GreenDelta

sustainability consulting + software

# Sustainable mining: how to quantify social issues in the mining industry and metals supply chain

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Social LCA – Challenges and solutions in application and implementation
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# Framework


MINERALS AND METALS
SOCIAL FAIRNESS
LEGAL FRAMEWORK
ENVIRONMENTAL PROTECTION
BUSINESS AND ECONOMICS
PRESSURES IN MINING

# Challenges – social issues

- **Dynamic**, cause-effect relations among social and socio-economic risks and impacts
- How to understand the **local context**
- **Complementarity** with the other sustainability dimensions
- How to measure issues expressed in a **qualitative** way
- **Data quality**

# Challenges – social issues in mining

- How to **balance** business, environmental protection and social fairness
- **Positive** and **negative** impacts

# Challenges – social issues in mining

- Positive and negative impacts

Job creation

Poor working conditions

Infrastructure construction

Rise of the cost of living

Local development

Resettlement, limited access to resources

Economic and income growth

Unfair distribution of the profit

Population growth

Social tensions and matters

Human health and safety issues

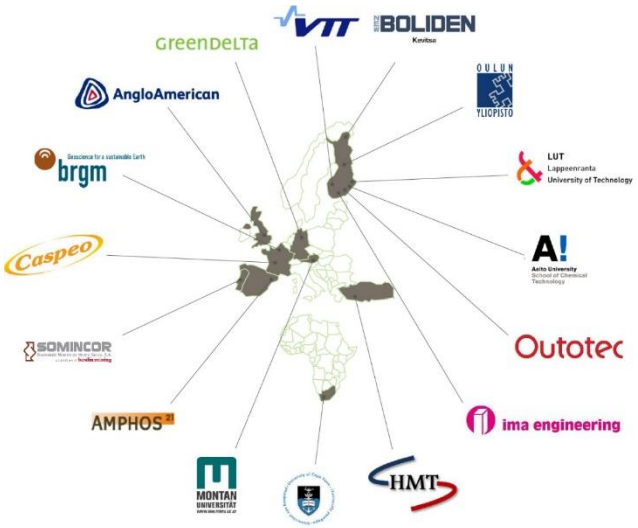
Discrimination

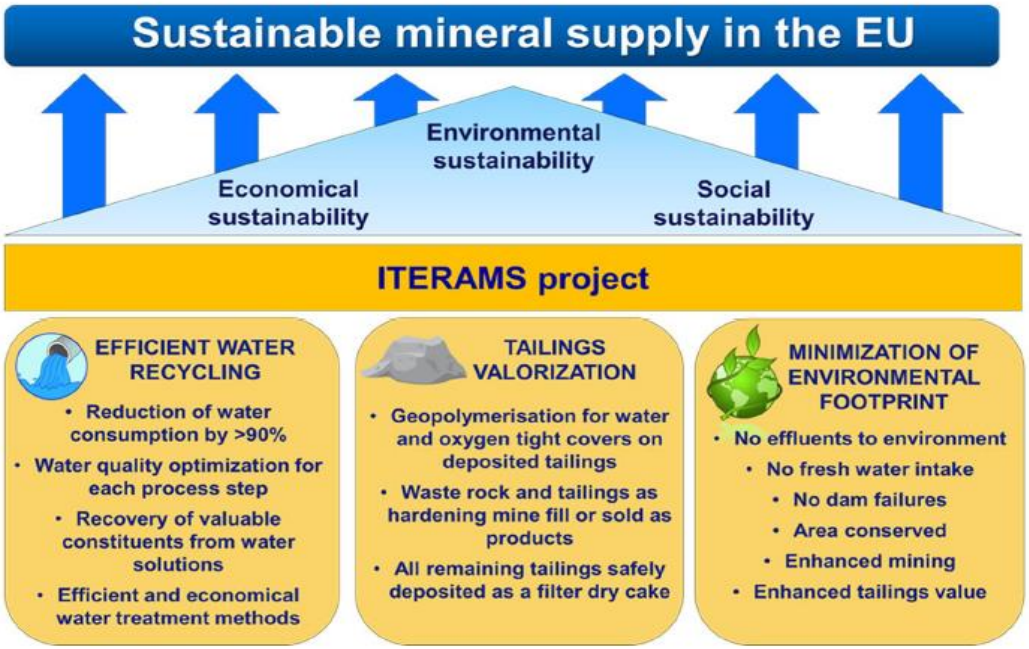
# Challenges – social issues in mining

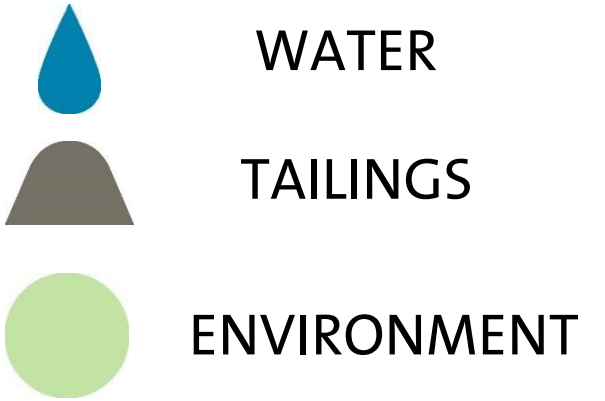
- How to **balance** business, environmental protection and social fairness
- **Positive** and **negative** impacts
- How to approach **local communities**
- **Collaboration** with the mine sites/companies
- **Data collection**
- How to measure risks/impacts in the **supply chain**

# Integrated Mineral Technologies for more Sustainable Raw Material Supply

- H2020 issue "Sustainable selective low impact mining"
- 3 years: 1.6.2017 – 31.5.2020
- 7.9 M€ budget
- 16 partners



# The ITERAMS project

- **Sustainability assessment**

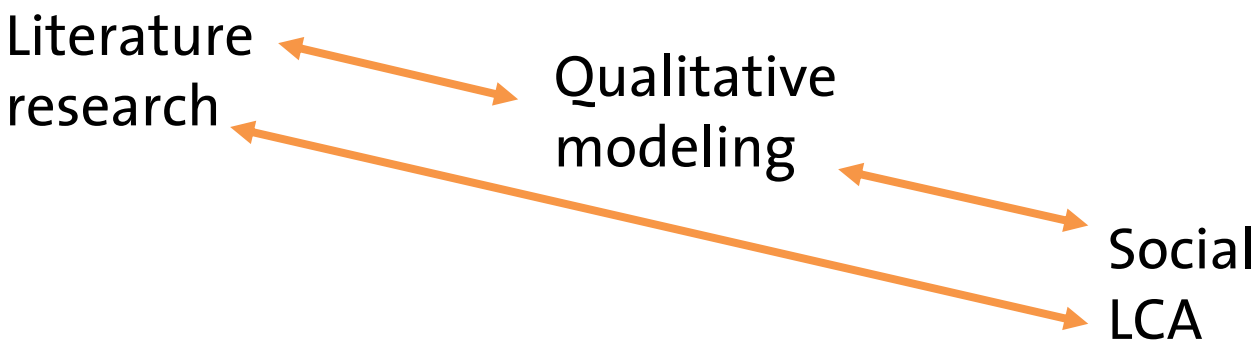
  - Environmental
  - Cost
  - Social

- **Local communities**

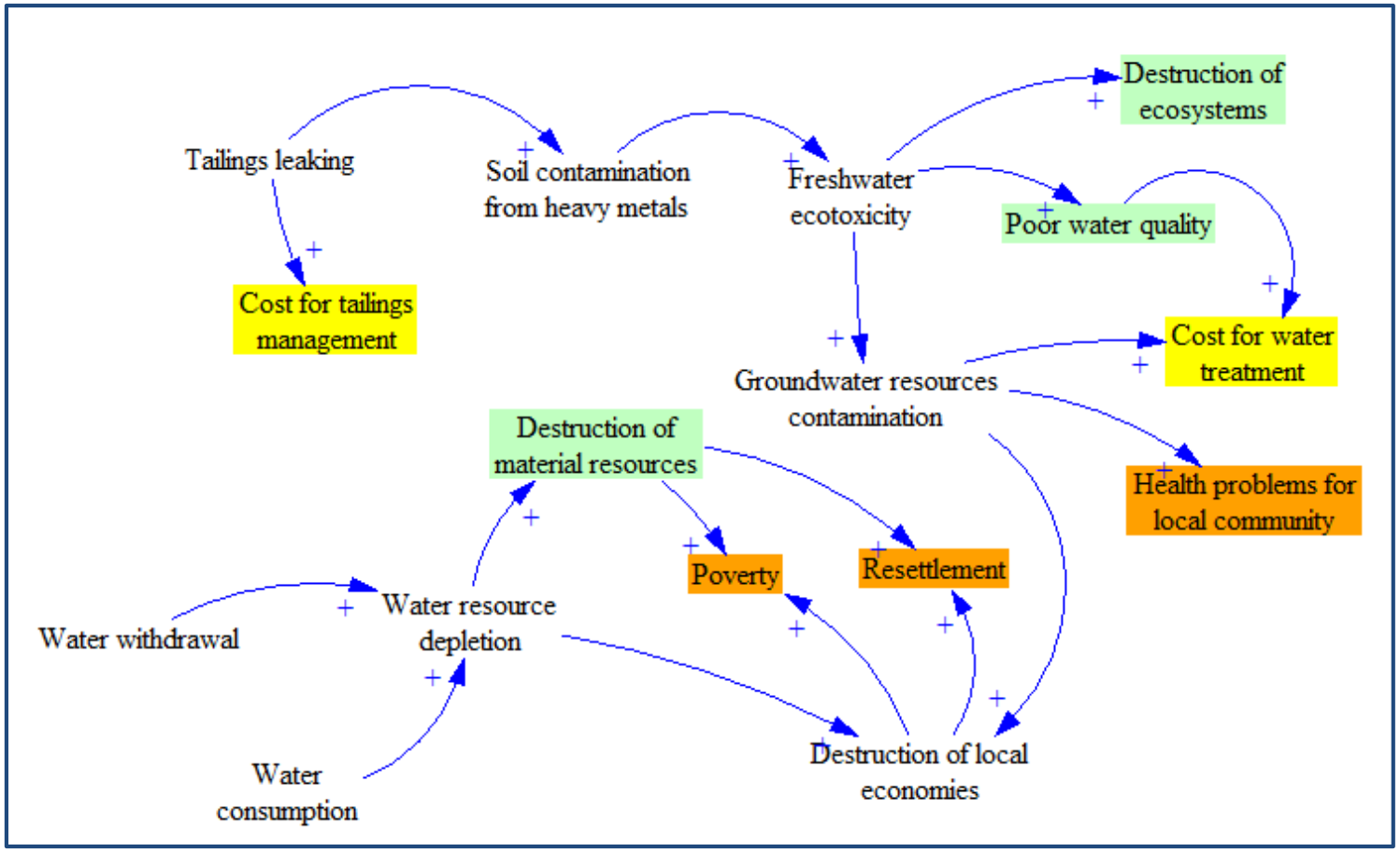
  - Social perception
  - Communication channels
  - Communication action plan

