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Energy transition minerals and their intersection with land-connected peoples

In the format provided by the authors and unedited

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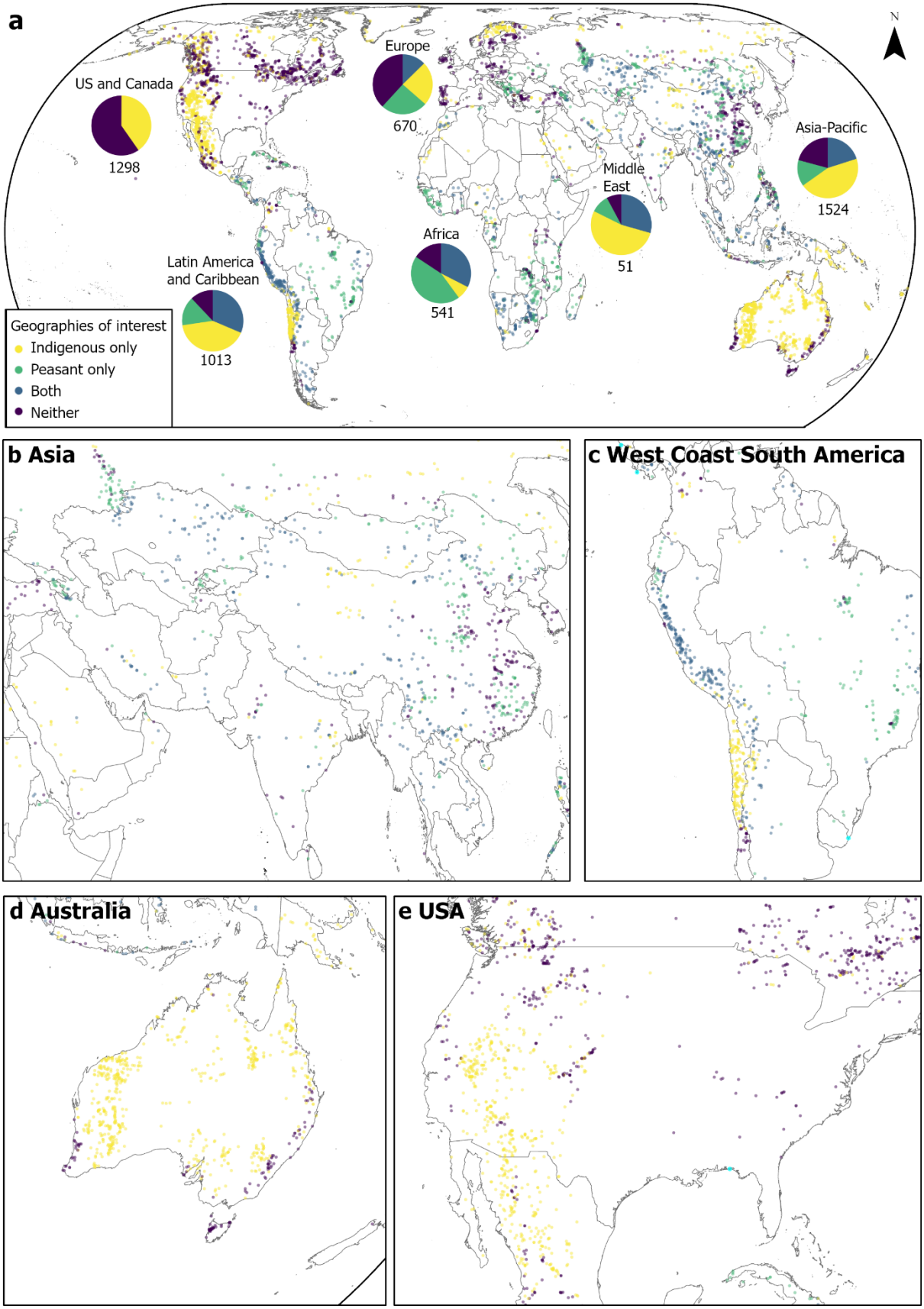

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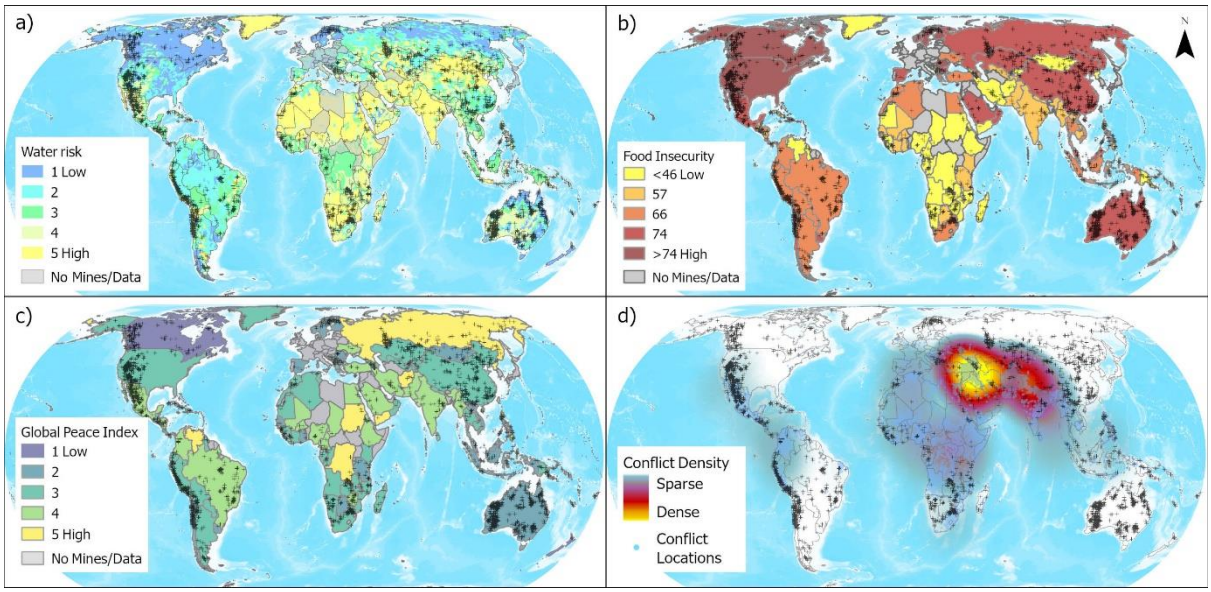

