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Tu ʔëhena – "Water is Life": Tracking Changes on Land, Lake, and River Systems in the Northern Saskatchewan Athabasca Region from the Perspectives of Denesuline Peoples

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Abstract
The purpose of this article to share the results of a small scale qualitative study conducted in the Athabasca Region regarding changes that are occurring in the lake and river systems from the perspectives and stories of Denesuline Elders. The results suggest the region is facing ecological stress due to climate change and industrial activity. The study is part of a broader research project in the Mackenzie River Basin spearheaded by the University of

Alberta entitled: *Tracking Change: Local and Traditional Knowledge in Watershed Governance*.

Introduction

Breathtaking morning sun rays streak across the northern skyline with a reverberating arc of crimson red, pink, ending with shades of purple bluish colors that bounce off the stillness and darkness of lake water. As the sun rıses above the horızon, the kindness of the gıver of lıfe warms the cool mornıng aır. This is a new day over Denesuline nęnę homelands. There is a feeling of peace. The smell of earth grounds the human spirit. Looking down from high above, the rivers meander like watery veins providing nourishment and lifeblood to the northern landscape. The birds sing their songs of welcome to all beings. The sound of waves hitting shoreline speak in echoes against the vastness of the land. This is an on-going conversation between water, trees, sand, and pebbles that goes back to the dawn of existence in the Athabasca region. At this time of the morning, one can hear flocks of seagulls, geese, ducks, and loons feasting and singing in harmony with smaller birds that pull the heartstrings of the Denesuline peoples that have lived in this area for thousands of years.

The beauty of the Denesuline (Dene)[1] culture mirrors the beauty of the northern landscape internalized within the deepest ravines of each person. The Dene worldview, knowledge system, language, traditional values, ceremonies, hand drums, songs, tea dances, and seasonal practices are rooted within the land, lakes, and river systems. 'Tu ʔëhena' means 'water is life' and 'life is water' in the Dene language. Wıthout water, life cannot exıst. As authors of this article, all three of us are of Dene heritage. We come from a long line of northern land-based ancestors. We grew up in the north and consider ourselves stewards of our traditional territories. We have a vested interest in research that is conducted on our lands. Research in the past was often conducted without Indigenous[2] involvement. Today it is about research 'with' and 'for' First Nations peoples. All the research participants in this study consented to have their name published within this document. Ethical processes were followed as part of the larger Tracking Change Project.

The ecological diversity of the Athabasca region mirrors the diversity of Dene communities, like boreal forest trees, each with their own shape, color, shade and tone, and joined by roots intertwined in kindness, respect, and interdependence. The waterways of the area have been used a source of survival and as aquatic travel routes as far back as the Elders can remember. Stories are shared in the language, 'dëne yatıé'. When you listen carefully to the words you can hear the sounds of the land 'nı̨h'. The north wind spirit carries the whispers and hearty laughter swirling in circles, teaching, guiding, and passing on complex knowledge to the next generation of young leaders. The pull to the land and water begins early in life. Youth are taught the spiritual

[1] The term Denesuline and Dene are used interchangeably in this article that refer to Indigenous peoples that live in the Athabasca region of northern Saskatchewan.

[2] The term 'Indigenous' is used in this article to refer to the original peoples of Canada who have a long standing geographical occupation of the country stemming back to pre-contact times. The term 'First Nations' refers to Indigenous peoples who are of treaty status under section 35 of the Canadian constitution. 'Denesuline' & 'Dene' are used interchangeably to refer to peoples who occupy the Athabasca region and McKenzie River Basin.

significance of water in the Dene culture. ‘Tu ʔëhena’, water is life. The water spirit must always be revered by all.

Scientists are complementing their research with Indigenous knowledge. The Tracking Change research project featured in this article is focused on tracking changes in waterways from the perspectives of Denesuline peoples in the Athabasca region of northern Saskatchewan (Canada) (See Map in Appendix #1). Western science knowledge and Dene knowledge are two different but complementary types of knowledge systems. The Western science knowledge system is different from Dene epistemologies, methodologies, and pedagogical practices. However, there are also similarities (Tsuji & Ho, 2002). Similarities include the following: Both explain complex systems; both seek to understand the physical world; both are based on observation; both bodies of knowledge change over times; both verify through repetition.

In Dene culture, storytelling is considered a research methodology and a way of passing on and sharing ancestral wisdom. Dene stories collapse time and space. One has to listen carefully. One Elder is like a library with thousands of books, millions of pages, and concepts in the language that are beyond human intelligence crisscrossing back and forth between the natural and spiritual realms. Even though there was a small number of community research participants in this qualitative study, the voices have tremendous value. The concept of ‘community’ ‘dëne haralʔá’ extends to relatives that live in the natural world, the animals, plants, trees, birds, insects, and microscopic species. All of them teach us how to live in balance with the land. Humans represent only one strand within a sea of existence. The Elders say ‘we are the land’ and the land is part of who we are. When the land and water are destroyed, Dene culture is diminished.

Dene Peoples in the Athabasca region share a strong relationship with the land like other Indigenous peoples around the world. They play a pivotal role in environmental research. It is important to involve Elders who are the carriers of the history and culture (Michell, 2011). They have complex knowledge about sustainable ways of thinking and being that goes beyond the contents of this article. Dene cultural way of life includes hunting, trapping, fishing, and gathering. The land provides everything that people need to survive. The land is a classroom, healer, and teacher. Dene Peoples share a history of colonization, displacement, oppression, systemic racism and impacts of Residential Schools where several generations of children were taken away from their families and communities (Michell, 2015; TRC; 2015; Milloy 1999). Culture and language loss have resulted in social and psychological upheaval that is still clearly observable in communities. However, like the red willow that grows on northern shores of lakes and rivers, the people are resilient to the many forces that threaten their families, grasping the barest of rock and earth, they have visions of self-determination and hope for the future. Elders say we must take the youth back to the land in order to heal, re-learn, and re-bond with the earth spiritually, emotionally, physically, and mentally. We must teach them the original instructions of respect for the land and waters that were given by the Creator at the beginning of time.

In a 2011 climate change study conducted by the Jean Marie River First Nation in the North West Territories, Dene Elders predicted long ago there were changes coming to the region as a result of resource extraction activities that include the mining industry, oil, and gas exploration, forestry,

and hydroelectric dams.[3] The people are now witnessing those changes. There are calls for more involvement in the drafting of environmental laws, legislation, and policies based on treaty rights and Indigenous knowledge systems that balance conservation and economic development. The political and legal infrastructure is slow to change in Canada when it comes to equal sharing of land and resources. The Doctrine of Discovery and the legal term 'terra nullius' (empty land) is still a popular tool to justify territorial conquest of Indigenous lands (Watson, 2011). It is entrenched in the fabric of the Canadian legal system. The Doctrine of Discovery was a papal bull introduced by the Catholic Church during colonization. It is international in scope. Land could be legally obtained if it was found to be unused or deemed unoccupied. If it was occupied and if the Indigenous peoples who lived in a particular area refused to be converted to Christianity, they were murdered, and their lands stolen. However, there are Dene place names and stories written all over the northern landscape that speak of long term occupation that stem back to pre-contact times.

Today, the general public is often unaware that the Doctrine of Discovery fuels attitudes of superiority and decisions related to the occupation of Indigenous land and resource extraction activities in Canada. Clearly there is a different relationship with the land between Indigenous peoples and many European settlers. The doctrine is used extensively by successive governments and industrial companies without regard to environmental damage and long term impacts. Boom and bust mining proposals are monetarily attractive in the short term. However, once they deplete resources in an area, they leave behind devastating impacts on the land and waters and in the lives of Indigenous peoples. Environmental assessments and consultation with First Nations is often problematic. At the present time, the impact of global climate change is a big concern in the north. The overall purpose of this article is to share the results of research on the changes occurring in the lakes and rivers in the Athabasca region.[4]

Tracking Change: Local and Traditional Knowledge in Watershed Governance

The Athabasca region is not immune to climate change and environmental threats. The area requires on-going monitoring, documentation, remediation, and adaptation strategies. Prince Albert Grand Council (PAGC) represents First Nations in northern Saskatchewan including Denesuline communities in the Athabasca region. In the summer and fall of 2017, PAGC took part in a large research study entitled: Tracking Change: Local and Traditional Knowledge in Watershed Governance. It is a six-year project funded by the Social Sciences and Humanities Research Council (SSHRCC) led by the University of Alberta, Mackenzie River Basin Board, and the Government of Northwest Territories in collaboration with many other valued Aboriginal organization partners and universities. The opinions of the authors found herein do not necessarily reflect those of SSHRCC or the project. Prince Albert Grand Council (PAGC) in Saskatchewan is one of the participating organization partners. The research in the Athabasca region is significant because health is connected to a healthy environment.

