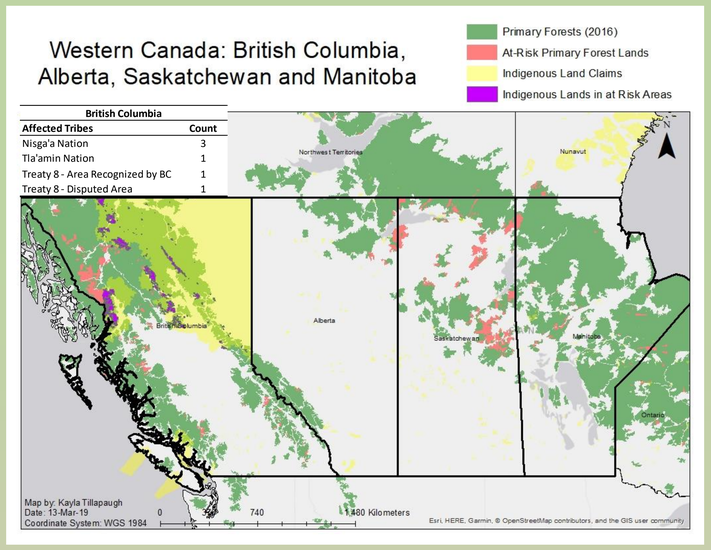
Identifying Global Primary Forests and Indigenous Communities At-Risk of Infringement by Fossil Fuel Extraction

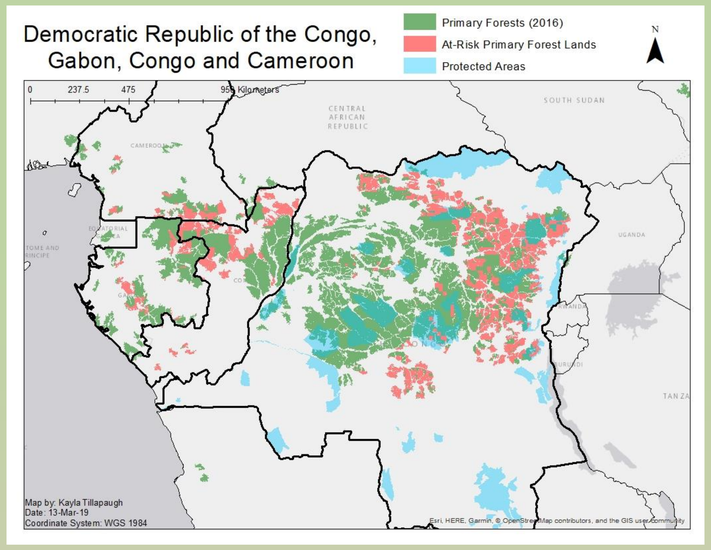
Introduction

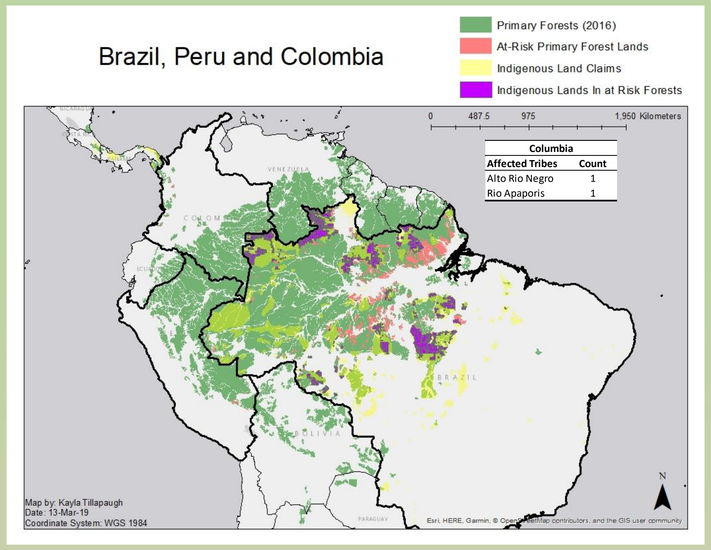
Around the globe, healthy forests are being imperiled by the extraction of fossil fuels such as coal, oil and gas. For years, Indigenous Nations have fought to protect the lands upon which they still largely depend. Today there are many organizations and activists striving to prevent these ecological and human crises with the limited resources they have. This mapping project is intended to help prioritize where limited resources - primarily funding from foundations - might be effectively allocated in support of these fights.