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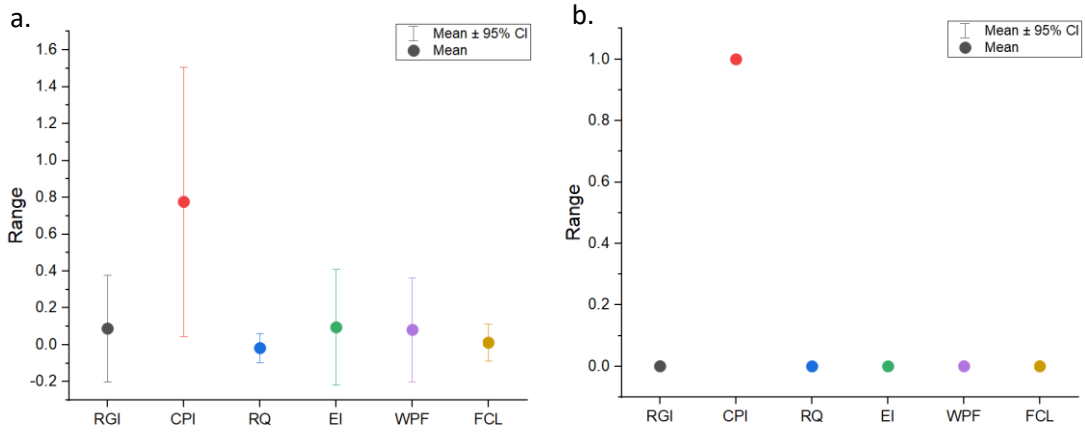

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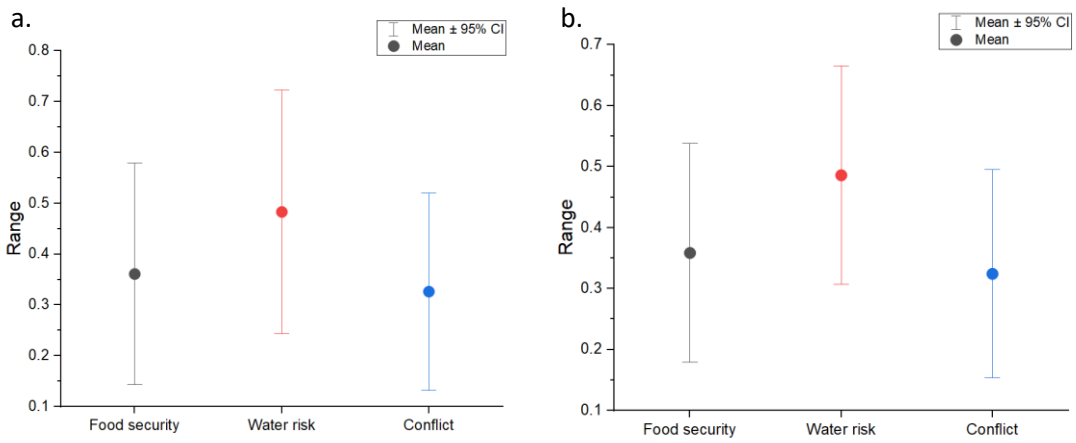

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Supplementary Tables

Supplementary Table 1: Proportion of ETM contained in reserves and resources on or near Indigenous Peoples' land and/or Peasant land. Project sample size n = 5097