[3] Jean Marie First Nation (NWT). (2011). Impacts to the health and wellness of the Jean Marie First Nation in the face of a changing climate. Final Report prepared for Health Canada – Environmental Health Research Division. Ottawa, Ontario.

[4] Tsannie, J. (2017). Athabasca region tracking change research: Final report. Edmonton, Alberta: University of Alberta. Submitted to Dr. Brenda Parlee – Canada Research Chair by the Prince Albert Grand Council.

The goal of the broader Tracking Change research project is to create opportunities to collaboratively document and share local and traditional knowledge (LTK) about social ecological change in the Mackenzie River Basin and determine its' role in watershed governance. In 2017-18, the Tracking Change research funded 12 community-based projects. The Prince Albert Grand Council was funded to conduct a study in the Athabasca region. The collaborative research activities in the Mackenzie River Basin include the following specific research themes:

1. Historical and contemporary observations and perceptions of conditions and change in the health of the **aquatic environment** (e.g., water quality, quantity, flow, groundwater, permafrost conditions);
2. Historical and contemporary observations and perceptions of conditions and change in **fish species** (population, movements, diversity, invasive species) and other **aquatic species** (e.g., geese, beaver);
3. Sustainability of **fishing livelihoods** (e.g., harvesting levels and practices, diet, health, access issues, perceptions of change in the health of valued fish species);
4. Implications of change for **governance** (e.g., how to maintain healthy relationships to the aquatic ecosystem, maintaining respectful and spiritual relationships, respecting treaty rights).

According to a 2016 Tracking Change Research report[5], the following impacts have been reported by Indigenous peoples in the Mackenzie River Basin:

- There are shifts in the types and health of fish species caught in the rivers and lakes;
- Creeks and smaller rivers are drying up;
- Melting permafrost is resulting in slumping river and lake banks;
- The water is muddier with sediments from the shoreline;
- There are low water levels that inhabit access to traditional hunting and fishing areas;
- Fish have been reported to be smaller;
- There are also new species of fish such as Arctic Char never seen before in northern in-land rivers;
- Grayling and Trout have disappeared in some areas;
- There is concern with high levels of mercury and other contaminants from industrial activity;
- The warmer trend makes the winter ice thinner and treacherous.

These results are similar to the qualitative interview study conducted in the Athabasca region in 2017. However more scientific and Indigenous-based research is needed in other communities in order to obtain a comprehensive portrait of what is occurring.

[5] Parlee, B., & Maloney, E. (Eds). (2016). Tracking Change: Local and Traditional Knowledge in Watershed Governance. Report of Community-based Research Projects in the McKenzie River Basin. University of Alberta: Edmonton, Alberta. www.trackingchange.ca

The Athabasca Region – Northern Saskatchewan

The Athabasca region has ecological importance in northern Saskatchewan. For the purposes of readers in this article, a geographical map is included in this article. The area has a mixture of boreal forest, fresh water lakes, rivers, sandy deposits, rocky terrain, and a thinning tree line to the north. The Athabasca River 'dës nedhe' flows into Lake Athabasca 'tu nedhe'. The river has its source in the Rocky Mountains to the west and flows across Alberta and then into the Peace-Athabasca delta. From the delta it flows into the Athabasca River which is part of the Mackenzie river system. From Lake Athabasca it flows northward via the Slave River to Great Slave Lake, and then up the Mackenzie River which empties into the Arctic Ocean. The river journey is over 4,000 kilometers. Impacts on the river system from industrial activity in the south eventually makes its away north and enters the Arctic Ocean.

The lower part of the Athabasca River to the south plays a key role in the Oil Sands industry. Fort McMurray is located on the river system. It links northward into Lake Athabasca which is the 4th largest lake in Canada with a huge landmass. The length of the lake, east to west is 283 kilometers and the width is 50 kilometers. There is a wilderness protected area called the Athabasca Dunes Ecological Reserve on Lake Athabasca. The region has active sand dunes and habitats for rare plants, fish, fur bearing animals, and migratory waterfowl. It is a beautiful park-like setting that attracts wilderness adventurers and tourists from all over the world. 30% of the lake to the west is located in Alberta with shallow waters, 16 meters deep and increasing in depth toward the east. The following Athabasca Denesuline communities are located on the lake which flows into a river tributary and boreal forest to the east: Camsell Portage, Uranıum Cıty, Fond du Lac, Stony Rapids, Black Lake, and Hatchet Lake.

Tracking Change Research Project in the Athabasca Region

Denesuline Peoples in the Athabasca region are at the front lines of climate change. They offer an alternative perspective on changes that are occurring which complement Western science research. The effects vary across the north. In some areas, the lakes are getting larger and in other areas they are drying up. There is no doubt that fresh water lakes, river systems, and animal habitats in the region are undergoing ecological stress. There are also impacts from the south where there is industrial activity, mining, logging, dams, and petroleum extraction. These activities affect the northern context. For example, the Dene people have followed the caribou migration routes for hundreds of years. Caribou habitats have been disrupted as a result of mining exploration and other types of resource extraction activities. There are concerted efforts to protect the remaining herds. The federal government has listed the Woodland Caribou as 'species at risk' prompting a recovery strategy. According to Dene worldview and belief system, when one aspect of the environment is impacted there is a reverberating domino effect. The land, lakes, rivers, humans, animals, plants, waterfowl, and fish are an interdependent web of life.

On August 18, 2017, a CBC report[6] released the results of a study done by Dr. Bill Shotyk, a soil and water scientist from the University of Alberta. The study found the Oil Sands Industry in Fort McMurray was leaking tailings ponds into the Athabasca River. The tailings ponds contain toxic materials including bitumen, naphthenic acids, cyanide, and heavy metals. Research suggests these contaminants are leaking into groundwater. Other Studies have suggested as much as 11 million litres of tailings water containing substances like benzene, arsenic and cyanide are leaking into the Athabasca River on a daily basis. According to the CBC report, Dale Marshall of Environmental Defense noted a peer reviewed study published in 2014 by government scientists showed elevated concentrations of chemicals in the Athabasca River that matched the chemical fingerprint of tailings ponds. It is evident that the toxic chemicals are ending up in fish-bearing waters which clearly violate the Fisheries Act. The research project in this article is focused on Athabasca region which sends further alarm bells to the general public.

The qualitative data collection conducted in the Athabasca region included two research venues during the months of August and September 2017. The first venue of the research took place in a land-based spiritual gathering hosted by the Lutsel K'e Dene First Nations at Great Slave Lake from August 5th to 11th, 2017. Denesuline Elders, youth, and traditional land users were participants in the gathering. Allan Adam, a co-author of this article was the community researcher involved in the project. He was invited to participate in the spiritual gathering as a preliminary precursor to the actual interviews taking place within the Athabasca region. Spiritual teachings and protocols are the first step in research about land-based knowledge to remind people of their interdependent relationship with the natural world. Water has cultural and spiritual significance in the Dene culture. The people use water for sustenance and healing purposes. There are spiritual places close to water all over the north where gatherings take place. Allan was able to listen to the stories from a diversity of Dene Elders and traditional land users at the Great Slave Lake gathering. Storytelling, ceremonies, and seasonal activities are the main ways of passing on Dene history and culture in families and communities.

The second venue for the research project took place in Black Lake, northern Saskatchewan on September 29 and 30, 2017. It was suggested by the Research Chair of the University of Alberta that interviews be conducted in mid September in the Athabasca region. A small group of Elders and traditional land users were approached to share their stories. Verbal/Oral consent was obtained to record their stories and use their actual names. Their responses to interview questions paint a portrait of changes taking place in the lakes and rivers. Each one of the Elders that were interviewed have lived in the north all their lives. Their vast land-based knowledge and wisdom stretches back in time. The interviews were transcribed from the Denesuline language into English for the purposes of reaching a wider audience. We remind readers translations are always problematic if one is not aware of the Dene worldview and belief system. Careful attention was

[6] CBC Report. The Canadian Press. August, 18, 2017. NAFTA's environmental arm demands Canada explain leaks from the oil sands tailings ponds. http://www.cbc.ca/news/canada/calgary/nafta-canada-oilsands-tailings-leaks-concerns-1.4253487.

paid in providing accuracy of their responses through a continuous feedback loop during the interviews.

