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Raw Materials & Environment 2019

Climate Change Impacts on Mining and Raw Material Supply

Berlin, 20 February 2019

Lukas Rüttinger, adelphi

Adani coal terminal releases more water into wetlands near Abbot Point port

By [Ashleigh Stevenson](#)

Updated 7 Feb 2019, 10:59am



Australia flooding to disrupt lead, zinc concentrate rail shipments

Reuters | about 16 hours ago |

Glencore coal operations in Queensland hit by heavy rain

⌚ February 7, 2019 📰 News 🚩 Ewen Hosie

PHOTO: Abbot Point Operations said it would continue to monitor for water releases. (Supplied)



© Pablo Sanhueza / Getty Images

← Floods

Floods

Escondida copper production for the 2017 financial year decreased by 21 per cent to 772 kt. The decrease was due to: a four day site-wide suspension of operations following a fatality in October 2016, 44 days of industrial action in the March 2017 quarter and severe weather in early June 2017, reducing production by 21 kt, 214 kt and 12 kt,

Floods in the Atacama Desert

It is not every day that you have a billion-dollar loss in the desert, especially one caused by water. The people in northern Chile now know from painful experience that it can indeed happen.

02.03.2016

BREAKING CITY NEWS FEBRUARY 25, 2015 / 5:02 PM / 3 YEARS AGO

Drought in Chile curbs copper production, to trim global surplus

Reuters Staff

4 MIN READ



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MARKETS | COMMODITIES

Water Troubles in Tiny Chilean Town Threaten Global Copper Supply

Drought in Chile results in reduced output, legal wrangling between miners and farmers

Aims of the project

- 1. Addressing research gaps:** Systematic assessment of how climate change can potentially affect the environmental risks of mining and how raw material supply chains might be affected by climate change impacts.
- 2. Developing policy options for a more responsible and coherent raw material policy,** feeding into
 - the German Resource Efficiency Programme (ProgRess)
 - the German Raw Material Strategy (Deutsche Rohstoffstrategie)
 - and the German Strategy for Adaptation to Climate Change (Deutsche Anpassungsstrategie).