1st step

**Social hotspots screening**

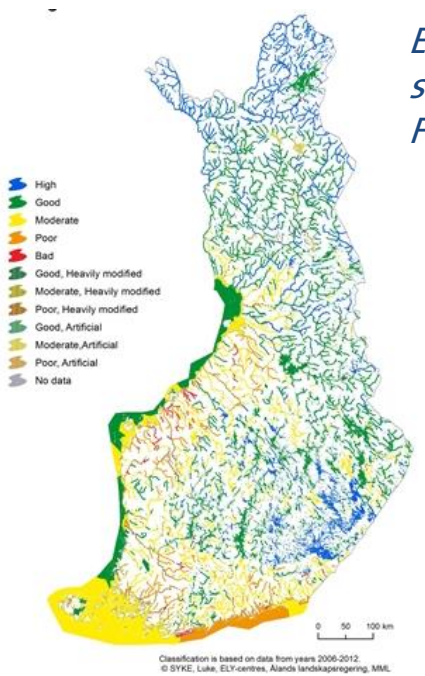


# Understanding – a qualitative model

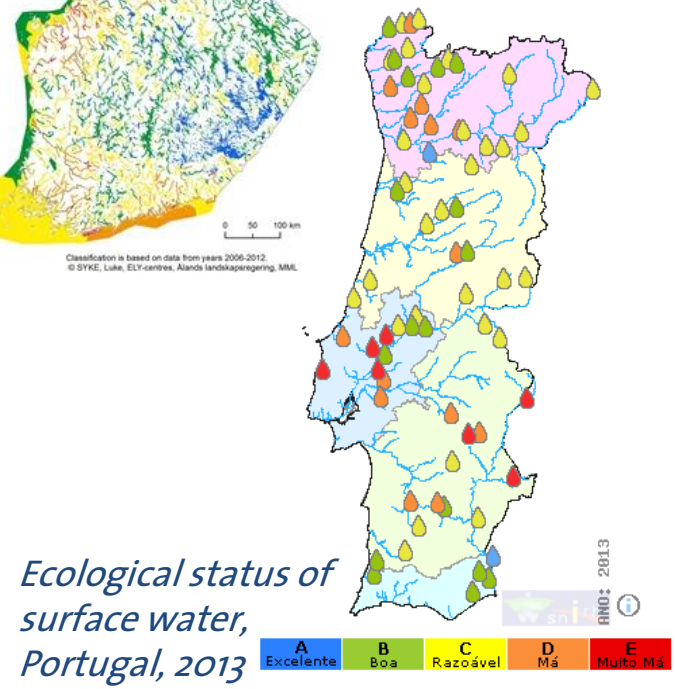


# Understanding - the context of mining

- Vulnerability of local communities, e.g. their dependence on local water reserves
- Availability and quality of water and mineral resources
- Conflicts with other industries
- Importance of mining for the local/national economy
- Risks on a national scale (not sector-specific)
- Steadiness of risks/impacts