According to the interview responses, Denesuline peoples in the Athabasca region have definitely witnessed changes on the land, and freshwater lakes and river systems that impact fish, animals, plants, and habitats similar to other areas in the Mackenzie River Basin. These changes have social, cultural, economic, and political repercussions. The research conducted in the small remote community of Black Lake is only a tip of the iceberg. More studies are needed in other Athabasca communities.

From the broader Tracking Change study results there is a need for on-going research, adaptation strategies, remediation, legislation, and protective laws. Economic development and resource extraction activities on Indigenous lands must involve the 'duty to consult' and 'free and prior informed consent' based on a Supreme Court ruling. Canada has also endorsed the United Declaration on the Rights of Indigenous peoples (United Nations General Assembly, 2017) that recommends conservation and protection of lands and resources. According to the United Nations Declaration on the Rights of Indigenous Peoples, Article 29:

1. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programs for indigenous peoples for such conservation and protection, without discrimination.
2. States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.
3. States shall also take effective measures to ensure, as needed, that programs for monitoring, maintaining and restoring the health of indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented.

Furthermore, the Truth and Reconciliation Commission on Report in Canada (TRC) (Michell, 2017; TRC, 2015) recommends 94 calls to action in order repair relationships with Indigenous peoples. It is about establishing an equal place for Indigenous peoples in the social fabric of the country in the aftermath of colonization and Residential schools. The TRC (2015) reinforces the United Nations Declaration on the Right of Indigenous Peoples when it comes to environmental protection. The research in the Athabasca region is about monitoring and protecting freshwater lakes and rivers. The cost of doing nothing has dire consequences for all Canadians and First Nations.

According to the interview responses in the Athabasca research project (2017), the perspectives and changes in the region include the following:

- Disruption of fish and animal habitats as a result of mining exploration;
- Depletion of certain fish species;
- Noticeable smaller fish;

- Unhealthy and deformed fish;
- Contaminated water toward the west side of Lake Athabasca;
- Mining and uranium tailings seepage;
- The smell of oil in the air;
- High cancer rates among Denesuline peoples;
- Lack of research about the impacts on fish and human health;
- Water level fluctuations due to upstream hydro projects ın Brıtısh Columbıa;
- Increased sediments in water;
- Limited access to traditional hunting and fishing areas;
- Unhealthy drinking water; and
- Impact changes in the north from southern industrial and resource extraction activities.

The next section substantiates the research results and analysis based on quotes from the interview respondents.

Interview Responses and Quotes from Research Interviews

This section includes key quotes from the research participants that substantiate the changes that are occurring in the Athabasca region. The voices of the Elders are organized into themes beginning with their worldview and spiritual relationship they have with the land and waters.

Denesuline Spiritual Relationship with the Land and Waters

Denesuline peoples in the Athabasca region have strong spiritual and cultural ties to the land, lakes, and rivers. Respect is an underlying traditional value that reinforces conservation and sustainable ways of living and being.

Elder Bert Lemaigre from La Loche on the west side of northern Saskatchewan says the teachings of the old people must be passed on from generation to generation:

> Our Elders taught us to respect our lands and what it provides for us, in Dene we say ‘nuhech’alanie’, the life path that all of us walk on. We are taught those ways from a young age and carry on those ways for the rest of our lives. We make sure when we take anything from the land, we do not take it all, we also do not destroy the land so that nothing can live on it. The land is who we are. We come from the land and we go back to the land when our journey here is done, this is the Dene way.

According to 66-year old, Victor Echodh from Black Lake,

> People pay their respects to the water… if it is the first time they are there. That is what the people did long ago. I remember when we traveled up north and people met us the land from Lac Brochet where my grandfather’s relatives came from. Whether it was up north at Selwyn lake or if they came here, we always traveled together on the land. If it was their first time, they gave offerings to the lake,

> tobacco, tea or branches from a tree, anything that was close. Those were ways we respected the lake spirit. Now, I see that being lost, we are not teaching our young people but I still see that we try to still carry on those ways. That is what I see any how. (September 29, 2017)

Denesuline Fishing Practices and Habitats

Denesuline peoples rely on freshwater fish and fish habitats for sustenance including caribou and other animals that occupy the Athabasca region. The following quotes speak to traditional abundance and the changes that are occurring:

> There were all kinds of fish, just down at the lake here by the community, we used to catch all kinds of good fish…trout, pickerel, white fish and more. The old ladies made smoked fish and they would gather berries. Many young people don't live our ways and only rely on store bought foods. They also indulge too much in booze, dope and other things, this is creating problems now. In the old days, we had diapers made of moss for our babies. They liked that, it was healthy. (J. Echodh, September 30, 2017)

> There are different fish now and deformed ones too. I have seen some fish with two heads too and I wonder why that is happening out there on the lake. About four years ago, Jules and myself set a net out on the lake, we caught a small trout and it's back was bent in a weird way and that is the second time I saw strange fish like that from the lake. I have seen changes in my life time on the lake. For example, if you drink water now, some people are getting upset stomach from that now. It does not taste as good anymore. That is what I see now. I have to be honest here, a couple days ago the power went off and we took water from the lake. My wife asked me to get some water in a pail, so I did. I poured some water in a pot for coffee and I did not boil it too much but soon afterwards, I started to have a stomach ache. My wife also drank and she too got sick. So water quality has changed as well. (Mercredi, September 29, 2017)

Changes in Freshwater Quality

The research respondents have major concerns about water quality in the Athabasca region that affect fish, fishing habitats, the ability to harvest for sustenance, and the general health of the people in northern communities. There is need for more scientific research and community-based monitoring.

> Water quality is changing and I can foresee that we will have less water in the future…what we see in Fort McMurray is not good, water is changing because of that. I don't think much good will come out of that development. That's what I see. In my younger days, it never used to be like that. All that stuff is going in the water no wonder the fish are affected by it too. There is stuff in the water, we don't know what it is, imagine, how fish are already dying from that, we don't know that yet. I have heard people from Camsell Portage talk about smelling oil in the air when the

> wind blows from that direction. My friend said that when they travel out in the middle of the lake south of Uranium City, the same smell of oil is there too. Whatever is happening there is affecting us on this lake. There are still lots of fish but we don't know the total effects on the fish, yet, we don't know and we need answers. (Mercredi, September 29, 2017)

> There was a mine near here quite a while ago back in the 1940s. Nisto Mine is near Black lake. The job site was abandoned and left like that, even the company did not own up to it. The job was done on behalf of investors and that was how the mine was developed back then. So after about 20 to 30 years later, people began to talk about their concerns over it. We noticed more people getting sick from cancer and other illnesses here in the community. So all the government people including resources, government, health and other specialists worked with us on it. That was how decommissioning was begun there. Gunnar Mine is a big clean-up project that underway now. (Echodh, September 29, 2017)

Protection of Freshwater Lakes & Rivers

Denesuline peoples demand protection of their traditional territories, freshwater lakes and rivers in the Athabasca region. There is a need to develop awareness of traditional stewardship practices that will inform the development of laws and policies.

50-year old John Baptiste Dantouze from Black Lake states,

> When you look at things today and wonder about what has transpired over the years. My late dad used to talk about what the old people talked about. Take care of the water and prepare and document information about how you must protect the water for future generations. When you listen to the news in the states for example, there is a shortage of water down there and this worries me…water quality is decreasing and they don't respect water. They waste it. Almost all the homes have big swimming pools and when I think about the pipelines being built, I'm beginning to wonder about what the lines will be used for, right now oil has a value but will not be worth much in the future. I worry that they will be making deals to take our water and ship it down those pipelines, I'm sure they are making deals now on those things. Water will be sold all over the place, even in the States. We still have lots of freshwater water here. (Dantouze, September 29, 2017)

> I believe this information is going to be good for the future, we need a strong positon about water, we have all kinds of uranium here, big potential, other metals, soon they will come to mine. We don't want our water to be destroyed. We know pollution will eventually come here. The wind and water movement will affect us in the future. We don't want our water destroyed, we have to watch, we need a strong position. You will need to develop a strong position paper. (Echodh, September 29, 2017)

> "Not much has changed to this day, we still live off the fish from our lakes. Fish samples are always being taken by different people who work with the department of environment, there are monitoring areas located at specific points around here. These include Cree river, Fond du Lac river and by Stony Rapids where the river goes into the big lake. Samples are taken on a periodic basis to see if there are any changes to water etc. two people from each community assist in this and report back to the members about the findings and so forth. From the findings, we have been able to determine that most of the small lakes around Black lake all have good quality fish in them." (Echodh, September 29, 2017)

Conclusion of Final Research Report

The *Tracking Change: Local and Traditional Knowledge in Watershed Governance* Project sheds light on the perspectives of Indigenous peoples whose voices are rarely acknowledged in scientific-based environmental research. Western science and Indigenous Knowledge systems stem from different worldviews, philosophies, and foundations. Although there are differences, there are also similarities (Tsuji & Ho, 2002). Bridging them provides a powerful portrait of the changes that are occurring in the Mackenzie River Basin.

