iran. Journal of Traffic and Transportation Engineering (English Edition) 2017, 4(3), 290–299. https://doi.org/10.1016/j.jtte.2017.05.005.
80. Grubesic, T. H.; Murray, A. T. Constructing the divide: Spatial disparities in broadband access. Papers in Regional Science 2002, 81, 197-221.
81. Thompson S.; Thapa K. Red Sucker Lake First Nation Ancestral Land Use and Traditional Activities Report. Natural Resources Institute, University of Manitoba, Manitoba Canada. Personal communication, 2018.
82. Manitoba government. Manitoba's Provincial Planning Act (81/2011). Available online: https://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=81/2011 (accessed on 13 July 2023).
83. Island Lake Tribal Council. Indigenous protected Island Lake Region Expression of Interest (EOI) for Indigenous-Led Area-Based Conservation (ILABC), Environment Canada funding application, 2023.
84. Rezende, C. L.; Scarano, F. R.; Assad, E. D.; Joly, C. A.; Metzger, J. P.; Strassburg, B. B. N.; Mittermeier, R. A. From hotspot to hopespot: An opportunity for the Brazilian Atlantic Forest. Perspectives in ecology and conservation 2018, 16(4), 208-214.
85. Huff, A. Indigenous land rights and the new self-determination. Colo. J. Int'l Envtl. L. & Pol'y 2005, 16, 295.
86. Catovsky, S.; Bradford, M. A.; Hector, A. Biodiversity and ecosystem productivity: implications for carbon storage. Oikos 2002, 97(3), 443-448.
87. Zakharchenko, N. V.; Hasanov, S. L.; Yumashev, A. V.; Admakin, O. I.; Lintser, S. A.; Antipina, M. I. Legal Rationale of Biodiversity Regulation as a Basis of Stable Ecological. Journal of Environmental Management & Tourism 2018, 9(3 (27)), 510-523.
88. Wardle, D. A.; Jonsson, M.; Bansal, S.; Bardgett, R. D.; Gundale, M. J.; Metcalfe, D. B. Linking vegetation change, carbon sequestration and biodiversity: insights from island ecosystems in a long-term natural experiment. Journal of Ecology 2012, 100(1), 16-30.
89. MacArthur, J. L.; Hoicka, C. E.; Castleden, H.; Das, R.; Lieu, J. Canada's Green New Deal: Forging the socio-political foundations of climate resilient infrastructure. Energy Research & Social Science 2020, 65, 101442.
90. Hayden, A. When green growth is not enough: Climate change, ecological modernization, and sufficiency. McGill-Queen's Press-MQUP: Ontario, Canada, 201

 doi:10.20944/preprints202404.1458.v1

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