	Indigenous only	Peasant only	Overlap	Combined Indigenous and Peasant	Neither	Number of projects
Bauxite	20%	63%	11%	94%	6%	110
Cerium	0%	5%	49%	54%	46%	7
Chromite	9%	45%	20%	74%	26%	49
Chromium	0%	88%	1%	89%	11%	7
Cobalt	18%	44%	10%	72%	28%	299
Copper	44%	12%	22%	78%	22%	2081
Dysprosium	13%	0%	27%	41%	59%	5
Gallium	0%	100%	0%	100%	0%	3
Germanium	0%	79%	21%	100%	0%	4
Graphite	7%	82%	1%	90%	10%	78
Heavy Mineral Sands	34%	31%	8%	73%	27%	63
Ilmenite	20%	31%	13%	64%	36%	59
Indium	19%	0%	76%	95%	5%	4
Iridium						*0*
Iron Ore	35%	33%	9%	78%	22%	661
Lanthanides	15%	11%	42%	68%	32%	113
Lanthanum	0%	6%	48%	55%	45%	6
Lead	45%	17%	19%	80%	20%	764
Leucoxene	85%	0%	0%	85%	15%	20
Lithium	78%	2%	7%	87%	13%	128
Magnesium	36%	3%	9%	47%	53%	10
Manganese	12%	6%	63%	81%	19%	72
Molybdenum	20%	57%	9%	86%	14%	358
Neodymium	0%	2%	45%	47%	53%	8
Nickel	34%	18%	23%	76%	24%	484
Niobium	73%	15%	3%	91%	9%	49
Platinum	2%	36%	46%	84%	16%	173
Praseodymium	0%	2%	25%	27%	73%	7
Rare Earth Elements	15%	11%	42%	68%	32%	133
Rutile	33%	22%	1%	57%	43%	39
Samarium	0%	2%	47%	49%	51%	5
Scandium	53%	1%	0%	55%	45%	11
Selenium						*0*
Silver	43%	8%	23%	74%	26%	1905

Tantalum	44%	6%	26%	76%	24%	59
Tellurium	0%	0%	0%	0%	100%	2
Tin	36%	9%	30%	74%	26%	123
Titanium	23%	48%	7%	78%	22%	56
Tungsten	20%	24%	26%	70%	30%	113
Vanadium	55%	15%	10%	80%	20%	108
Ytterbium	0%	0%	29%	29%	71%	4
Yttrium	72%	0%	15%	87%	13%	17
Zinc	44%	13%	20%	78%	22%	1036
Zircon	48%	13%	7%	68%	32%	55

Supplementary Table 2: Proportion of ETM contained in reserves and resources on or near Indigenous Peoples' land or Peasant land that are located in areas with specific contextual risk factors. Project sample size n = 3538

	Water risk	**Conflictual settings**	**Food insecurity**	**Both water risk and conflictual settings**	**Both food insecurity and conflictual settings**	**All three contextual factors**	**Indigenous Peoples and/or Peasant land**	**Number of projects on or nearby Indigenous Peoples' and/or Peasant land**
Bauxite	8%	79%	99%	7%	78%	7%	94%	75
Cerium	100%	90%	96%	90%	86%	86%	54%	3
Chromite	91%	92%	90%	91%	90%	90%	74%	33
Chromium	100%	100%	100%	100%	100%	100%	89%	3
Cobalt	73%	80%	85%	63%	67%	55%	72%	200
Copper	78%	60%	78%	42%	43%	31%	78%	1405
Dysprosium	68%	68%	71%	68%	38%	38%	41%	3
Gallium	100%	100%	0%	100%	0%	0%	100%	2
Germanium	100%	100%	100%	100%	100%	100%	100%	4
Graphite	83%	80%	96%	74%	79%	74%	90%	48
Heavy Mineral Sands	32%	52%	97%	20%	50%	20%	73%	38
Ilmenite	41%	70%	92%	36%	65%	33%	64%	35
Indium	20%	100%	80%	20%	80%	0%	95%	3
Iridium								*0*
Iron Ore	42%	60%	83%	26%	45%	17%	78%	494
Lanthanides	61%	75%	81%	52%	59%	51%	68%	71
Lanthanum	100%	88%	96%	88%	84%	84%	55%	3
Lead	62%	64%	75%	45%	46%	35%	80%	524
Leucoxene	23%	0%	100%	0%	0%	0%	85%	11
Lithium	72%	79%	82%	55%	61%	39%	87%	86

Magnesium	12%	6%	100%	0%	6%	0%	47%	9
Manganese	71%	85%	87%	68%	73%	67%	81%	63
Molybdenum	90%	88%	86%	82%	78%	76%	86%	242
Neodymium	100%	95%	95%	95%	90%	90%	47%	3
Nickel	55%	64%	69%	39%	38%	21%	76%	330
Niobium	4%	98%	97%	2%	96%	2%	91%	31
Platinum	98%	99%	92%	97%	91%	91%	84%	120
Praseodymium	100%	94%	95%	94%	89%	89%	27%	3
Rare Earth Elements	61%	75%	81%	52%	60%	51%	68%	84
Rutile	38%	41%	100%	9%	41%	9%	57%	25
Samarium	100%	97%	89%	97%	86%	86%	49%	3
Scandium	7%	9%	94%	0%	3%	0%	55%	8
Selenium								*0*
Silver	73%	82%	78%	62%	66%	54%	74%	1275
Tantalum	45%	68%	75%	32%	49%	28%	76%	43
Tellurium	0%	0%	0%	0%	0%	0%	0%	0
Tin	58%	86%	90%	56%	77%	55%	74%	72
Titanium	35%	74%	88%	28%	63%	27%	78%	32
Tungsten	78%	71%	78%	68%	65%	64%	70%	70
Vanadium	38%	33%	78%	29%	30%	29%	80%	83
Ytterbium	100%	100%	40%	100%	40%	40%	29%	2
Yttrium	81%	65%	86%	65%	62%	62%	87%	12
Zinc	61%	69%	68%	49%	48%	39%	78%	651
Zircon	37%	29%	100%	15%	29%	15%	68%	35

Supplementary Table 3: Proportion of ETM contained in reserves and resources on or near Indigenous Peoples' land or Peasant land that are located in areas with a majority of national capacity measures and contextual measures above the medium risk threshold. Project sample size n = 3538