First Nations across Canada and other Indigenous Peoples around the world have long argued the importance of taking better care of the planet. Enormous amount of research has been conducted. However, grassroots perspectives in the Athabasca region about the lakes and rivers systems are limited. Community involvement is the key to understanding the changes that are occurring (Michell, 2013). Dene peoples have much to share about their sacred relationship with the land. This research project addresses the gaps in the literature. It is an opportunity to begin the process of finding out more about the impacts on the northern landscape and waterways from the perspectives of Denesuline Peoples. Land-based education and climate change awareness in the schools is essential for youth who are the next generation of stewards and protectors of the land, lakes, and rivers (Tuck, McKenzie, & McCoy, 2014).

According to Dene Elders the water and river systems in the Mackenzie River Basin are facing ecological disruptions. In this study, the interviewees state there are noticeable water quality issues on the west side of Lake Athabasca. However, there are no fences that divide one part of the lake to the other. The David Suzuki Foundation as well as leading environmental organizations, Indigenous groups, and First Nations communities are calling on Prime Minister Trudeau of the Liberal government to restore protections of lakes and rivers that were stripped by the former Conservative government. First Nations in Saskatchewan including the Prince Albert Grand Council have formally expressed the need for more involvement in the drafting of environmental laws and legislation reviews as part of reconciliation and inherent rights under section 35 of the Canadian constitution.

There are serious environmental and health implications impacted by climate change and industrial activities. Indigenous Peoples are the most vulnerable. To the Denesuline Peoples in the Athabasca region, healthy water conditions equals health and wellness in the communities. Without clean water there is no life. There is a definite need for on-going research and monitoring in communities

that are situated on Lake Athabasca. These include Uranium City, Camsell Portage, Fon du Lac, Stony Rapids, and Hatchet Lake as well as other regions that are under the umbrella of the Prince Albert Grand Council. Developing stewardship plans and articulating Watershed Governance require evidence-based research. Water samples are being conducted in some communities.

Economic development must be balanced with rigorous environmental reviews and conservation ethics from Indigenous perspectives so there is no further damage to the remaining freshwater systems in the Athabasca region. While there is remediation, decommissioning, and clean-up of old mining sites, more work is required that will restore health and ecological balance in the north. Indigenous perspectives are critical when it comes to understanding the impacts. Although more studies are needed, the following is a story that should raise alarm bells for researchers and government officials.

On November 7th, 2017, CBC news[7] reported the University of Ottawa is doing a health study on the effects of a gold mine that is now closed in Yellowknife. The Health Effects Monitoring program is taking samples of toe nail clippings, saliva, and urine samples from Dene Peoples that live in the area. It is a requirement of an environmental assessment that is part of the mine cleanup plan. The goal is to measure the amount of arsenic that has accumulated in people's bodies. The mine released thousands of tons of arsenic trioxide dust into the atmosphere in its 56-year period of operation. The study complements a recent assessment of arsenic contamination in food, water, and soil in the same region. The Dene people state these studies should have been done at the beginning when the mine was starting. Not after the fact.

Water issues connect both Indigenous and non-Indigenous Peoples across Canada. Joint protests are becoming more common. Western science teaches that humans are made of water. To the Denesuline Peoples water is sacred. We all come from water inside the womb of our mothers. Women are the first teachers of the natural world. We all hear the drum beat for nine months which represents the rhythm and balance of the earth. The Dene hand drum is made from Caribou hide and sinew with links to water, fire, air, and earth. When you listen carefully to the beat, it is like the sound of a thousand caribou walking in unison across the tundra. So it must be with protecting all water sources that all Canadians and First Nations depend on for life purposes.

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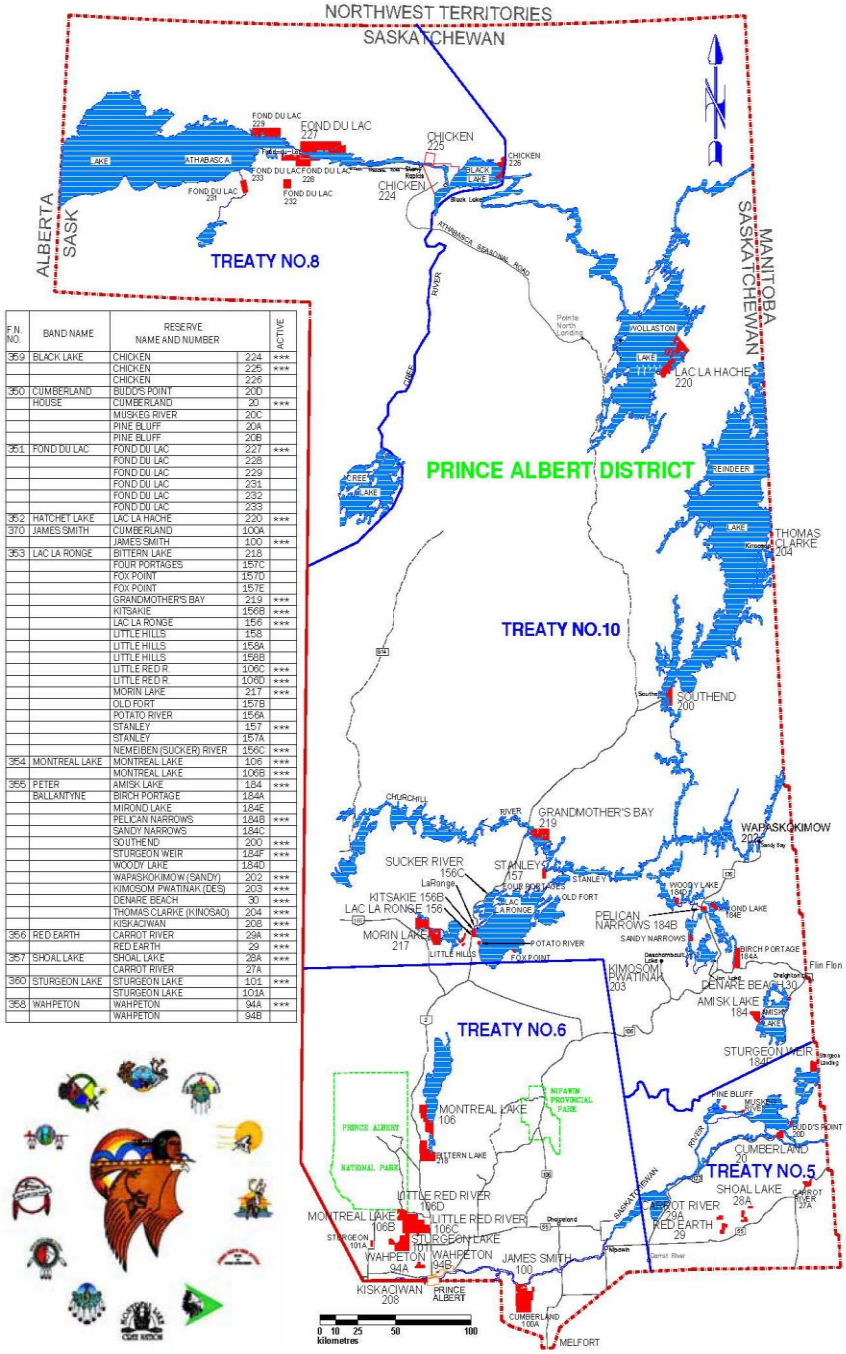
Appendix #1: Map of Northern Saskatchewan (Prince Albert Grand Council, 2018)