Canada

Climate: Mainly subarctic/polar tundra

Raw material: Nickel, Tungsten



Chile

Climate: Cold semi-arid to desert

Raw material: Copper, Lithium

South Africa

Climate: Mainly arid to temperate

Raw material: PGM, Nickel

Five case studies



Australia

Climate: Tropical, winter dry/coastal; hot desert; hot semi-arid

Raw material: Bauxite, iron ore, coking coal

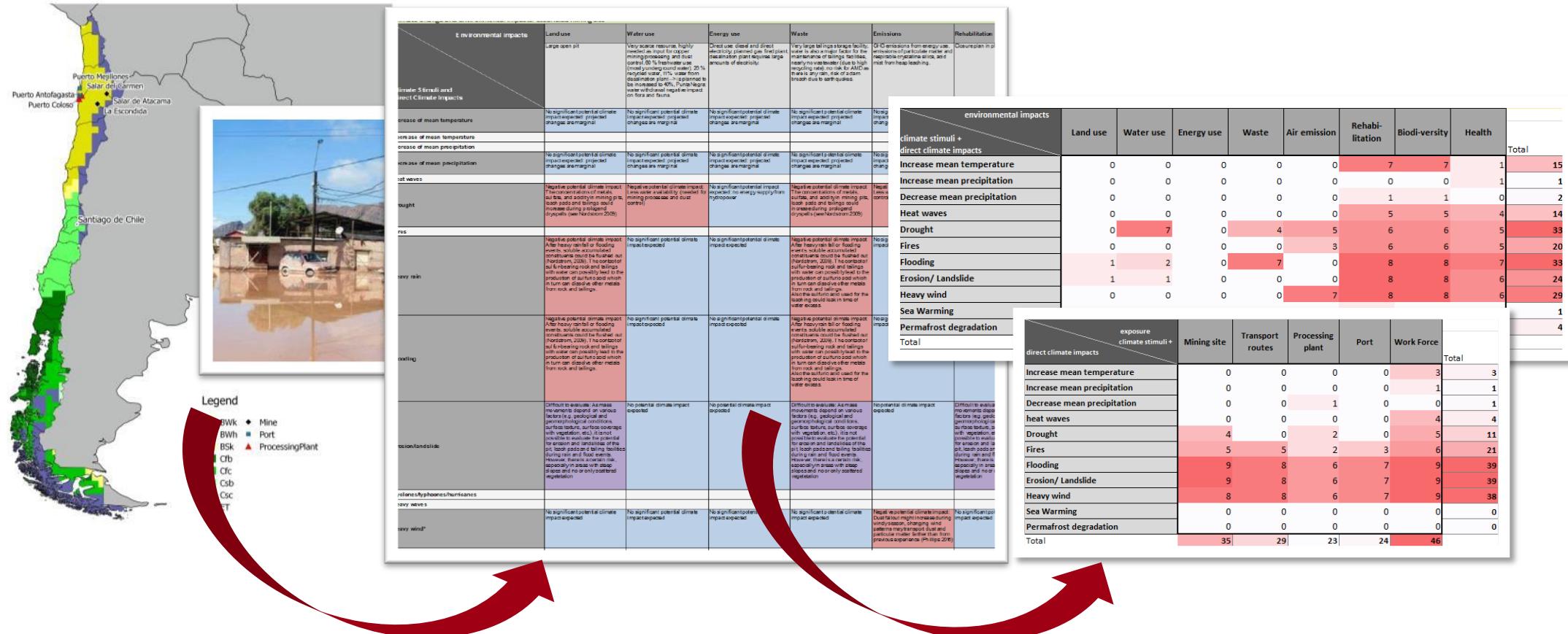
Indonesia

Climate: Tropical rainforest/coastal

Raw material: Tin

Climate change and mining

Part I and II of the research process



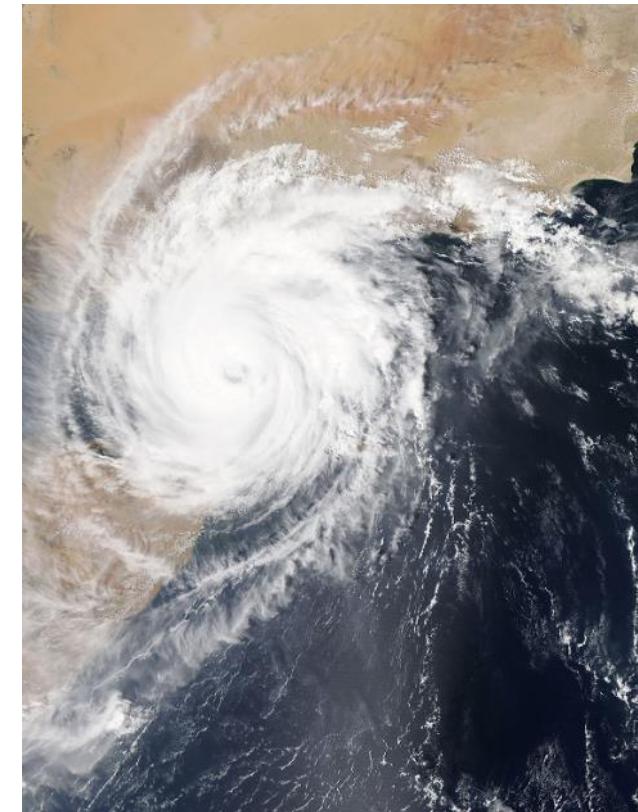
5 country case studies, covering 9 raw materials

27 site-specific assessment matrixes for potential climate impacts

Comparing assessment matrixes, leading to general observations

Extreme weather events as main risk

- Extreme weather events stand out as main risks across different raw materials, mining sites and climatic zones.
 - Increase environmental risks and can cause disruption of operations
- Combination of extreme weather events can increase risks



NASA/unsplash

Biodiversity, rehabilitation and local communities

- Rehabilitation and biodiversity are closely interlinked and affected by nearly all climate impacts.
- Biodiversity and local communities are under pressure by multiple stressors
- Climate change can act as a '**risk multiplier**'
- Need for comprehensive understanding how mining interacts with other pressures including climate change



Lubo Minar/unsplash

Climate change and supply chain disruptions

- Flooding, erosion/landslides and heavy winds are the biggest risks
- Fires, drought (less water available for dust suppression) and heat waves can endanger the workforce
- Mining sites at remote areas are more vulnerable to potential supply chain disruption