	Percentage of reserves and resources with a majority of permitting, consultation and consent measures above medium risk threshold	**Percentage of reserves and resources with a majority of permitting, consultation and consent measures and contextual factors above medium risk threshold**	**Number of projects on or nearby Indigenous Peoples' and/or Peasant land**
Bauxite	81%	78%	75
Cerium	96%	96%	3

Chromite	92%	90%	33
Chromium	100%	100%	3
Cobalt	83%	66%	200
Copper	57%	46%	1405
Dysprosium	38%	38%	3
Gallium	100%	100%	2
Germanium	100%	100%	4
Graphite	93%	84%	48
Heavy Mineral Sands	56%	48%	38
Ilmenite	71%	65%	35
Indium	80%	80%	3
Iridium			*0*
Iron Ore	60%	48%	494
Lanthanides	93%	63%	71
Lanthanum	96%	96%	3
Lead	59%	47%	524
Leucoxene	0%	0%	11
Lithium	63%	61%	86
Magnesium	66%	6%	9
Manganese	82%	73%	63
Molybdenum	81%	78%	242
Neodymium	95%	95%	3
Nickel	79%	35%	330
Niobium	99%	97%	31
Platinum	99%	91%	120
Praseodymium	95%	95%	3
Rare Earth Elements	93%	63%	84
Rutile	42%	41%	25
Samarium	89%	89%	3
Scandium	3%	3%	8
Selenium			*0*
Silver	75%	67%	1275
Tantalum	73%	49%	43
Tellurium			0
Tin	97%	77%	72
Titanium	74%	63%	32
Tungsten	75%	68%	70
Vanadium	33%	30%	83
Ytterbium	40%	40%	2
Yttrium	72%	62%	12
Zinc	64%	50%	651
Zircon	30%	29%	35

Supplementary Table 4: The top 25 countries by number of projects that have a majority of national capacity measures above the medium risk threshold. Project sample size n = 3538

	Number of projects on or nearby Indigenous Peoples' and/or Peasant land that are in jurisdictions a majority of permitting, consultation and consent conditions above medium risk threshold
China	312
Mexico	212
Peru	186
Russia	149
South Africa	136
Brazil	116
Argentina	79
Kazakhstan	73
Philippines	72
Indonesia	66
Bolivia	39
India	33
Mongolia	30
Zambia	29
Dem. Rep. Congo	27
Papua New Guinea	25
Zimbabwe	24
Ecuador	23
Iran	21
Guinea	20
Tanzania	18
Cuba	17
Saudi Arabia	16
Morocco	16
Mozambique	16

Supplementary Table 5: The top 25 countries by number of projects that have a majority of national capacity measures and contextual measures above the medium risk threshold. Project sample size n = 3538

	Number of projects on or nearby Indigenous Peoples' and/or Peasant land that are in jurisdictions a majority of permitting, consultation and consent conditions and contextual factors above medium risk threshold
China	311
Mexico	212

Peru	186
South Africa	135
Brazil	116
Argentina	79
Kazakhstan	73
Philippines	68
Bolivia	39
Russia	37
India	33
Indonesia	30
Zambia	29
Dem. Rep. Congo	27
Ecuador	23
Guinea	20
Saudi Arabia	16
Morocco	16
Mozambique	15
Madagascar	15
Tanzania	14
Dominican Republic	11
Nicaragua	11
Serbia	11
Colombia	10

Supplementary Table 6: number and percentage of projects with contextual measures above medium risk threshold, distinguished by development stage (early stage or operating).

	Early stage	**Operating**
Number of projects on or nearby Indigenous Peoples' land and/or Peasant land	2409	1005
Number of projects on or nearby Indigenous Peoples' and/or Peasant land that are in areas of high water risk	1417	694
Number of projects on or nearby Indigenous Peoples' and/or Peasant land that are in conflictual settings	1535	772
Number of projects on or nearby Indigenous Peoples' and/or Peasant land that are in food insecure jurisdictions	1614	810
Number of projects on or nearby Indigenous Peoples' and/or Peasant land that have two out of three contextual metrics above medium risk threshold	1577	787

Percentage of projects on or nearby Indigenous Peoples' and/or Peasant land that are in areas of high water risk	59%	69%
Percentage of projects on or nearby Indigenous Peoples' and/or Peasant land that are in conflictual settings	64%	77%
Percentage of projects on or nearby Indigenous Peoples' and/or Peasant land that are in food insecure jurisdictions	67%	81%
Percentage of projects on or nearby Indigenous Peoples' and/or Peasant land that have two out of three contextual metrics above medium risk threshold	65%	78%

Supplementary Table 7: List of ETM and associated number of projects

ETM	**Number of projects with reserves and resources***
Bauxite (Aluminium)	110
Chromium	56
Cobalt	299
Copper	2081
Gallium	3
Germanium	4
Graphite	78
Indium	4
Iridium	0
Iron Ore	661
Lead	764
Lithium	128
Magnesium	10
Manganese	72
Molybdenum	358
Nickel	484
Niobium	49
Platinum	173
Rare Earth Elements	133
Selenium	0
Silver	1905
Tantalum	59
Tellurium	2
Tin	123
Titanium	137
Tungsten	113
Vanadium	108

Zinc	1036
Zircon	55

*Note: some deposits contain more than one ETM.