F.N. NO.	BAND NAME	RESERVE NAME AND NUMBER		ACTIVE
359	BLACK LAKE	CHICKEN	224	***
		CHICKEN	225	***
		CHICKEN	226	
350	CUMBERLAND HOUSE	BUDD'S POINT	20D	
		CUMBERLAND	20	***
		MUSKEG RIVER	20C	
		PINE BLUFF	20A	
		PINE BLUFF	20B	
351	FOND DU LAC	FOND DU LAC	227	***
		FOND DU LAC	228	
		FOND DU LAC	229	
		FOND DU LAC	231	
		FOND DU LAC	232	
		FOND DU LAC	233	
352	HATCHET LAKE	LAC LA HACHE	220	***
370	JAMES SMITH	CUMBERLAND	100A	
		JAMES SMITH	100	***
353	LAC LA RONGE	BITTERN LAKE	218	
		FOUR PORTAGES	157C	
		FOX POINT	157D	
		FOX POINT	157E	
		GRANDMOTHER'S BAY	219	***
		KITSAKIE	156B	***
		LAC LA RONGE	156	***
		LITTLE HILLS	158	
		LITTLE HILLS	158A	
		LITTLE HILLS	158B	
		LITTLE RED R	106C	***
		LITTLE RED R	106D	***
		MORIN LAKE	217	***
		OLD FORT	157B	
		POTATO RIVER	156A	
		STANLEY	157	***
		STANLEY	157A	
		NEMEIBEN (SUCKER) RIVER	156C	***
354	MONTREAL LAKE	MONTREAL LAKE	106	***
		MONTREAL LAKE	106B	***
355	PETER BALLANTYNE	AMISK LAKE	184	***
		BIRCH PORTAGE	184A	
		MIROND LAKE	184E	
		PELICAN NARROWS	184B	***
		SANDY NARROWS	184C	
		SOUTHEND	200	***
		STURGEON WEIR	184F	***
		WOODY LAKE	184D	
		WAPASKOKIMOW (SANDY)	202	***
		KIMOSOM PWATINAK (DES)	203	***
		DENARE BEACH	30	***
		THOMAS CLARKE (KINOSAO)	204	***
		KISKACIWAN	208	***
356	RED EARTH	CARROT RIVER	29A	***
		RED EARTH	29	***
357	SHOAL LAKE	SHOAL LAKE	28A	***
		CARROT RIVER	27A	
360	STURGEON LAKE	STURGEON LAKE	101	***
		STURGEON LAKE	101A	
358	WAHPETON	WAHPETON	94A	***
		WAHPETON	94B	

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The Intersectionality of Wildlife Conservation and Indigenous Rights

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Abstract
Literature on the effects of industrial development on wildlife or Indigenous cultures tends to be single-issue focused. We foreground the shared vulnerability of, and violence towards, both wildlife and Indigenous Peoples in a holistic outlook for human and environmental justice and liberation. Using the framework of 'industrocentrism,' this paper highlights the neoliberal industrialist paradigm as a common threat to both Indigenous Peoples and wildlife in its insatiable capitalist quest for profits. As industry is an exceptionally wide-ranging topic, this paper focuses on three specific types, namely logging, agriculture, and mining. In turn, we examine these sectors to provide an overview as to how the global industrial complex imposes small- and large-scale risks to Indigenous cultures and wildlife species simultaneously. An intersectional focus on how much anthropologists and conservationists have in common against state-corporate expansion can

perhaps facilitate more efficient and effective cooperation in order to create stronger and longer lasting solutions that are beneficial to both humans and wildlife.

Introduction

The neoliberal industrial paradigm, with its entanglement of development, progress and capital, is a significant threat to the struggles of both wildlife conservationists and Indigenous People. Viewing any barriers to trade as illegitimate barriers to growth, progress, and profit, neoliberalism has outstripped sustainability in each sector of industry. As Best and Nocella (2006) note, free market capitalism thrives on "the exploitation of humans, animals, and the Earth" (p. 2). Thus, the oppression of wildlife and Indigenous Peoples are inseparable, and industry is disastrous for both. Throughout this paper, the term "conservation" is used as a general reference to the promotion of healthy, functioning ecosystems and species, and the mitigation of human impacts on the more-than-human world. Further, we choose the term "Indigenous Peoples" in hopes of encompassing diverse groups of people who are similar in that they have been adversely affected by colonization on their traditional lands and/or displaced from their land by industrial economies.

A focus on capitalist industry is gaining increasingly political implications since the 2016 U.S. presidential election, as pushes for industrial expansion have accelerated. Broad measures have been enacted which would pave the way for unchecked development on both protected and unprotected lands. This is particularly evident in Donald Trump's administration's blatant disregard for those at Standing Rock in North and South Dakota, and through efforts to dismantle the Endangered Species Act and undermine the Environmental Protection Agency. Without these checks in place, industries are poised to wreak havoc on people, ecosystems, and nonhuman animals domestically with ramifications that could extend abroad and deep into the future.

A common theme emerging from conservation and Indigenous rights discourse is that Indigenous Peoples and wildlife are seen as 'impediments' to development and 'progress': Indigenous Peoples because they frequently resist industrial encroachment on their land, and wild animals because they occupy territory capitalists consider a waste if it is not developed. The *process* of development also creates problems for both wildlife and Indigenous Peoples. Often local people are not consulted with at any point during the development procedure (McGee, 2009). Nor does it seem, in most cases, that thoughts about how industrial development might impact wildlife are even entertained. Thus, our goal with this paper is to highlight the similar ways wildlife and Indigenous Peoples are threatened and harmed by global industrial development. In so doing, we hope to encourage a shared, holistic vision of protection, well-being and progress built on bridges of solidarity between justice movements.

Within academia there is a significant lack of research published which acknowledges the commonalities between industry's impact on both Indigenous communities and the environment. While this is true across all areas of industry, for sake of brevity, consider the literature surrounding the negative impacts of logging. A vast majority of articles focus on the environmental impacts of logging in general, primarily the loss of biodiversity and species richness in logged areas. For example, Walker et al. (2013) and Tobias (2015) focus on the fragmentation of forest caused by

logging roads and the implications this has for plant and nonhuman animal species. Brown and Gurevitch (2004) and Huth and Ditzer (2001) investigate short term versus long term impacts of logging on biodiversity within specific forest types. Similarly, Edwards et al. (2012) and Pinheiro et al. (2016) compare the environmental impact of selective logging to conventional clear cutting. What each of these articles fail to mention, however, is the impact that this activity also has on local human communities. This is also true of the converse. While there are remarkably fewer articles discussing the impact of logging on Indigenous communities, these too are one dimensional in that they neglect to discuss concomitant environmental degradation (See Marfo & Shanz, 2009; Tomaselli, 2012; Wadley & Eilenberg, 2005; Wood, 2004). Essentially, anthropologists discuss human dimensions, and conservationists discuss nonhuman dimensions. To address this shortcoming, this paper synthesizes numerous single-issue focused papers in order to highlight how the practices and processes of industrial development cut across the human-nonhuman divide.

To this end, we examine the impacts of industry on both wild animals and Indigenous Peoples. The global-industrial complex is expansive (see Best et al., 2011). Thus, we focus on three particular sectors: agriculture, logging, and mining. We choose these three activities because we view them as harboring the most explicit and personal forms of violence, as they directly infiltrate and destroy the very places, lives, and livelihoods of non/humans, as well as come with many indirect (structural) forms of violence. We first discuss road construction to illustrate the fact that industry types are related. In turn, we then examine the impact logging has on deforestation and the integrity of ecosystems, the intertwined industrial and corporate nature of both plant and animal agriculture, and finally consider the ways in which mining operations impact local non/human inhabitants. "All of these processes," write Nocella and Walton (2005), "have been driven by one ideological agenda[:] capitalism" (p. 1). Cumulatively, these impacts have caused such devastation to lifeways of non/humans that they have been compared to war (McGee, 2009). The reality of this common violence is reflected in the particular concept of 'industrocentrism.'

Industrocentrism

Academics and activists alike often attribute large-scale environmental problems to anthropocentrism. While many significant factors linked to current environmental justice issues are anthropo*genic* in that they are results of human-specific behaviors, ultimately, the outcomes are not in the best interest of (most) humans, and thus would not qualify as anthropo*centric*. Matthew Calarco suggests that an effective approach to intersectional non/human liberation is to turn attention toward critiquing anthropocentrism because it serves to reify "the privileged status of those who are deemed to be fully and quintessentially human" (Calarco, 2016, p. 54). However, interpretations of "fully and quintessentially human" frequently exclude certain groups of people in an attempt to define 'human' in a way that denounces notions of animality. Thus, "fighting for rights for animals entails fighting against the present established (anthropocentric, capitalist) order" because "this established order is at odds with the economic and ecological well-being of marginalized and dispossessed people" (Calarco, 2016, p. 65).

