

# IS THE ENERGY TRANSITION REALLY SUSTAINABLE? AN EXPLORATION OF ENERGY TRANSITION-DRIVEN EXTRACTION IMPACTS

Research about the socio-environmental impacts of graphite extraction in Mozambique



FIGURE 1. ALTERNATIVE ENERGY SOURCES FOR A SUSTAINABLE FUTURE

The energy transition is considered a positive development, almost without question. This transition ushers in a sustainable future, or so it strives to do. But let us consider the broader ramifications of the transition, especially as it relates to contexts in the Global South. Processes are set in motion that, unfortunately, are at odds with the move in the direction of sustainability. The total impact of the energy transition must be considered in order to determine how this truly contributes to the pursuit of sustainability. One particular example that is examined is the impact of increased graphite mining in Mozambique.

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To provide some further context, the energy transition is geared at implementing a sustainable future by becoming carbon neutral. The Global North has adopted a vision of incorporating renewable energy sources. Slowly, our society is making changes to low carbon alternatives in order to minimize our carbon footprint. Any energy source that is responsible for high Greenhouse Gas (GHG) emissions (a.k.a. carbon emissions) needs replacing for a 'green' counterpart. Instead of petroleum or gas, we should use wind- and solar energy. Instead of petrol cars, it would be better to change to electric vehicles. But what are the ramifications of collectively changing our energy sources? What implications does such a transition bring with it? This 'green' future cannot be achieved without mass production of clean energy alternatives. The production of clean energy technologies is highly mineral intensive and cannot be achieved with recycling of materials alone. This means green mineral mining increases. And let's be honest, mining isn't typically known to be very beneficial to the environment or local communities. Particularly in low- and middle-income countries, where there is generally poorer legislation and regulation. Most resource rich countries fall in that category, apart from a few exceptions.

## IMPACTS OF GRAPHITE EXTRACTION IN NORTHERN MOZAMBIQUE

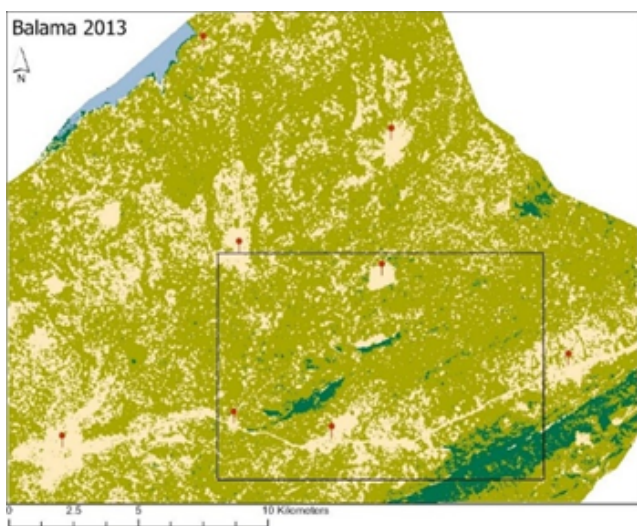
There has been an insurgence of green mineral extraction, which is experienced across the globe. The province of Cabo Delgado, in Northern Mozambique, is one of those places that is undergoing an extractive boom. I conducted a study to identify the socio-environmental changes resulting from increased mining. It consisted of land use land cover (LULC) study by using RS and GIS methods, and a qualitative data analysis using interviews. The change and impacts of increased graphite mining were analyzed with these methods. The analysis showed areas where the actual mines appeared and expanded, as well as surrounding changes in the landscape resulting from the mines' presence. Figure 2 provides a visual of one of the investigated graphite mines situated in the landscape. The maps of figures 3 and 4 show what the landscape looked like before and after this mine entered the scene.



FIGURE 2. AREAL PHOTO OF A GRAPHITE MINE IN NORTHERN MOZAMBIQUE



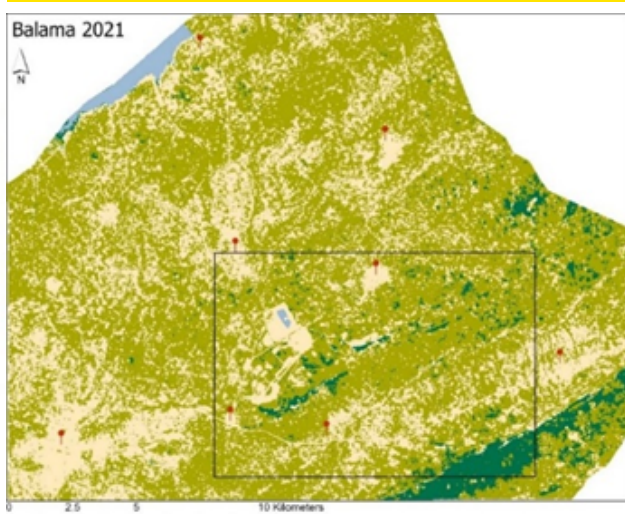
The villages near the mine have expanded because of in-migration and resettlement. In the mine areas, the mining activities are pushing aside all previous land uses. Farmers who used the ground for cultivation were displaced. The companies and government see to it that those who were displaced are resettled elsewhere. That means space is made for these people somewhere else, which comes at the cost of the natural vegetation and landscape. On the whole, the vegetation has decreased as a result of mining which comes with issues of loss of biodiversity, desertification and damage to ecosystems.