Supplementary Table 8: Percentage of projects captured depending on population density radius and threshold selection

		Radius for population density mean									
		10 km	20 km	30 km	40 km	50 km	80 km	100 km	120 km	150 km	200 km
Percentage of projects below the population density threshold of:	10 p/km^2	62%	58%	56%	58%	54%	56%	51%	53%	54%	52%
	20 p/km^2	68%	65%	64%	65%	62%	62%	58%	61%	61%	61%
	30 p/km^2	72%	70%	69%	70%	67%	67%	64%	66%	66%	65%
	40 p/km^2	74%	74%	72%	73%	71%	71%	68%	70%	70%	67%
	50 p/km^2	76%	76%	75%	76%	74%	74%	71%	74%	72%	71%
	60 p/km^2	78%	78%	78%	78%	76%	77%	75%	77%	75%	75%
	70 p/km^2	79%	80%	79%	80%	78%	79%	77%	78%	78%	77%
	80 p/km^2	81%	81%	81%	82%	80%	81%	79%	80%	79%	79%
	90 p/km^2	82%	83%	83%	83%	82%	82%	81%	82%	82%	81%
	100 p/km^2	83%	84%	84%	84%	83%	84%	82%	83%	83%	82%
	110 p/km^2	84%	85%	85%	85%	85%	85%	84%	85%	84%	84%
	120 p/km^2	85%	86%	86%	86%	86%	86%	85%	86%	86%	86%
	130 p/km^2	86%	87%	88%	87%	87%	87%	86%	87%	87%	87%
	140 p/km^2	87%	88%	88%	88%	88%	88%	87%	88%	88%	88%
	150 p/km^2	88%	89%	89%	89%	89%	89%	88%	89%	89%	88%

Supplementary Table 9: Percentage of projects near or on Indigenous Peoples' land captured depending on population density radius and threshold selection

		Radius for population density mean									
		10 km	20 km	30 km	40 km	50 km	80 km	100 km	120 km	150 km	200 km
Percentage of projects below the population density threshold of:	10 p/km^2	73%	70%	69%	69%	66%	69%	62%	65%	65%	64%
	20 p/km^2	78%	77%	76%	77%	75%	74%	70%	72%	72%	72%
	30 p/km^2	82%	81%	81%	81%	80%	78%	76%	77%	77%	76%
	40 p/km^2	84%	84%	83%	83%	83%	82%	81%	81%	81%	78%
	50 p/km^2	85%	86%	86%	86%	86%	85%	84%	84%	83%	82%
	60 p/km^2	87%	87%	88%	87%	87%	87%	87%	86%	84%	85%
	70 p/km^2	88%	89%	90%	89%	89%	89%	89%	87%	87%	86%
	80 p/km^2	89%	90%	91%	90%	90%	90%	90%	89%	88%	88%
	90 p/km^2	90%	92%	92%	91%	92%	91%	92%	90%	91%	89%
	100 p/km^2	91%	92%	93%	92%	93%	92%	93%	92%	91%	90%
	110 p/km^2	92%	93%	94%	93%	94%	93%	94%	93%	92%	91%
	120 p/km^2	92%	94%	95%	93%	94%	93%	94%	94%	93%	92%
	130 p/km^2	93%	95%	95%	94%	95%	94%	95%	95%	93%	93%
	140 p/km^2	94%	95%	96%	94%	96%	94%	95%	95%	94%	93%
	150 p/km^2	94%	96%	96%	95%	96%	95%	95%	96%	95%	93%

Supplementary Table 10: Percentage of projects near or on Peasant land captured depending on population density radius and threshold selection

		Radius for population density mean									
		10 km	20 km	30 km	40 km	50 km	80 km	100 km	120 km	150 km	200 km
Percentage of projects below the population density threshold of:	10 p/km^2	40%	33%	30%	32%	26%	30%	21%	27%	28%	27%
	20 p/km^2	49%	43%	41%	44%	39%	40%	34%	38%	38%	36%
	30 p/km^2	55%	51%	50%	52%	47%	47%	43%	46%	45%	43%
	40 p/km^2	60%	58%	56%	57%	54%	55%	49%	53%	53%	49%
	50 p/km^2	63%	63%	62%	64%	60%	61%	55%	59%	57%	53%
	60 p/km^2	67%	68%	67%	69%	64%	65%	61%	64%	61%	61%
	70 p/km^2	70%	72%	71%	73%	69%	70%	66%	67%	66%	66%
	80 p/km^2	72%	76%	75%	76%	72%	73%	69%	71%	69%	70%
	90 p/km^2	75%	79%	78%	78%	76%	75%	74%	73%	74%	74%
	100 p/km^2	78%	82%	81%	81%	79%	78%	75%	76%	75%	76%
	110 p/km^2	81%	84%	83%	84%	81%	82%	77%	79%	78%	78%
	120 p/km^2	82%	87%	86%	86%	83%	83%	79%	81%	81%	81%
	130 p/km^2	84%	88%	88%	87%	85%	84%	82%	83%	83%	82%
	140 p/km^2	86%	90%	90%	89%	87%	85%	83%	85%	85%	83%
	150 p/km^2	87%	92%	92%	90%	88%	87%	84%	87%	86%	84%

Supplementary Table 11: Datasets and criteria used for selecting ETM projects on Indigenous Peoples' land