Exposing and problematizing this discrepancy may provide a useful framework from which to draw connections between difficulties plaguing both conservation and Indigenous rights. Part of

anthropocentrism is *industrocentrism*, an ideology that values industrial interests such as capital accumulation, growth, and competition, collectively euphemized as 'progress,' above all else. Regarding shared adversities between the goals of anthropology and conservation, Shoreman-Ouimet and Kopnina (2016) argue that opposing industrocentric thought is crucial in pursuing a multispecies ethnography:

> The industrialized world tends to render everything living as a resource ... in the case of nonhumans, as a commodity to be consumed. The main distinction thus should be between industrialist *versus* anthropocentric *and* ecocentric worldviews, as destructive tendencies of industrial neoliberal capitalism are good for neither humans nor nonhumans (p. 9).

In other words, the lives of wildlife and Indigenous Peoples are similarly devalued by the "technological-economic system" which disregards and subsumes both humanity and nature simultaneously. This capitalist ideology is inherently damaging to non/humans on individual, cultural, and species levels (Kidner, 2014, p. 469).

Critiquing industrocentrism exposes anthropocentism's exclusionary principle of what (or who) counts as valuable and could therefore act as a means of promoting solidarity between conservationists and those fighting for Indigenous rights. In line with Best and Nocella (2006), a common focus on industrial development gets at the root cause of many of the harshest common oppressions and promotes alliances within a multi-species environmental justice struggle. We now turn to the ways in which this simultaneous violence is affected.

Roads: An Intersection of Ecological and Indigenous Harm

Different forms of industrial development are deeply interrelated with various forms of development often influencing each other. An illustration of the connection between development types, as well as between Indigenous rights and conservation, is roads. Roads are often a precursor to many types of industrial activity in order to gain access to project sites. After development, additional roads are inevitably built that lead away from these areas, providing access to natural resources in more remote areas of nature, and creating impetus for further iterations of development. Furthermore, roads are constructed to link disparate sites in order to facilitate mobility of people and commodities between destinations. Thus, roads both precede and follow industrial development in a continuous cycle of build, connect, repeat.

There are both direct and indirect effects of roads on wildlife and Indigenous Peoples. According to Suarez et al. (2013, p. 266), "Road construction has immediate impacts on wildlife mobility and mortality, and direct effects on forest cover.... More importantly, roads provide access to previously remote regions, thus facilitating colonization, deforestation, exploitation of wildlife and agricultural encroachment" (Suarez et al., 2013, p. 266). The number of road-killed animals is staggeringly high, second only to that of animal agriculture (Desmond, 2013), and hazards posed to wildlife extend well beyond roads themselves (Benitez-Lopez, Alkemade, & Verweij, 2010). Roads often present a barrier to animal movement, either in everyday travel, seasonal migration, or more permanent emigration. This can result in lower variability in the gene pool and/or inbreeding. Such consequences make species survival precarious in that they leave populations

more vulnerable to external changes in the environment by weakening biological defense mechanisms.

Of special concern are roads in or near protected areas. In a study of the wild meat market of the Yasuni Biosphere Reserve in the Ecuadorian Amazon, Suarez et al. (2013) found that even with restricted access to "outsiders,"

> [t]he new road… attracted local Waorani people who settled along the road and use it as a hunting corridor. Thus, while the control strategy in this road was effective in terms of avoiding colonization and deforestation … cultural changes among the Waorani and the transportation subsidies that they receive from the oil company, turned them into major suppliers of bushmeat to the market located at the origin of the road (p. 267).

This led to significant declines in the number of several species of monkey in the surrounding area. While controlled access to a road and protected area was shown to reduce colonization and minimize effects of habitat fragmentation, it was not enough to also protect wildlife.

In the Philippines, roads built for a logging plantation cut into Indigenous areas, making them accessible to domestic outsiders, who then colonize along the roads and set up their own farms (Foster, 2012). As a result, Indigenous inhabitants are pushed off their traditional lands and further into the forests. This sets a troubling precedent for Indigenous Peoples and conservation efforts, as there is an expectation that any attempts to invade protected areas will ultimately fail (Fearnside, 2001). Sometimes, this notion is an area's most effective defense tool.

The remainder of the paper is a review of development in logging, agriculture and mining as they relate to conservation and Indigenous rights. Each section begins with an overview of connections between the two movements under the respective industrial activity, with two subsections specific to each movement individually. Intersections are apparent throughout.

Logging

Ignoring, externalizing, or indifference to negative consequences of development is apparent throughout the logging industry. Commercial logging destroys massive amounts of forest and therefore is contrary to the interests of non/human life. From 1990 to 2015, approximately 129 million ha of forest was felled, with Africa and South America suffering the greatest losses (MacDicken et al., 2015). This is concerning, as forests perform a number of ecosystem services, including water purification, erosion control, and carbon sequestration, in addition to providing shelter and resources to a vast number of non/human animals (MacDicken et al., 2015). As these protective functions of the forests are destroyed, heavily logged areas become subject to soil erosion, landslides, lower water quality, and increased CO_2 release (Roboredo, 2013).

Illegal logging, which accounts for 50-90% of timber harvested from tropical forests, is even more damaging, as there are no regulations to mitigate its effects (Arcilla et al., 2015). Consequently, many of the most biodiverse forests in the world are rapidly deteriorating, with a number of species facing "a real and ever-present threat of extinction" (Suhariyanto & Purnama, 2013, p. 1).

Indigenous communities are also threatened as their dependence on forests for food, shelter, and medicine forces them to come into direct contact with loggers, resulting in conflicts over resources (Roboredo, 2013, p. 296). With no regulations to protect land rights, such conflicts often force Indigenous Peoples to flee from their homes into areas densely populated by other groups, putting a greater strain on the land's resources (Roboredo, 2013, p. 296).

Logging and Conservation

One of the greatest concerns for conservationists regarding both legal and illegal logging is its threat to biodiversity, as it causes "changes in forest structure, disturbance, dislodgement of animals from their habitats, gap opening, and loss of food resources" (Castro & Michalski, 2014, p. 100). While some species exhibit behavioral plasticity, which enables them to adapt to these changes, those who cannot adapt quickly enough are threatened with extinction (Rimach et al., 2013, p. 2). Brown spider monkeys, for example, are experiencing significant population decline due to their sensitivity to anthropogenic disturbances, making them one of the 25 most endangered primate species in the world. Habitat loss and fragmentation due to increased logging throughout Columbia has forced them into smaller fragments of land, resulting in greater competition for food, and increased physiological stress (Rimach et al., 2013, p. 2). While stress may not seem consequential, it leads to a reduction in reproductive success in many species, such as dung-beetles (França et al., 2016), Fijian ground frogs (Narayan et al., 2015) and Mountain White-crowned sparrows (Dietz et al., 2013), potentially decreasing population densities.

In addition to habitat loss and fragmentation, Osone et al. (2016) explain that logging increases forest susceptibility to fire by "disrupting the canopy cover, thereby producing warmer and drier conditions on the forest floor, and by providing large quantities of fuel in the form of logging debris" (p. 94). These conditions, in combination with "slash and burn" agricultural methods, result in unintended fires which have proven to be catastrophic for a number of non-human species (Cochrane & Schulze, 1999, p. 3).

Logging and Indigenous Rights

Indigenous communities have been increasingly subject to intensive logging, which escalates conflicts over access to natural resources and land rights (Aiken & Leigh, 2011). Brosius (1997) discusses the Penan, two distinct groups of Indigenous Peoples who live in the Malaysian state of Sarawak in Borneo. In the early 1980s, logging companies began invading Penan land, and this dramatically decreased many forest resources they relied on for subsistence and trade (Brosius, 1997, p. 49). Bulldozers driven through the forests uproot fruit trees and sago palms, main staples of the Penan diet, and removal of the forest canopy exposes the forest floor to rain, resulting in soil erosion and the siltation of rivers (Brosius, 1997, p. 49).

When Indigenous Peoples show resistance to logging operations on their land, violence often ensues. Such is the case in Maranhão, Brazil, where illegal loggers have intentionally set fire to approximately 50% of the Arariboia Indigenous Reserve, destroying the villages and crop lands of the Guajarara Indians, and threatening the survival of a number of uncontacted members of the Awá tribe (Wallace, 2016). Fires are used as a diversionary tactic to distract Indigenous "Forest

Guardians" who have joined together to defend their lands (Wallace, 2016). When diversions fail, loggers open fire on Forest Guardians to prevent them from seizing timber trucks.