*Ecological status of surface water, Finland, 2015*




*Ecological status of surface water, Portugal, 2013*

# SLCA screening – a first quantification

- Country: Finland, Portugal
- Database: PSILCA
- IAM: Social Impacts Weighting Method in PSILCA
- Process: Mining of metal ores

**SLCA screening steps:**

1. Define social risks (without upstream chain)
2. Calculate social risks and impacts over the life cycle
3. Compare results with an average country sector
4. Explore relations between social impacts and governance and human development

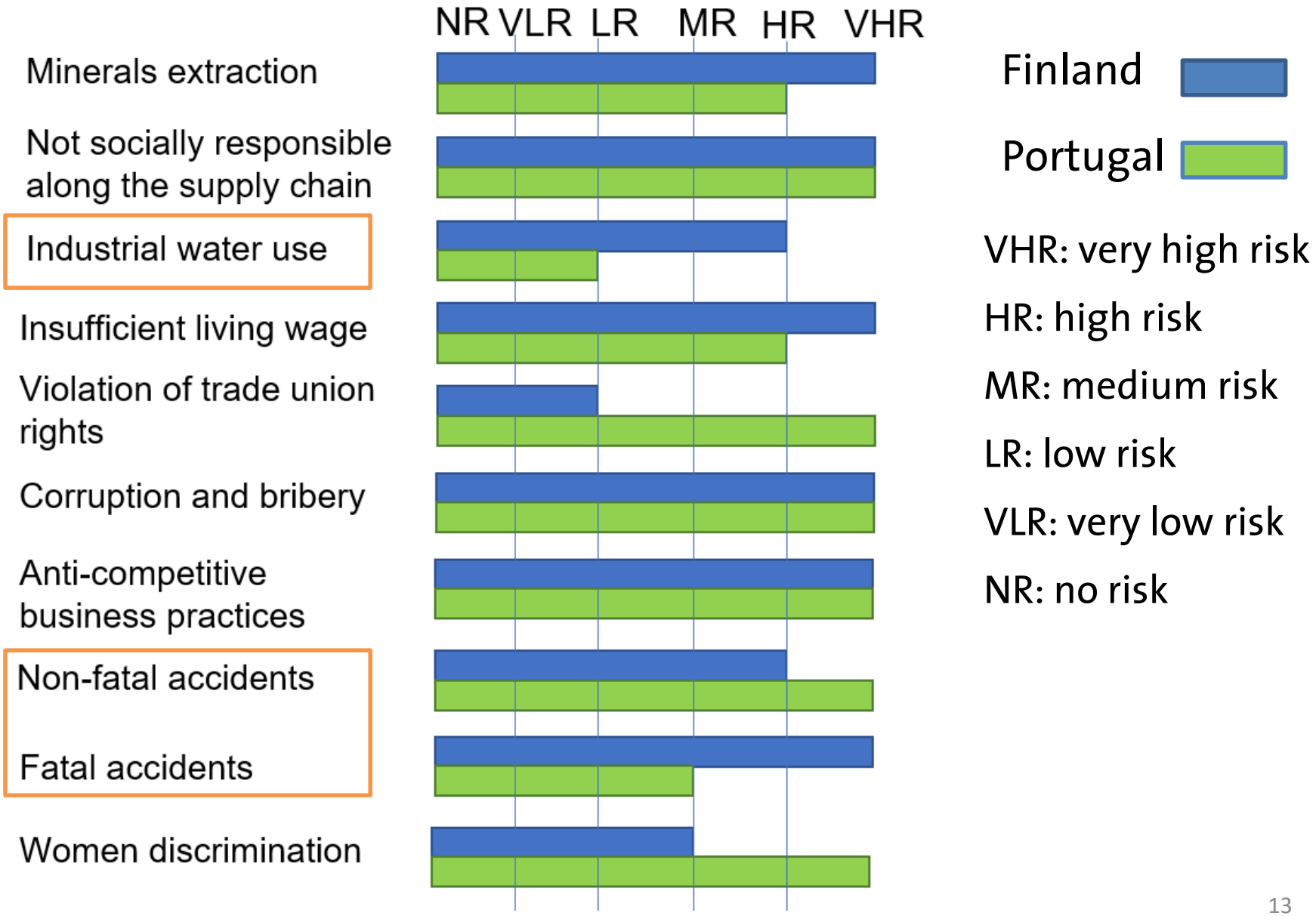
# 1. Social risks in the sector

*Social aspects for the process Mining of metal ores, Finland, from PSILCA database*