Torsten Dederich/unsplash; Matt Howard/unsplash

Climate change vulnerability assessment of main producing countries and reserves

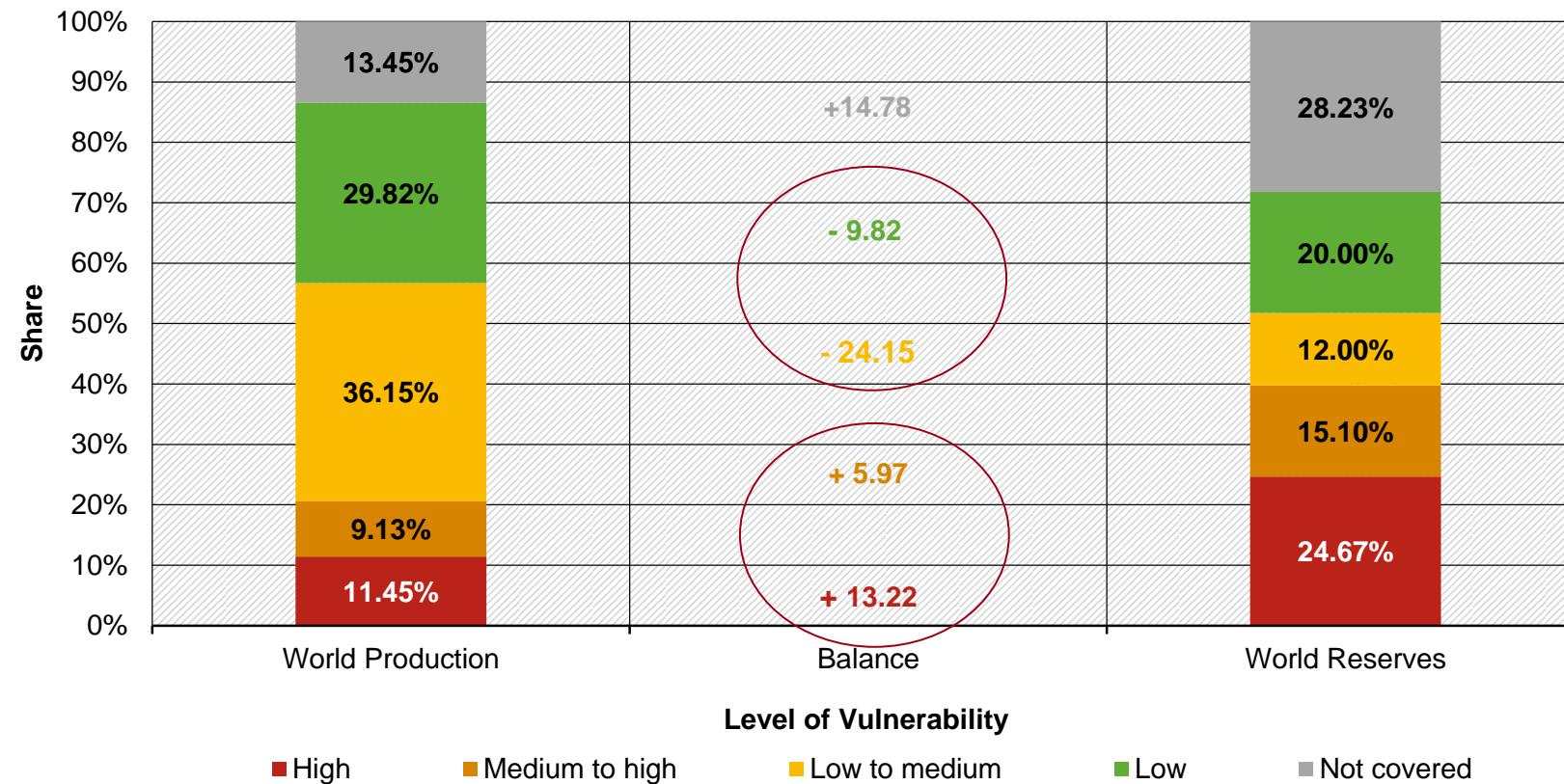
- ND-GAIN Country Index
 - Scores grouped into quartiles
- Production and reserves
 - 9 selected raw materials
 - **Today:** Main producing countries representing 75% of current world production
 - **Outlook:** Countries with main reserves (= countries which potentially become more important as distribution of production gradually converges towards the distribution of reserves, according to Coulomb et al. 2015)
 - Data: 2016 production and reserves, mostly USGS data