Even "peaceful" encounters between Indigenous Persons and logging companies can have devastating impacts on a community. The Nahua, an Indigenous group living on the Kugapakori Indigenous Reserve in the Peruvian Amazon, made official contact with a logging company in 1984, where they were "showered with manufactured gifts" by Yaminahua loggers who hoped to use their land (Napolitano, 2007, p. 522). The Nahua agreed, but soon after began to suffer from epidemics of pneumonia, malaria, and parasites, illnesses to which they had not been previously exposed. Survivors found their lives completely disrupted, as they were too sick to hunt for food or harvest their gardens, making them fully reliant upon the loggers (Napolitano, 2007).

Indirect impacts of logging are equally troubling as they support additional forms of development. For example, logging often leads to increased agricultural expansion as it opens up previously inaccessible areas of the forest. These areas are highly desirable because road networks constructed by logging companies facilitate the transport of agricultural products to markets, therefore increasing profit. In turn, increased profit often results in greater land-use change, as farmers have the means to increase the size of their land (Makana & Thomas, 2006, p. 1376).

Agriculture

Both plant and animal agriculture have caused damage to or threatened the goals of both conservationists and Indigenous communities in multiple ways. One of the most general is land use and land-coverage change which is occurring at an alarming rate. For example, "[p]lantations in developing nations grew by [about] 5300 km^2/year from 1990 to 2005, with the biggest increases in China and India" (Laurance et al., 2014, p. 110). Other disturbances from agriculture include pollution, ecosystem simplification, dispossession and killings. These problems are often magnified by the scale of plantations, surrounding poverty, and the quest for expansion. Additionally, agriculture is usually accompanied by other forms of development: "In the tropics, large increases in water harvesting, damming, and diversion of rivers will be needed for agricultural expansion, intensification, and associated electricity needs" (Laurance et al., 2014, p. 112).

An apt application of industrocentrism as manifested in agriculture is the Green Revolution. Ushered in by Norman Borlaug in the 1940s, the Green Revolution was hailed as a way to increase food supply to feed the hungry part of a growing human population. The Indian state of Punjab is one instantiation of the shared damage wrought by agricultural development (Shiva, 1991). Although purportedly designed for abundance and peace, the Green Revolution, imposed by industrialized Westerners and opposed by locals, left Punjab beset with violence and scarcity, triggering ecological and cultural crises (Shiva, 1991, pp. 11-12). Forcefully coerced, Punjab was left with depleted biological and cultural diversity while the Green Revolution was heralded as a success and Borlaug was decorated as a hero with the 1970 Nobel Peace Prize for his role.

Agriculture and Indigenous Peoples

Between 2009 and 2011, four activists in Argentina were killed for resisting the influence of foreign agribusiness. In the province of Santiago del Estero, peasant activist organizations have been influential in defending Indigenous rights in Argentina and Latin America more widely. Pablo Lapegna (2013) gives the details of one of the more recent deaths associated with this struggle:

> [T]wo armed men showed up in the humble house where Cristian Ferreyra lived with his wife and two children… . The two men, security guards hired by an agri-businessman, shot Ferreyra and Darío Godoy, another activist, and beat Ferreyra's wife and a family friend. Some hours later, Ferreyra bled to death. (p. 2)

Ferreyra's assassinators worked for a corporation wanting to expand their genetically modified soybean crop into Santiago del Estero. In the two years preceding Ferreyra's killing, three other land activists were murdered also. Moreover, no one was personally held accountable for these crimes (Lapegna, 2013, p. 2). This instance illustrates two levels of danger: livelihoods are at stake in general, and, if people resist, individuals risk being targeted specifically. This glaringly highlights the continuing threat large companies pose to Indigenous People. Such killings are intended to stifle Indigenous movements and intimidate locals out of their traditionally held lands.

Africa has had and continues to have issues with large-scale land grabbing. Corporations acquire land from state governments which frequently results in forcing local people from their homeland so it can be turned over to mostly foreign businesses. Some of this relocation has domestic sources; national governments have pushed their own people from native lands to appease developers. The primary use of this land is agriculture in the form of agro-fuel production and food procurement. Driven by food security concerns, several nations have bought land throughout Africa in a manner resembling the scramble for Africa during the nineteenth century and thus could be said to be capitalist colonialism (Odoemene, 2012; Liberti, 2013). Indigenous Peoples in rural areas are vulnerable in deals between government and big business:

> since the majority eke their livings from the use of land for agriculture. Most subsistence farmers are easily exploited by their own governments by selling land to foreign investors because they do not have titles to their land (Attah, 2013, p. 218).

A location that combines land-grabbing and agricultural expansion is Tanzania where a large-scale land deal was made for using land for raising both plants and 'livestock'. This resulted in pollution of nearby freshwater sources previously managed by an Indigenous community of the Iringa region (Arduino et al., 2012). This particular deal was made without any consent from the people whose water sources became contaminated which endangered their health. This example illustrates how areas and people can be affected by industrial practices even if they are not located nearby the activity site or even, as in this case, when such activity does "not explicitly involve any changes in water use for irrigation or extractive purposes" (Arduino et al., 2012, p. 345).

Additionally, there is the insidious threat of cultural deterioration. When Indigenous communities lose their land to agricultural development, this can have a profound impact on their ability to maintain cultural knowledge, which puts communities at risk of "disappearing as distinct peoples" (Colbran, 2011, p. 63). Examples of this can be seen in Kalimantan, Indonesia, where oil palm companies continue to transform Indigenous land into plantations. Indigenous communities across Kalimantan manage their land via agroforestry, growing a mosaic of crops while simultaneously protecting large areas of forest (Mulyoutami et al., 2009). As their land is converted to oil palm monoculture, many of the plants used for customary ceremonies and traditional medicines become impossible to find (Marti, 2008). As these practices diminish, communities find it difficult to pass on traditional knowledge about the natural environment, and this leads to lack of social cohesion due to a shift from communal activities to individualism (Marti, 2008).

Social cohesion is further jeopardized when leaders of these communities are co-opted by monetary incentives from palm oil companies to accept plantations on their land (Marti, 2008). In many communities, this has led to a lack of trust in leaders, which in turn creates a loss of respect for customary laws and values, as well as a loss of cultural pride (Colbran, 2011). This worsens as community members are forced to become plantation laborers or oil palm shareholders themselves in order to make a living (Marti, 2008). Overall, this has resulted in Indigenous communities who are completely detached from the environment around them, no longer having the abilities to create and sustain the intimate relationships they once had with the natural world.

Agriculture and Conservation

Wildlife are overlooked at least as much as people when it comes to appropriating land and "many wild species cannot survive in even the most wildlife-friendly farming systems" (Tscharntke et al., 2012, p. 54). Thus, as agriculture expands and intensifies, a key concern is the degree to which biodiversity can persist in landscapes which are becoming increasingly dominated by human industry. From classical conservation biology, it is known that large areas are needed for wildlife to carry out natural processes and to foster resilient ecosystems (Soule & Terborgh, 1999). However, in the midst of global human population increase and concomitant growth in consumption, it is projected that an additional 107 million hectares of natural ecosystems will need to be converted into agricultural land by 2050 in order to adequately accompany such growth (Alexandratos & Bruinsma, 2012). Taking away this much land would severely constrain the ability of conservation measures to protect wildlife. Another major concern is that agricultural expansion is occurring most rapidly in biogeographic regions possessing especially large numbers of species. As Laurance et al. (2014) assess the situation,

> As the 21st century unfolds, the greatest expansion of agriculture will almost certainly occur in South America and Sub-Saharan Africa, which have large land areas with unexploited agricultural potential. It will encompass many different ecosystems such as forests, semi-arid land, and savanna-woodlands (p. 108).

Therefore, under current trends, key locations for conservation are under the greatest threat.

Wild lands that are home to wildlife, whether protected or unprotected under the law, also face indirect threats. Protected areas not near agricultural fields can still be negatively affected by a plantation. This is because ecosystems are not isolated regions, but interact with their surrounding environment. Predators may roam great distances searching for mates or food, crossing in and out of protected areas. And energy flows such as freshwater or seed dispersal may be contaminated by nearby crops or animal farms limiting population size of wild animals (Baudron et al., 2009). 'Livestock' operations, in particular, have led to the killing of large numbers of wildlife species that are perceived as a direct threat to ranchers' profits, with wolves experiencing the greatest amount of persecution (Nibert, 2013). Wolves are still perceived as a major threat to 'livestock' and several states in the U.S. have tried to have them delisted from the endangered species list in order to make it legal to hunt them in large numbers, and, presumably, to extinction.