Social assessment

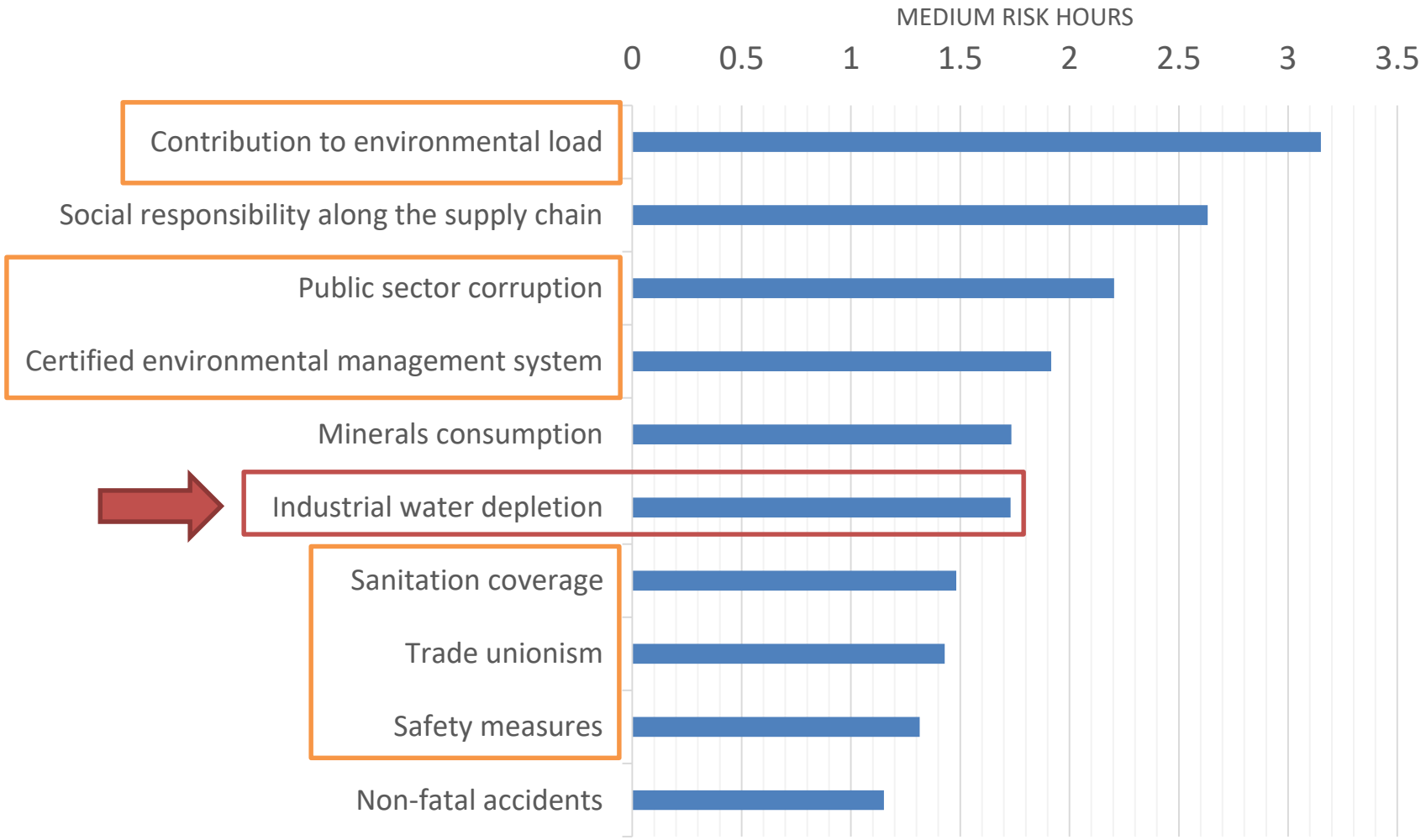
| Name | Raw value | Risk level | Activity variable | Data quality | Comment | Source |
|---|---|---|---|---|---|---|
| Local Community | | | | | | |
| Respect of indigenous rights | | | | | | |
| Presence of indigenous population | 1 [Y/N] | Medium risk | 0.00563033842697635 [h,... | (1;1;1;1;n.a.) | Data from: 2015; Las... | FAO 2017: Presen... |
| Human rights issues faced by indigenous people | 3 [Score] | Medium risk | 0.00563033842697635 [h,... | (2;3;1;1;n.a.) | Ratification of ILO C... | ILO 1989: Indigen... |
| Access to material resources | | | | | | |
| Extraction of ores | 3.3592 [t/cap] | Very low risk | 0.00563033842697635 [h,... | (2;1;4;1;n.a.) | Data from: 2013; Las... | SERI/ WU Vienna ... |
| Extraction of industrial and construction minerals | 22.3624 [t/cap] | Very high risk | 0.00563033842697635 [h,... | (2;1;4;1;n.a.) | Data from: 2013; Las... | SERI/ WU Vienna ... |
| Extraction of biomass (related to population) | 10.2463 [t/cap] | High risk | 0.00563033842697635 [h,... | (2;1;4;1;n.a.) | Data from: 2013; Las... | SERI/ WU Vienna ... |
| Level of industrial water use (related to renewable water resources) | 1.930909091 [% of renewable ] | Low risk | 0.00563033842697635 [h,... | (2;2;5;1;5) | Data from: 1995; Las... | FAO 2017: Water ... |
| Certified environmental management systems | 6.360856269 [# per 10k empl.] | Medium risk | 0.00563033842697635 [h,... | (1;1;2;1;2) | Value calculated wit... | ISO 2017: CEMS |
| Level of industrial water use (related to total withdrawal) | 32.3 [% of total ] | High risk | 0.00563033842697635 [h,... | (2;2;5;1;5) | Data from: 1995; Las... | FAO 2017: Water ... |