**↑ BEFORE**

FIGURE 3. MAP OF THE LAND COVER BEFORE THE MINE APPEARED

**↘ AFTER** FIGURE 4. MAP OF THE LAND COVER AFTER THE MINE APPEARED



**Legend**  
 □ Syrrah Resources Mining Concession  
**Land Cover Class**  
 ■ Developed / Bare soil  
 ■ Water  
 ■ Dense vegetation  
 ■ Light vegetation  
 ● Village

To expand on resettlement a little more, at minimum, the situation for the displaced should be equally as good as before, and preferably even improved. However, that is easier said than done. Finding suitable replacement land that is not already in use, while still being accessible to the population, has proven to be a challenge. Some reported issues of their new farmland being too distant for them to access, others were appointed occupied land, and still others received land that was not fit for cultivation. The trouble is that the population of Northern Mozambique is generally very poor, and they rely on subsistence farming. This means that their livelihoods are threatened. An interviewee expressed this, saying:

*“Yes, we all lost [our cultivated farmland] and up until then we are suffering from hunger because it is in those fields that we were producing food, since they took it away, we are suffering”.*

The displaced do not necessarily get incorporated into the new job market either. Economic development from mining is known to be highly unequally distributed. Some benefit from it, while it brings others grievances.

As for further environmental impacts, people experience air and water impacts. In terms of air impacts, the graphite mines produce graphite dust in the extraction process, and the wind picks this up so that it affects the surrounding communities. Wind has increased as a result of the ongoing deforestation. An interviewee summarized:

*“Here the situation is terrible, there is a lot of wind, they produce a lot of dust that when we put our products to dry in the courtyard, everything gets dirty from dust, but all this is because there are no more trees to defend us”.*

People inhale and ingest graphite dust, because it settles on produce and contaminates water sources. This negatively affects their health. Additionally, flooding has occurred because the mines release excess water from dams when it rains. Floods bring destruction to infrastructure, homes and crops and mix into water sources causing contamination.



FIGURE 5. CABO DELGADO PROVINCE

Upon examining the identified socio-environmental impacts, it becomes apparent that increased mining brings different negative outcomes. This is probably not a surprise. Nonetheless, this research holds some valuable contributions. The socio-environmental impacts of graphite

mining were uncovered and brought in relation to the energy transition. By using a mix of remote sensing and GIS and qualitative data, my research has shed light on the expanding scale of these impacts. The spatial data was a new contribution, which demonstrates how and where the LULC is changing. The community data further contextualized the changes and provided additional insights. Applying both quantitative (RS & GIS) and qualitative methods (interviews) complements an existing body of literature on mining impacts, and these methods proved to strengthen the findings. The combination of methods demonstrated the quantitative and qualitative data reinforced one another. Overall, the findings should give reason to consider the interconnectedness of our world today. The identified mining-induced impacts occur in relation to the energy transition and as such the Global North plays a part in it. If we are merely outsourcing environmental degradation to another part of the world, then are we really achieving sustainability at all?

## WHERE DO WE GO FROM HERE?

As things stand now, we will not quit extraction immediately in pursuit of other solutions. So then, the question is really how to go about extracting key minerals with as little negative impacts as possible? Three points are suggested:

1. A proactive approach
2. Anticipation and mitigation
3. Improved monitoring and regulation

These points are interrelated, because having a proactive approach means one must anticipate and seek to mitigate negative outcomes. Monitoring socio-environmental impacts is crucial to anticipation, and mitigation is achieved through regulation. The points apply to local influential actors and actors in the Global North, but to each in different ways.

Local actors are ultimately responsible for protecting its population and environment. Their task is to anticipate the potential socio-environmental impacts, and then focus on minimizing these where possible. The government must acknowledge and seek to address issues from the mining industry and all of its indirect consequences. There is a need to implement legislation that is in the best interest of the population (not just benefiting the economy in general). Additionally, there is a need for improvement of monitoring and regulation arrangements, as this is a major challenge presently.

Secondly, actors from the Global North should also anticipate the global impacts of the energy transition and resume responsibility for their role in this. This begins by recognizing international linkages driving extractive projects. There are ample opportunities for offering support to guide the increased mining activity in a just and sustainable way. Strategic groups, policy makers and academics should consider what influence or supportive role they may be able to play. One example could be to provide support in the monitoring process, which is valuable data to the local actors (e.g., government officials, local level planners and development practitioners).

All in all, it is unlikely we can move away from the need for green minerals extraction. It is very important to recognize and address the wider impacts of the energy transition. We must make an effort to ensure sustainable practices in all processes of the transition. That includes working towards improving extraction practices and impacts such as in Northern Mozambique.



## ABOUT THE AUTHOR

Liesanne Baak is a student of the Master International Development Studies (2021-2022) at Utrecht University. This blog was written as a part of an assignment for completing and obtaining the Master's degree.



**Universiteit Utrecht**  
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