Mining

Similar to agriculture, mining results in extensive loss of habitat for a number of non-human species, as well as the forced displacement of Indigenous Persons from their ancestral lands (Kitula, 2006, p. 405). It is also an activity which causes imminent disruption to the environment, and therefore poses significant risks to non/humans living in the surrounding area (Candeias et al., 2015). During the mining process, massive amounts of waste containing heavy metals contaminate nearby bodies of water, soil, and vegetation, causing "covert, persistent, and irreversible" damage (Li et al., 2014, p. 844). Whether exposed to directly or indirectly via the consumption of contaminated resources, these pollutants are known to have a devastating impact on wildlife, causing behavioral changes, low reproductive success, malformations, and increased mortality rates (Chapa-Vargas et al., 2010, p. 90). Heavy metal pollution has equally concerning impacts on humans, especially Indigenous People who commonly live in close proximity to mining operations. Carcinogenic risks have been found to be "unacceptably high" in these areas, as well as risks of dementia, kidney and liver disease, and central nervous system disorders (Li et al., 2014).

Mining and Conservation

Mining operations can have significant impacts on the environment both while they are in use and long after they have been abandoned. Not only do they result in habitat loss and fragmentation, but they also contaminate soil and water with toxic waste, such as tailings (Candeias et al., 2015). Tailings, a by-product of metallic ore processing, contain copious amounts of toxic substances including lead, arsenic and mercury (Candeias et al., 2015). Lead exposure has been shown to have severe impacts on a number of species, resulting in damage to the immune, vascular, nervous and reproductive systems, as well as causing behavioral abnormalities (Pareja-Carrera et al., 2014, p. 211). In the old mining districts of Sierra Madrona and Alcudia Valley, there are 484 abandoned lead producing mines, with surrounding ecosystems still showing high levels of contamination. Elevated lead levels in plants and water has created severe problems for wildlife. Deer and boar, for example, are suffering from reduced reproductive function and altered immune systems due to increased exposure to these chemicals (Pareja-Carrera et al., 2014, pp. 210-1). Additionally, Plummer (2015) found that mercury produced during the gold amalgamation process pollutes both water and sediment, and accumulates within the bodies of fish, birds, reptiles, mammals, and insects (p. 488). Mercury exposure negatively impacts the neurological and hormonal systems of

vertebrates, which in turn affects their ability to reproduce, care for offspring, and evade predators. For example, fish exposed to mercury tend to form "loose, sloppy schools," lay fewer eggs, and respond slower to predators (Kessler, 2013).

Arguably the most serious threat of mining, however, is Acid Mine Drainage (AMD), which has contaminated over 19,300 km of rivers and 72,500 ha of lakes across the United States (Fletcher et al., 2006, p. 2432). AMD occurs when sulphides become exposed to water or air, creating sulfuric acid which then dissolves additional metals and metalloids from surrounding rock (Henri et al., 2014, p.39). Simate and Ndlovu (2014) explain that, because AMD contains high levels of acid and metals, it is especially detrimental to aquatic organisms, either causing mortality due to acute exposure, or stunted growth, reduced reproduction, deformities and lesions from chronic exposure (p. 1791). Furthermore, AMD significantly lowers the pH level of water, which has devastating impacts on the physiological functioning of a number of aquatic species, and can eventually lead to the disappearance of entire populations of fish due to the failure of embryos to mature (Simate & Ndlovu, 2014, p.1791; Henri et al., 2014). Even more concerning is that AMD has exceptionally long-lasting impacts which can continue to degrade environments for "centuries to millennia" (Byrne et al., 2012, p. 2019).

Mining and Indigenous Peoples

The relationship between mining companies and Indigenous communities is characterized by an extensive history of conflict. Not only are Indigenous voices and rights to traditional lands overlooked or ignored, but they often receive little economic benefit from mining activity and are subject to the pollution of precious natural ecosystems. At the United Nations World Conference on Indigenous Peoples, Windel Bolinget (2014) illustrates the magnitude of socio-economic and human rights implications surrounding the mining industry:

> The projects of foreign mining companies….really aggravate the impacts of climate change: the destruction of our livelihoods, our rice fields, the landslides of roads that will paralyze transportation and communication of our communities and cause many deaths… Once our communities, our forests that we depend on are destroyed, the impacts of climate change will be tenfold compared to non-indigenous communities (n.p.).

Although Bolinget was referring to Indigenous communities in the Philippines, detrimental impacts on the livelihoods of Indigenous Peoples induced by mining are global. One such case is that of the Yanomami. In 1987, after gold was discovered in Roraima Brazil, thousands of *garimpeiros*, or gold miners, invaded Indigenous protected areas to exploit the country's extensive mineral deposits (Plummer, 2015, p. 484; Zhouri, 2010, p. 260). The Yanomami were faced with devastating losses from this encounter. Zhouri (2010) explains that the introduction of new diseases, such as the flu and malaria, along with a rise in malnutrition, have resulted in severe population decline (p. 260). Furthermore, the pollution of major water sources due to improper disposal of mine wastes has led to the contamination and death of many aquatic species, which in turn poison the Yanomami who sustain from them (Plummer, 2015, p. 485).

A number of cases highlight the social marginalization and denial of rights that Indigenous Peoples face due to mineral extraction on their lands. This is especially apparent in Australia, where over 70% of uranium deposits are located on the traditional lands of Indigenous Peoples (Graetz, 2015a, p. 113). In the 1970's, the Ranger Uranium Mine was proposed to be constructed in the Alligator Rivers Region of the Northern Territory, the ancestral home of the Mirarr Traditional Owners who had inhabited the region for over 50,000 years (Graetz, 2015b, p. 132). Despite explicit opposition from the Mirarr, the Australian government disregarded the *Aboriginal Land Rights Act of 1976*—which grants Indigenous Australians the right to oppose development on their land—and approved construction of Ranger (Graetz, 2015b). The government's explanation for their decision was simply that the rest of Australia was in favor of the mine, and therefore, "opposition shall not be allowed to prevail" (Blackwell & Dollery, 2014, p. 78).

Opposition to mining activity by Indigenous Persons has also led to violent attacks against them. Such violence is evidenced in a case study in Tampakan, Philippines, involving B'laan resistance to large scale mining operations on their ancestral lands. Battalions were deployed by the Filipino government and instructed to raid B'laan villages in search of resistance leaders, preventing villagers from participating in traditional hunting practices and rituals (Wetzlmaier, 2012, p. 340). A similar instance was documented in a 2016 report by the Justice and Corporate Accountability Project which implicated the involvement of 28 Canadian mining companies in organizing targeted injuries, murders, and sexual assault toward Indigenous People throughout South America (Imai et al., 2016, p. 4).

Conclusion

Given that the authors of this paper—unlike its subjects—are not direct victims of neoliberalism, we refrain from offering specific solutions for resistance. Surely, a radical broadening and connecting of environmental justice struggles aimed at neoliberal industrial development is needed (Best & Nocella, 2006). However, we also believe no single answer can encompass the wide array of situations faced by wildlife and Indigenous communities. Each locus of confrontation with industry contains unique cultural, economic, political, and ecological circumstances. Thus, while we have traced out a common problem, we will say only that we feel solutions will be most effective if handled on a case-by-case basis with local inhabitants (human and nonhuman) at the forefront of their own negotiations and conflict resolution.

From the overview of consequences of industrocentric ideology given in this paper, it is clear that neoliberal industrial development continues to harm many non/humans in various ways. The difficulties faced by wildlife and Indigenous Peoples due to insatiable industrial expansion are similar, but not identical. Both can face loss of individual life; wildlife risk biodiversity loss and extinction while Indigenous Peoples face a potential loss of culture. Roads present an especially pressing issue that links types of industry by both preceding and following most forms of development. In any form, development risks a litany of negative consequences, some of which persist geographically and temporally removed from project sites. In the face of such oppressive forces, social unrest is often a result. While in limited cases resistance attempts prove successful locally, industrial complexes continue to march ahead globally. This paper coalesced some common threats and harms within the context of industrocentrism to encourage further

strengthening of cooperation between anthropologists and conservationists, and activists and allies on their behalf, in an alliance under a united vision of total liberation from the system of capitalist-driven industrial development.

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