This study attempted to identify global primary (old growth) forests and Indigenous Tribes which are vulnerable to the damaging effects of fossil fuel extraction. This project also strived to define the amount of carbon that would be displaced with the removal of these forests. This poster outlines primary forests, indigenous territories, and areas of potential future fossil fuel extraction which render forests “at-risk”.



British Columbia	
Affected Tribes	**Count**
Nisga'a Nation	3
Tla'amin Nation	1
Treaty 8 - Area Recognized by BC	1
Treaty 8 - Disputed Area	1



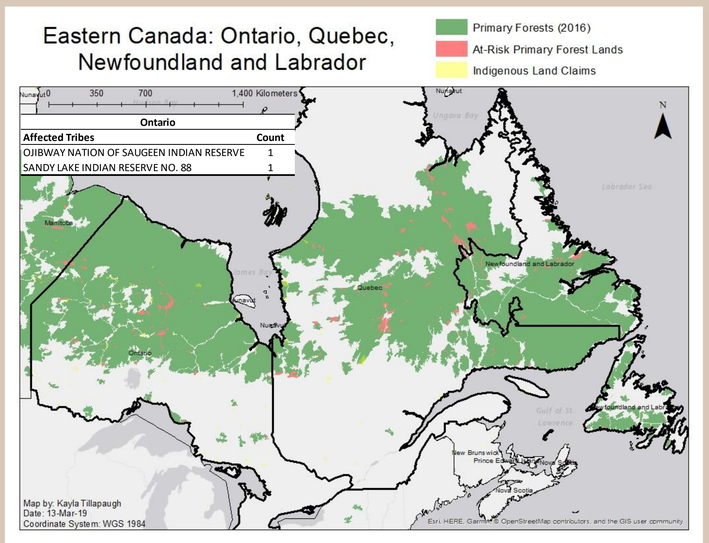


Columbia	
Affected Tribes	**Count**
Alto Rio Negro	1
Rio Apaporis	1

Brazil			
Affected Tribes	**Count**	**Affected Tribes**	**Count**
Alto Rio Negro	3	MTdio Rio Negro I	4
Alto Turiatu	1	MTdio Rio Negro II	1
AndirÃŸ-Marau	1	Munduruku	2
ApiakÃŸ do Pontal e Isolados	1	NhamundÃŸ/Mapuera	2
Apyterewa	1	Nukini	1
Arara	1	Pacaas Novas	1
Araribóia	1	PanarÃŸ	2
ArawetT IgarapT Ipixuna	2	Parakanp	1
Aripuanp	1	Parana do Boa Boa	1
BaÃ·	2	Parque do Aripuanp	1
Badjonkore	2	Parque do Tumucumaque	2
Balaio	1	Raposa Serra do Sol	1
Betania	1	Rio Apaporis	3
Cachoeira Seca	1	Rio BiÃŸ	1
Coata-Laranjal	1	Rio Branco	2
CuT CuT/ Marabitanas	1	Rio GuaporT	1
Diahui	1	Rio Mequens	1
EnawenO-NawO	1	Rio Negro Ocaia	2
Escondido	1	Rio Paru DEste	2
Galibi	1	Rio TTa	2
Guanabara	2	Sai-Cinza	2
IgarapT Capana	1	Santa Inez	1
IgarapT Lage	1	Sete de Setembro	1
IgarapT Lourdes	1	Spo Leopoldo	1
Ipixuna	1	Spo Marcos - RR	1
Ituna/Itata (restritpo de uso)	1	Spo Pedro do Sepatini	1
Jacamim	1	SururuÃŸ	2
JacareÃ-ba/Katauixi (restritpo u:	1	Tenharim do IgarapT Preto	1
Japuira	1	Tenharim Marmelos	1
Juma	1	Tenharim Marmelos (Gleba B)	1
Karara(	1	TikÃ-na de Feijoal	2
Karipuna	1	TorÃŸ	1
Karitiana	1	Trincheira Bacaja	2
Kawahiva do Rio Pardo	1	Trombetas/Mapuera	3
Kaxarari	1	Uata	1
Kayabi	1	Uneiuxi	3
Kayap=	3	Uru-Eu-Wau-Wau	2
Koatinemo	3	Waimiri-Atroari	2
KuruÃŸya	1	Waippi	1
Lago do Correio	1	WaiWÃŸi	1
Lago do Limpo	1	Xikrin do Rio Catete	1
Lauro SodrT	2	Xipaya	1
Massaco	2	Yanomami	1
Menkragnoti	4	Zoe	1
Total Tribes: 88			