Dataset name	**Dataset source**	**Dataset description**	**Inclusion criteria**
Indigenous Peoples Land	Garnett et al. (2018)[1]	Indigenous Peoples' land maps were compiled from 127 data sources to generate a global map of terrestrial lands managed or owned by Indigenous Peoples.	Projects falling in or within 10 km of an Indigenous Peoples' land polygon.
Population Density	Global Human Settlement Layer, European Commission (2015)[2]	The population density dataset uses residential population estimates for year 2015, which were disaggregated from census or administrative units to grid cells, using the Global Human Settlement Layer for built-up areas.	A mean population density lower than 100 people per km^2 in a 100-km radius around the project.
Climate Classification	Beck et al. (2018)[3]	Beck et al. provide Köppen-Geiger climate classification map at 1-km resolution. It is derived from an ensemble of topographically-corrected climatic maps.	Projects in region with fallowing climate classifications: arid, polar or

			tropical rainforest.

Supplementary Table 12: Datasets and criteria used for selecting ETM projects on Peasant land

Dataset name	Dataset source	Dataset description	Inclusion criteria
OECD member countries	Organisation for Economic Co-operation and Development[4]	The Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 38 member countries, founded in 1961 to stimulate economic progress and world trade.	Projects are in a non-OECD country.
Population Density	Global Human Settlement Layer, European Commission (2015)[2]	The population density dataset uses residential population estimates for year 2015, which were disaggregated from census or administrative units to grid cells, using the Global Human Settlement Layer for built-up areas.	A mean population density lower than 200 people per km^2 in a 20-km radius around the project.
Global Croplands	Unified Cropland Layer, Waldner et al. (2016)[5]	Waldner et al. provide a global cropland layer at 250 m resolution for global agriculture monitoring. Cropland is land used for the cultivation of food.	A non-zero mean value within a 10-km radius around the project, for either cropland or pasture land raster.
Global Pastures	Global Pasture Lands, v1, NASA Socioeconomic Data and Applications Center (2000)[6]	The Global Pastures datasets represent the proportion of land areas used as pasture land (land used to support grazing animals) in the year 2000. Satellite data were combined with agricultural inventory data.	

Supplementary Table 13: Datasets and thresholds used for characterising other contextual factors influencing risk conditions around ETM projects

Dataset name	**Dataset source**	**Dataset description**	**Medium threshold**
Global Peace Index	Vision of Humanity (2021)[7]	The Global Peace Index measures peace as the "absence of violence and absence of the fear of violence". The index uses indicators classified under three themes: (1) ongoing domestic and international conflict, (2) societal safety, and (3) security and militarization.	Defined by dataset authors: equal to or above 3
Conflicts	Georeferenced Events Database (GED), Global Version 21.1, Uppsala Conflict Data Program, Uppsala University[8]	In the GED, conflicts are defined as individual events of organized violence, phenomena of lethal violence occurring at a given time and place. These events are sufficiently fine-grained to be geo-coded down to the level of individual villages, with temporal durations disaggregated to single, individual days. The GED contains more than 200,000 single events that occurred between 1989 and 2020.	A 50-km distance between the mining project and a violent conflict
Global Food Security Index	Economist Impact (2021)[9]	The Global Food Security Index (GFSI) is a country-level measure covering 113 countries It is based on a quantitative and qualitative benchmarking model, constructed from 28 standardised indicators that measure food security. The index considers the core three issues of 'affordability', 'availability', and 'quality and safety'.	Threshold between first and second quartile: score equal to or below 72.2
Overall Water Risk	World Resources Institute, Aqueduct water risk framework - Version 3.0[10]	The Aqueduct water risk framework is based on a spatial dataset that delineates water catchments. Data on catchment was gathered from the Global Drainage Basin Database (GDBD), comprising 11,476 complete river basins more finely resolved into 73,074 sub-basin polygons. Overall water risk identifies areas with higher exposure to water-related risks and is an aggregated measure of all selected indicators from the Physical Quantity, Quality and Regulatory & Reputational Risk categories.	Defined by dataset authors: score equal to or above 2

Supplementary Table 14: Number and percentage of projects captured depending on the choice of distance threshold to nearest conflict.

	Number of projects below the threshold			Percentage of projects below the threshold		
Distance threshold to nearest conflict	All projects	Projects on or near Indigenous Peoples' land	Projects on or near Peasant land	All projects	Projects on or near Indigenous Peoples' land	Projects on or near Peasant land
10 km	297	150	139	6%	5%	8%
20 km	561	295	284	11%	11%	17%
30 km	747	406	398	15%	15%	24%
40 km	882	474	483	17%	17%	29%
50 km	1021	544	567	20%	20%	34%
60 km	1111	596	630	22%	22%	37%
70 km	1198	650	688	24%	24%	41%
80 km	1260	679	723	25%	25%	43%

Supplementary Table 15: Datasets and thresholds used for characterising permitting, consultation and consent conditions at national level in jurisdictions where ETM projects are located