# 1. Social risks in the sector



# 2. Results: S-LCA screening

- Metal ores, Finland, PSILCA (1 USD output)



# 2. Results: S-LCA screening

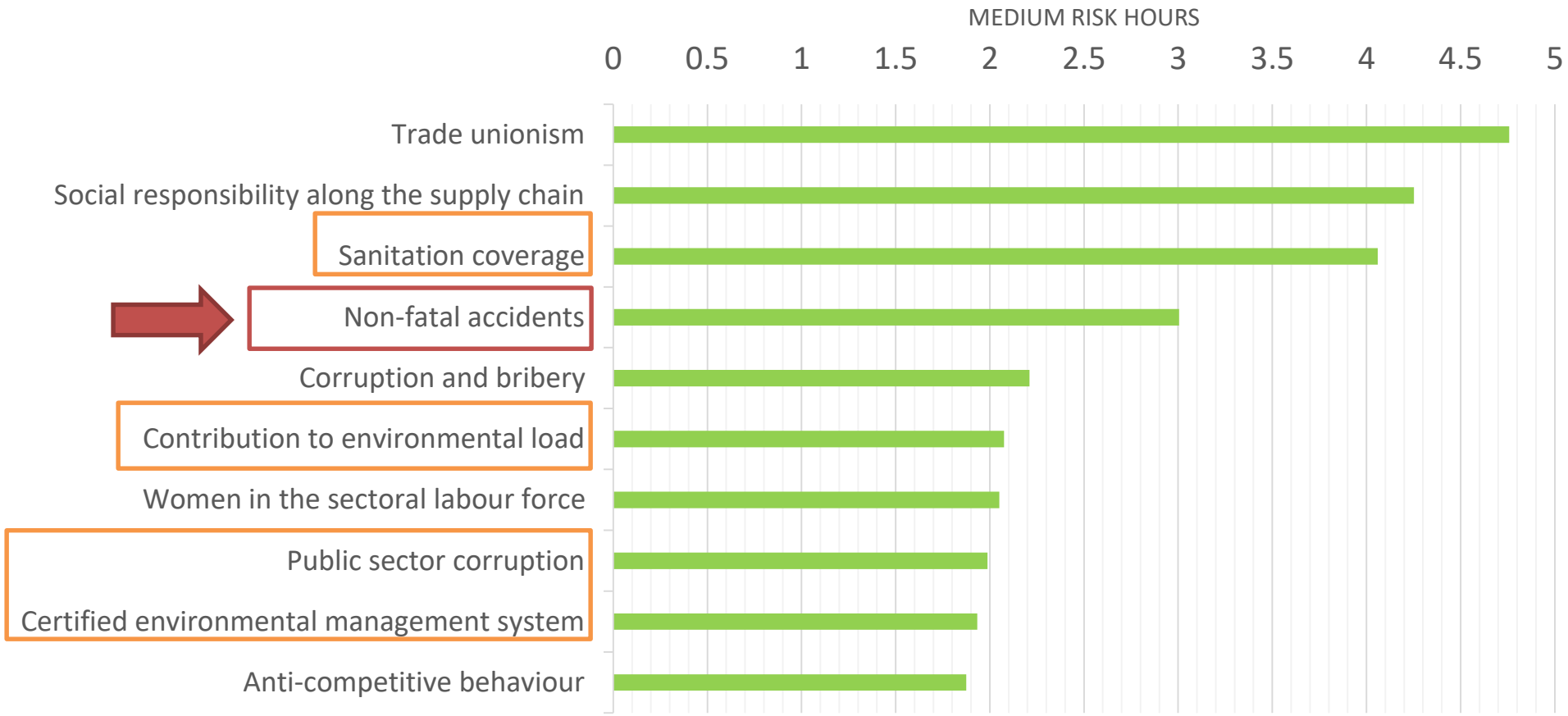
- Industrial water depletion, metal ores mining sector, Finland