Example Bauxite

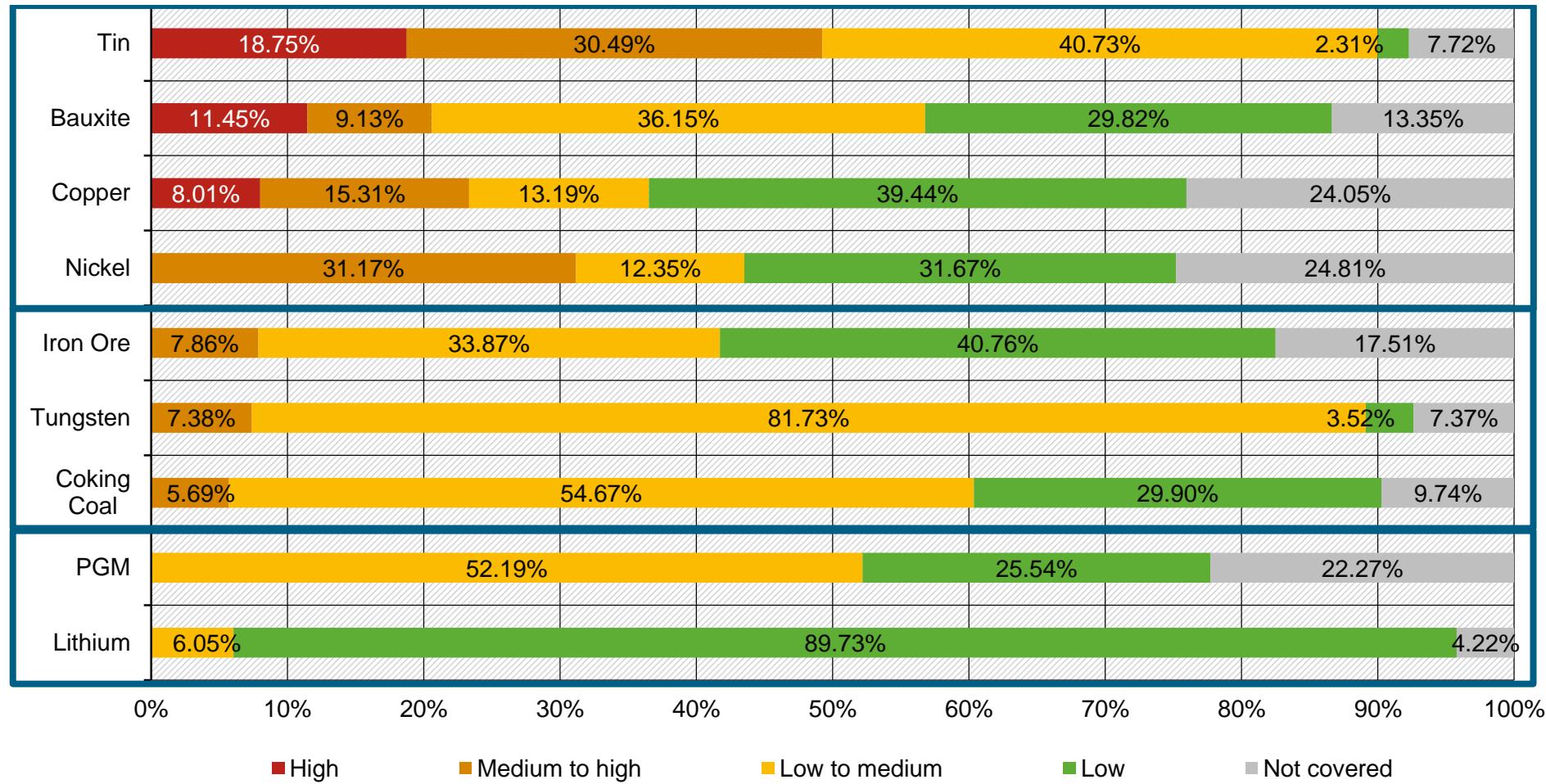
| Country | Share of world production | Share of world reserves | Vulnerability | Exposure | Sensitivity | Adaptive Capacity |
|--------------|---------------------------|-------------------------|---------------|----------|-------------|-------------------|
| Australia | 29.82% (Rank 1) | 20.00% (Rank 2) | 0.294 | 0.480 | 0.119 | 0.273 |
| China | 23.64% (Rank 2) | 3.33% (Rank 6) | 0.389 | 0.448 | 0.324 | 0.394 |
| Brazil | 12.51% (Rank 3) | 8.67% (Rank 4) | 0.381 | 0.501 | 0.256 | 0.385 |
| Guinea | 11.45% (Rank 4) | 24.67% (Rank 1) | 0.537 | 0.436 | 0.403 | 0.729 |
| India | 8.69% (Rank 5) | 2.77% (Rank 9) | 0.497 | 0.572 | 0.383 | 0.536 |
| Vietnam | 0.44% (Rank 19) | 12.33% (Rank 3) | 0.475 | 0.491 | 0.451 | 0.482 |
| Total | 86.55% | 71.76% | | | | |

Own figure, results based on USGS (2018), ND-GAIN (2018).