Methods

1. Data research, inquiry and download – added all layers to ArcMap
2. Projected coordinate systems into WGS 1984 (project tool)
3. Erased all overlapping layers (erase tool)
4. Combined all mining and indigenous layers into single layers (union tool)
5. Clipped new mining layer from forest layer (clip tool)
6. Created new area field and calculated geometry
7. Calculated statistics - totaled area of fossil fuel extraction areas within primary forests
8. Literature review and calculations – found approximate carbon stored and sequestered per-hectare for each ecozone
9. Multiplied approx. carbon stored/sequestered per-hectare by area of threatened forest for each region
10. Calculated statistics on all indigenous lands which overlap at-risk forest land – ran a summary on all names of tribes – created tables for each region



Ontario	
Affected Tribes	**Count**
OJIBWAY NATION OF SAUGEEN INDIAN RESERVE	1
SANDY LAKE INDIAN RESERVE NO. 88	1

Results and Discussion

- > 116 million hectares of primary forest land are at risk of fossil fuel mining expeditions
- > 33 million hectares of these forests reside within identified indigenous lands, representing a total of 110 tribes
- Total stored carbon within all identified threatened global forests is more than 27.2 billion metric tons
- These forests will on average sequester 1.2 billion metric tons of CO_2 per year

Damages associated with the removal and burning of fossil fuels are vast, but manageable with more sustainable mechanisms of energy production.

		Carbon Stored as Biomass		Carbon Sequestered Annually	
Region	**Total area of at risk primary forest (ha)**	**Average biomass carbon stored per Hectare (Mtons/ha)**	**Total average biomass carbon (Mtons)**	**Average CO2 sequestered per hectare annually (Mtons/ha/yr)**	**Average total CO_2 sequestered annually (Mtons/ha/yr)**
Brazil	47,238,297.23	213	10,061,757,309.83	13.61	642,808,700.31
Peru	305,803.25	213	65,136,091.40	13.61	4,161,305.52
Columbia	659,038.37	125	82,379,795.79	13.61	8,968,053.90
Congo	5,088,314.24	213	1,083,810,933.18	13.61	69,240,697.81
Democratic Republic of the Congo	16,714,003.60	213	3,560,082,765.88	13.61	227,440,605.58
Gabon	2,461,339.69	213	524,265,354.97	13.61	33,493,387.00
Cameroon	1,973,475.72	213	420,350,328.36	13.61	26,854,637.81
Mexico	1.28	100	128.39	13.61	17.47
British Columbia	10,449,108.86	810.5	8,469,002,733.23	4.00	41,796,435.45
Alberta	1,305,372.36	60	78,322,341.37	4.00	5,221,489.42
Saskatchewan	8,488,084.35	60	509,285,061.14	4.00	33,952,337.41
Manitoba	1,614,408.96	76	122,695,080.63	4.00	6,457,635.82
Ontario	1,940,891.38	76	147,507,744.53	2.39	4,635,172.09
Quebec	4,385,508.50	76	333,298,645.99	2.39	10,473,325.22
Newfoundland and Labrador	1,077,159.11	233	250,978,072.81	2.39	2,572,435.48
Northwest Territories	3,109,414.88	76	236,315,530.79	4.00	12,437,659.52
Yukon	12,619,040.81	99	1,249,285,040.43	4.00	50,476,163.25
Nunavut	276,091.73	99	27,333,081.03	4.00	1,104,366.91
Total	119,705,354.31		27,221,806,039.76		1,182,094,425.98