| Contribution | Process |
|---|---|
| 100.00% | Metal ores - FI |
| 77.89% | Manufacture of basic metals - FI |
| 17.00% | Manufacture of chemicals and chemical products - FI |
| 00.20% | Iron and steel mills and ferroalloy manufacturing - US |
| 00.17% | Non-ferrous metals - CA |

Direct process contribution to industrial water depletion

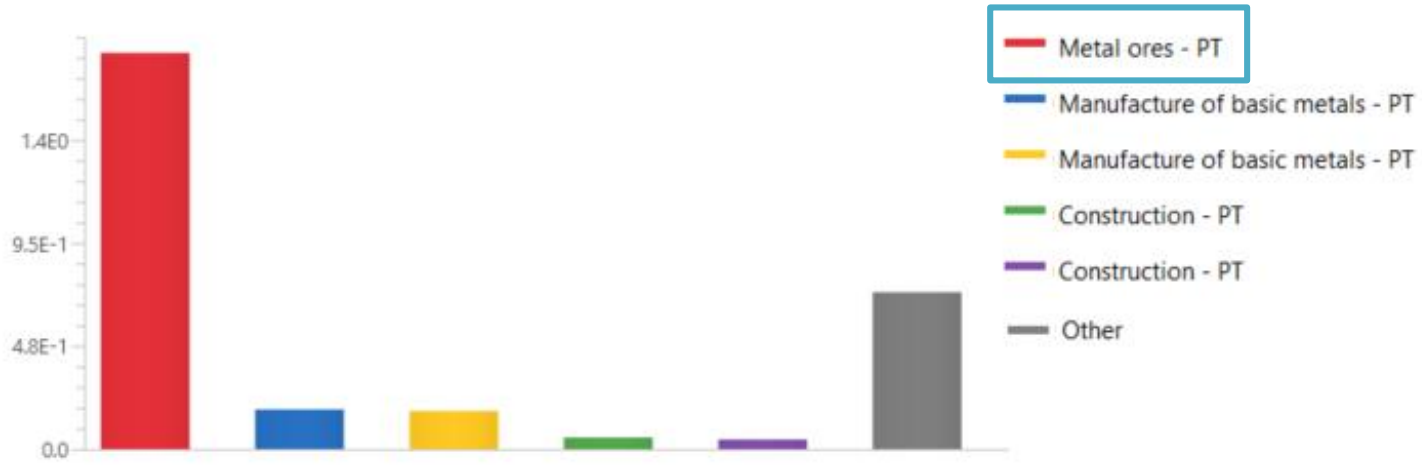
# 2. Results: S-LCA screening

- Metal ores, Portugal, PSILCA (1 USD output)