Dimension: Permitting			
Dataset name	**Dataset source**	**Dataset description**	**Medium threshold**
Corruption Perceptions Index	Transparency International (2020)[11]	The Corruption Perceptions Index (CPI) provides perceptions by business people and country experts of the level of corruption in the public sector.	Defined by dataset authors: score equal to or below 50
Resource Governance Index	Natural Resource Governance Institute (2021)[12]	The Resource Governance Index (RGI) assesses the quality of the country's laws, regulations and policies that are relevant to the extractive sector; the quality of mining project disclosure; the presence of oversight; the quality of the enabling environment for resource governance.	Defined by dataset authors: score equal to or below 60
Regulatory Quality	World Governance Indicators, World Bank (2020)[13]	The indicator captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Defined by dataset authors: score equal to or below 0

Dimension: Consultation and Consent			
World Press Freedom	Reporters Without Borders (2021)[14]	The Index provides a snapshot of the media freedom situation based on an evaluation of pluralism, independence of the media, quality of legislative framework and safety of journalists in each country.	Defined by dataset authors: score equal to or above 35
Civil liberties	Freedom in the World Index, Freedom House (2021)[15]	The Freedom in the World Index measures levels of civil liberties including freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights.	Defined by dataset authors: score equal to or below 42
Education index	United Nations Development Program (2019)[16]	Education Index is framed as a measure of years of schooling, with the education of current and future generations receiving equal weights.	Threshold between first and second quartile: country score equal to or below 0.79

Supplementary Table 16: OLS regression results for Permitting, Consultation and Consent thresholds (n = 4580)

	Coef	Std.Err	*t*	*p*	95% CI	R^2	Adjusted R^2	*F*
Constant	0.003	0.001	6.459	0.000**	0.002 ~ 0.004			
Resource Governance Index	0.088	0.012	7.526	0.000**	0.065 ~ 0.110			
Corruption Perceptions Index	0.776	0.029	26.411	0.000**	0.718 ~ 0.834			
Regulatory Quality	-0.018	0.003	-5.653	0.000**	-0.024 ~ -0.012	0.980	0.980	*F* (6,4573)=177879.374 *p*=0.000
Education Index	0.094	0.013	7.477	0.000**	0.070 ~ 0.119			
World Press Freedom	0.081	0.011	7.130	0.000**	0.059 ~ 0.103			
Freedom in the World	0.011	0.004	2.707	0.007**	0.003 ~ 0.019			

Dependent variable： Score outcome

D-W value： 1.845

* $p<0.05$ ** $p<0.01$

Supplementary Table 17: Robustness regression results for Permitting, Consultation and Consent thresholds (n = 4580)

	Coef	Std.Err	*t*	*p*	95% CI	R^2	Adjusted R^2	*F*
Constant	-0.000	0.000	-10.402	0.000**	-0.000 ~ -0.000			
Resource Governance Index	0.000	0.000	2.696	0.007**	0.000 ~ 0.000			
Corruption Perceptions	1.000	0.000	1690587136 6008608.000	0.000**	1.000 ~ 1.000			
Regulatory Quality	-0.000	0.000	-44.771	0.000**	-0.000 ~ -0.000	0.973	0.973	*F* (6,4573)=27357.822 *p*=0.000
Education Index	-0.000	0.000	-51.233	0.000**	-0.000 ~ -0.000			
World Press Freedom	0.000	0.000	42.012	0.000**	0.000 ~ 0.000			
Freedom in the World	0.000	0.000	21.536	0.000**	0.000 ~ 0.000			

Dependent variable： Score outcome

* *p*<0.05 ** *p*<0.01

Supplementary Table 18: OLS regression results for Contextual Factor measures (n = 4769)

	Coef	Std.Err	*t*	*p*	95% CI	R^2	Adjusted R^2	*F*
Constant	-0.042	0.004	-9.620	0.000**	-0.051 ~ -0.034			
Global Food Security Index	0.361	0.009	41.206	0.000**	0.344 ~ 0.378			
Overall Water Risk	0.483	0.010	50.113	0.000**	0.464 ~ 0.502	0.795	0.795	*F* (3,4765)=16763.080,*p*=0.000
Conflict	0.326	0.008	41.831	0.000**	0.311 ~ 0.341			

Dependent variable： Score outcome

D-W value： 1.851

* *p*<0.05 ** *p*<0.01

Supplementary Table 19: Robustness regression results for Contextual Factor measures (n = 4769)

	Coef	Std.Err	*t*	*p*	95% CI	R^2	Adjusted R^2	*F*
Constant	-0.040	0.006	-6.542	0.000**	-0.052 ~ -0.028	0.795	0.795	*F* (3,4765)=6158.355,*p*=0.000
Global Food Security Index	0.358	0.007	49.707	0.000**	0.344 ~ 0.373			
Overall Water Risk	0.486	0.007	67.621	0.000**	0.472 ~ 0.500			
Conflict	0.324	0.007	47.247	0.000**	0.311 ~ 0.338			

Dependent variable： Score outcome

* $p<0.05$ ** $p<0.01$

Supplementary Note 1

The two Indigenous Peoples' and Peasant land proxies were subject to an internal verification process. It functioned as sense-check against existing global sources understanding that the Garnett et al.[1] dataset, while the most complete, is primarily concerned with the intersection between Indigenous Peoples and conservation management. No spatial estimates have been developed for Peasant populations. The initial step of the process defined a first version of the proxies that addresses gaps in current sources, using a combination of global datasets. In the second step, the core study team tested the proxies by checking their coverage on an internally generated list of 60 known mining projects distributed around the globe. Based on the result of this check, proxies were corrected, and a new version was generated. This "build and check" iterative process was repeated until 58 of the 60 tested projects (>95% of the sample) were accurately captured by the proxies. A final step involved two separate members of the team manually verifying the locality, landcover and population densities of a randomly generated list of 40 mining projects from each of the qualifying samples (Indigenous Peoples' or Peasant) through satellite imagery. When this final step returned no aberration, the proxies were validated.