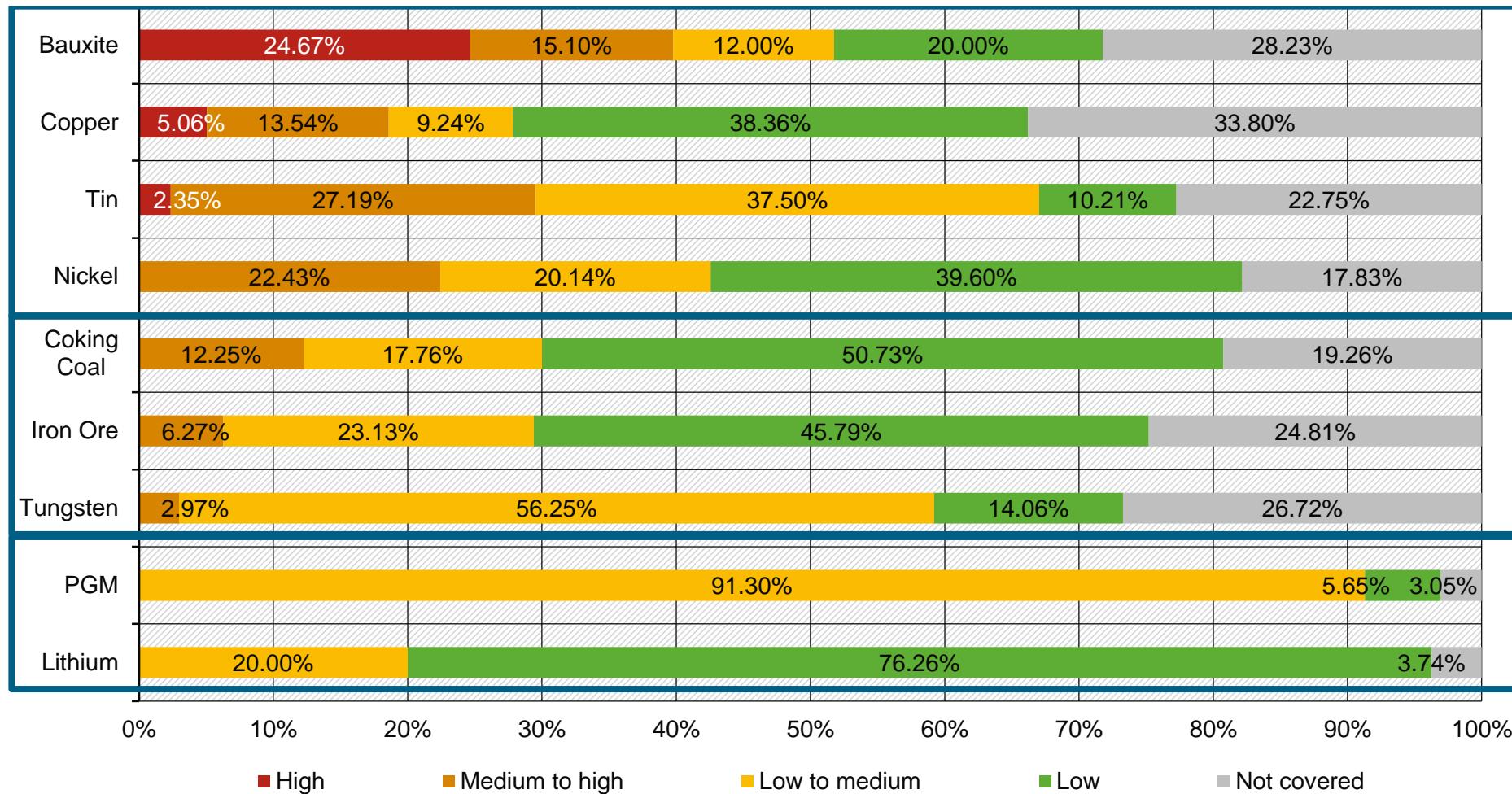
Bauxite Production and Reserves - Vulnerability



Comparison of the vulnerability of producing countries



Comparison of the vulnerability of reserves



What to do? How to increase the adaptive capacity of the mining sector?

- International level: G7 and G20 as entry points
- National level:
 - National climate change adaptation policies
 - German resource strategies and initiatives
- Company level:
 - Comprehensive climate change adaptation strategies and measures are largely lacking in the mining sector.
 - Mining companies and national authorities need to mainstream climate change adaptation into their policies, strategies, and operations.

Commissioned by



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