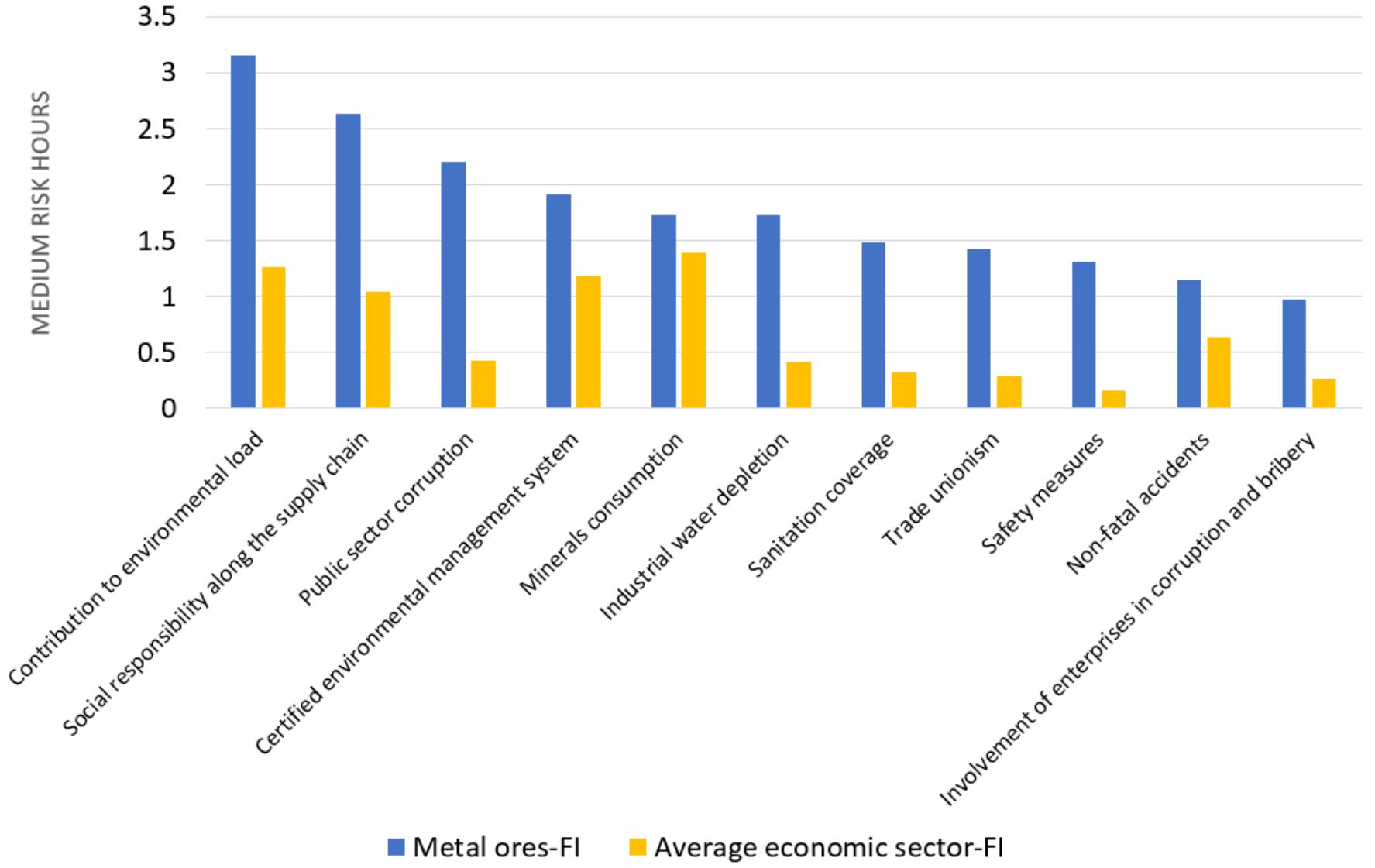


# 2. Results: S-LCA screening

- Non-fatal accidents, metal ores mining sector, Portugal




# 3. Comparison with an average country sector



# 4. Social and governance situation

| Worldwide Governance Indicators | Finland | Portugal |
|---|---|---|
| Voice and Accountability | 1.55 | 1.21 |
| Political Stability and Absence of Violence/Terrorism | 1.07 | 1.08 |
| Government Effectiveness | 1.94 | 1.33 |
| Regulatory Quality | 1.82 | 0.91 |
| Rule of Law | 2.03 | 1.13 |
| Control of Corruption | 2.22 | 0.87 |

"Estimate of governance ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance" (World Bank 2017)

# Primary data collection and creation of the foreground model

| Indicator | Data source and description of the value | Overall value | | Ore mining | |
|---|---|---|---|---|---|
| Reference year | | 2017 | 2018 | 2017 | 2018 |
| **Non-fatal accident rate** | | | | | |
| Number of workers | | | | | |
| Number of cases of non-fatal accidents | | | | | |
| Risk of non-fatal accidents (qualitative assessment) | | select | lect | select | select |
| **Fatal accident rate** | | | | | |
| Number of cases of fatal accidents | | | | | |
| Risk of fatal accidents (qualitative assessment) | | | lect | select | select |
| **Spending on locally based suppliers** | | | | | |
| | | select | select | select | select |

Very high risk
High risk
Medium risk
Low risk
Very low risk
No data

**General information: Rate of non-fatal accidents at workplace**

**Additional information**

Unit of measurement: #/yr and 100k empl.

Evaluation schema: 0-<750 = very low risk; 750-<1500 = l
1500-<2250 = medium risk; 2250-<3(
>3000 = very high risk; no data

**Outputs**

| Flow | Amount | Unit |
|---|---|---|
| Public sector corruption; very low risk | 0.00563 | h |
| Rate of fatal accidents at workplace; very high risk | 0.00563 | h |
| Rate of non-fatal accidents at workplace; high risk | 0.00563 | h |
| Right of Association; no risk | 0.00563 | h |

# The way forward

- Involve local communities in data collection
- Study of background situations

- To be able to quantify social impacts we should first understand what there is **behind**
- **Context** is crucial
- **Collaboration** is needed between all parties involved
- The choice of the **tools** used for the assessment influences the data collection approach

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- Picture slide 1: https://unsplash.com/photos/IutqINJUAts
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# Thank you!

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