To develop the Peasant land proxy, the "build and check" iterative process revolved around setting an appropriate population density threshold. In step one, a population density of

less than 250 persons per km^2 across a 100-km radius around the project was used as initial threshold to exclude more populous centres. In step two, a list of known mining projects was then used to test for extent. The selected population density threshold excludes the Nui Phao poly-metallic mining operation in Vietnam, despite it being surrounded by subsistence rice farming. Likewise, this threshold would exclude the Cerro de Maimon Copper-Gold operation (at 326 persons per km^2) in the Dominican Republic which is in clear proximity to vast tracts of subsistence activity. As part of the iterative process, step one was repeated with a new population density threshold of 500 persons per km^2 across a 100-km radius, noting that the Nui Phao area reports 481 persons per km^2. With this threshold, 98 percent of ETM projects fell within the qualifying sample. This was subject to further verification steps. Unlike the Indigenous Peoples' land proxy developed above, using a 100 km radius for Peasant lands draws in a large number of industrialised areas attached to major city centres. To narrow the focus to lands occupied by Peasant groups, the radius was reduced to 20 km with an adjusted population density of 200 persons per km^2. This approach saw the retention of Cerro de Maimon in the Dominican Republic within the qualifying set. Nui Phao, however, dropped out due to the heavy population build up in the townscape surrounding the project area. The new threshold and radius succeeded in capturing all projects known to be on or near Peasant land, with the exception of Nui Phao. The 200 persons per km^2 across a 20 km radius criteria was validated in the third and final step, where 40 random projects from the qualifying sample were parsed using the historic imagery function on Google Earth to verify the land cover classification. The visual check returned no aberration.

Supplementary Note 2

This note describes the sensitivity analysis results for the (i) Permitting, Consultation and Consent measures and (ii) Local and National Contextual Factors measures respectively. The sensitivity analysis involves two sets of robustness tests to confirm the stability of the dataset generated by different measures and thresholds. To conduct this test, we used the ordinary least squares (OLS) regression model and the robust regression model (M estimation method). For the OLS regression, the Durban-Watson test was done to test for significant residual autocorrelation. For both tests the statistic was ~1.85, as shown in Supplementary Tables 16 and 18, indicating no autocorrelation.

Robustness test on Permitting, Consultation and Consent measures

i. OLS regression analysis on Permitting, Consultation and Consent measures

As can be seen from Supplementary Table 12, individual thresholds are used as the independent variables for the OLS regression. The R-square value of the model is 0.980, which means that the six measures for permitting, consultation and consent (Resource Governance, Corruption Perceptions, Regulatory Quality, Education, World Press Freedom, Freedom in the World) can explain 98.04% of the variation in score outcomes for the Permitting, Consultation and Consent dataset. The model passed the F test ($F=177879.374$, $p=0.000<0.05$), which means that at least one threshold used across the six measures will affect the score outcome. The model formula is: Score outcome=0.003 + 0.088*Resource Governance Index + 0.776*Corruption Perceptions Index + 0.018*Regulatory Quality + 0.094*Education Index + 0.081*World Press Freedom + 0.011*Freedom in the world.

The regression coefficient values of the thresholds for each six measures are shown in Supplementary Table 12. In summary, the results show that all thresholds have a significant positive impact on the score outcome, with the exception of Regulatory Quality, which shows a significant negative impact.

ii. Robustness regression analysis for Permitting, Consultation and Consent measures

As can be seen from Supplementary Table 13, the thresholds for the six permitting, consultation and consent measures are used as independent variables. The score outcome is used as a Dependent variable for the Robust regression analysis (M estimation method). The regression coefficient values for the six measures are shown in Supplementary Table 13. In summary, the results show that all measures have a significant positive impact on the score outcome, with the exception of two measures, Education and Regulatory Quality, which indicate a significant negative impact on score outcomes.

Robustness test on Contextual factors

i. OLS regression analysis for Contextual factors

As can be seen from Supplementary Table 14, OLS regression analysis was carried out using thresholds from the Global Food Security Index, Overall Water Risk and Conflict measures as independent variables. The model R square value of 0.795 means that the thresholds for the Global Food Security Index, Overall Water Risk and Conflict can explain 79.50% of the changes in the score outcome. The model passed the F test ($F=16763.080$, $p=0.000<0.05$), meaning at least one threshold from the three measures will have an impact on the score outcome. The model formula is: Score outcome=-0.042 + 0.361*Global Food Security Index + 0.483*Overall Water Risk + 0.326* Conflict.

The regression coefficient values for the three measures are shown in Supplementary Table 14. In summary, the results show that each of the three measures have a significant positive impact on the score outcome.

ii. Robustness regression analysis for Contextual Factors

It can be seen from Supplementary Table 15 that the thresholds for Global Food Security, Overall Water Risk, and Conflict were used as independent variables. The Score outcome is used as a Dependent variable. Results for the Robust regression analysis (M estimation method applied) are presented in Supplementary Table 15. In summary, the results show that each of the three measures have a significant positive impact on the score outcome.

Supplementary references

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