



ENLENS: Energy Transition Through the Lens of SDGs

1. **Title:** Mining for energy transition: Understanding drivers of (un)sustainable mineral extraction
2. **Main applicant:** Prof. dr. Barbara Hogenboom, FGw, b.b.hogenboom@uva.nl
Co-applicant: Dr. A.C. Seijmonsbergen, Assistant Prof. FNWI, a.c.seijmonsbergen@uva.nl
3. **Societal case**

The Netherlands aims to become climate neutral in 2050 (SGD 13,7), but for critical metals this transition depends on countries outside of Europe. South America is host to open-pit mining of Lithium, Copper, Zinc and Molybdenum necessary for our solar panels, wind turbines, electric cars and e-bikes. While extraction of these minerals may, on short notice, be favorable for the national economy and employment (SDG 8), at the local level it often has a negative environmental impact: displacement, deforestation, pollution and biodiversity loss cause profound ecological damage (SDG14, 15)) and injustice (SDG1, 10, 16) [1,2]. Finding pathways towards (more) sustainable mining - reducing environmental impacts and strengthening local communities and economies - requires new interdisciplinary approaches for an in-depth understanding of local dynamics. In this project we combine a qualitative analysis of societal drivers of (un)sustainable mining with a quantitative analysis of the resulting environmental effects and spatio-temporal changes in land use and land cover (LULC). By sharing the setup, methods and insights with local stakeholders and informing researchers and policy-makers in the mining country and the Netherlands, our project supports efforts to limit negative external effects of the energy transition (see 5C).
4. **Scientific case**

The scientific question we aim to answer is what societal drivers, related to mining in local communities, lead to what environmental impacts of the local geo-ecosystems? Societal drivers include social, economic, political, cultural and knowledge processes. We will develop an interdisciplinary approach that combines computational analyses tools [3] with community-level fieldwork methods, in Peru or Chile. Firstly, we use pre-field time series analyses of remote sensing imagery (Landsat, Sentinel) and vegetation indexes (NDVI/EVI in Google Earth Engine), and supervised classification to quantify forest cover change, urban expansion and agricultural transformation around an open mine. Secondly, the resulting change analyses will be used on location to supports local fieldwork activities (interviews, observations, soil/water analysis, documentation search) and will result in better understanding the societal drivers behind the quantified environmental changes. Finally, the obtained information, including feedback of the local stakeholders, will be used to further fine tune the spatial analyses. Through this interdisciplinary synergy we will: a) Identify which societal drivers are responsible for environmental effects of mining; b) Quantify spatial and temporal changes and the environmental effects of mining linked across time and space; c) Indicate how societal drivers and environmental effects of mining impact on SDGs. The intended academic output is a science-based workflow that supports interdisciplinary researchers in analyzing and understanding complex societal-environmental processes around mining.



5. **Contribution to the aims and success indicators of ENLENS**

A. *How will your project evolve after the proposed research/activity. What is the long-term goal? (ENLENS aims at initialization of new activities that may carry on thereafter (seed-money)):*

Our project will:

- 1) Develop generic interdisciplinary workflows for solving complex environmental problems;
- 2) Actively support new networking and broaden collaboration that allow for innovative research, interdisciplinary ideas, and proposal writing.

B. *Why and how does your project contribute to the UvA-community of interdisciplinary research and ENLENS more specifically?*

Our project will:

- 1) Serve as a showcase for follow-up research initiatives on the interface of humanities and natural sciences in the context of the energy transition in NL and beyond;
- 2) Lay a foundation for the interdisciplinary ENLENS PostDoc’s work on indicators and metrics that can be used in sustainable development studies across countries in the light of SDGs.

C. *ENLENS aims at broadening the community beyond the group of project PI’s.*

Describe how your project will contribute to this goal, with at least one of the following:

The participatory set-up of the fieldwork requires an active science-society interaction in which we will first communicate with all stakeholders (local citizens, researchers, activists and public and private sector professionals) to align our research design and share the results from the pre-field assessments. After identifying and addressing drivers and their environmental and societal impacts we will deliver a scientific report or paper, a short summary for policy makers and a flyer, that will include clear descriptions of the causal pathways and contributions to interventions related to mining activities.

Our joint project with such an interdisciplinary group of students and researchers is quite exceptional in the UvA. It will widen students’ academic and societal scope by promoting and actively being involved in interdisciplinary research, both on field location in S-America, as well in the classrooms. We will teach and report on lessons learned about interdisciplinary learning and research processes in our Ba and Ma programs (Future Planet Studies, Earth Sciences, Latin American Studies, Sustainability Studies, Humanities in Context. We are willing to share our lessons learned through guest lectures.

The experiences and findings will be disseminated via social media during the implementation (Twitter/ Insta/ Blogs) and reported in popular news fora such as Folia and Geo.brief.

6. **Budget**

Research assist/PhD: 2 months 0.5 prep. (FNWI) + 1 month 1.0 field (FGw)	8.000
Stipends to support travel & local expenses of 6 master students, 3-6 weeks	9.000
Travel & local expenses for 2 researchers (2 weeks) and 1 assistant (4 weeks)	6.000
Fieldwork equipment (soil/water quality), materials, local outreach	1.000
Total budget	27.000

The requested amounts are based on an expected 50/50 division for FNWI and FGw. The FNWI assistant will be involved in pre-field analysis; the FGw assistant will be involved in fieldwork. Student travel support depends on the duration of their stay (1000-1500 for 3-6 weeks). For the assistant all travel expenses are covered; for the researchers only the expenses their teaching/research budget does not cover.



References

1. Van Teijlingen, K., Hogenboom, B. (2017). Debating Alternative Development at the Mining Frontier: Buen Vivir and the Conflict around El Mirador Mine in Ecuador. *Journal of Developing Countries* 32,4, 382-420.
<https://doi.org/10.1177/0169796X16667190>
2. Mapping Mining to the Sustainable Development Goals: An Atlas (2016). White paper submitted to the Economic Forum, Geneva, Switzerland, 11 pp. (Document available at: [Mapping Mining to the Sustainable Development Goals: An Atlas on JSTOR](#))
3. Werner, T.T., Bebbington, A., Gregory, G. (2019). Assessing impacts of mining: recent contributions from GIS and remote sensing. *The extractive Industries and Society* 6, 993-1012. <https://doi.org/10.1016/j.exis.2019.06.011>