Limitations and Constraints

Data Inquiry:

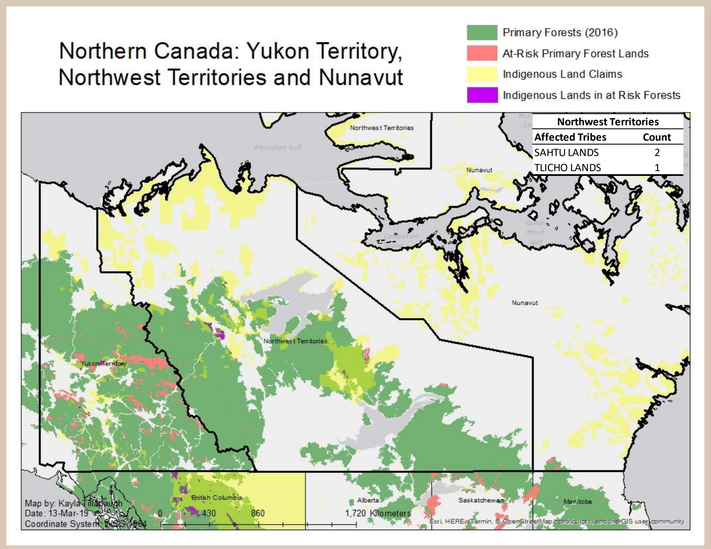
- Mining and hydrocarbon reservoir data is often classified
- Fossil fuel mining or mapping companies often do not release data free of charge
- Global data for Indigenous territories is extremely limited

Analysis:

- Massive data files made for very slow geoprocessing

Carbon storage and Sequestration Calculations:

- The amount of carbon stored or sequestered is specific to individual trees being measured
- Different sources reflect different data. Therefore, regional averages can be imprecise
- The amount of hydrocarbons stored within reservoirs is important for the purposes of this study, but could not be done due to time constraints, data limitations and the expanse of identified risk areas



Northwest Territories	
Affected Tribes	**Count**
SAHTU LANDS	2
TLICHO LANDS	1

Yukon Territory	
Afected Tribes	**Count**
CARCROSS/TAGISH FIRST NATION	1
CHAMPAGNE AND AISHIHIK FIRST NATIONS	1
FIRST NATION OF NACHO NYAK DUN	1
KLUANE FIRST NATION	1
KWANLIN DUN FIRST NATION	1
LITTLE SALMON/CARMACKS FIRST NATION	1
SAHTU LANDS	1
SELKIRK FIRST NATION	1
TA'AN KWACH'AN COUNCIL	1
TESLIN TLINGIT COUNCIL	1
TETLIT GWICH'IN TRIBAL COUNCIL	1
TR'ONDÑK HW-CH'IN	1
Total Tribes: 12	

Data Sources

- BC Oil and Gas Commission
- Forestry Research and Engineering: International Journal
- Global Forest Watch
- Government of Canada
- Government of the Northwest Territories
- Intact forests
- Journal of Environmental Economics and Management
- National Aeronautics and Space Administration (NASA)
- Nature Journal
- Northwest Territories Geological Survey
- Pacific Institute for Climate Solutions
- Proceedings of the National Academy of Sciences (PNAS)
- The Democratic Republic of Congo’s Cadastre Minier (CAMI)

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