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Avoiding The Resource Curse: Lessons from Fossil Fuels Applied to Critical Minerals. Can Climate Change Be Mitigated?

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ABSTRACT

The Resource Curse describes relatively poor nations rich in fossil fuels that have not been able to harness their resource wealth for the betterment of their nations and populations. As the world moves to renewable energy, are there learnings from the Resource Curse that can be applied to countries bestowed with an abundance of essential minerals, such as lithium and cobalt, required for renewable energy production? This study compares fossil fuels' socio-economic and legislative impacts with those of critical mineral mining. An extensive literature review identifies similarities and differences between these types of natural resources. Findings indicate that while critical minerals do not contribute directly to climate change, they share significant economic and political risks experienced in the fossil fuel industry. Risks for these nations include geopolitical power struggles, corruption, and economic dependence. In addition, findings show that lower-income countries rich in critical minerals may face heightened risks of authoritarianism and social unrest. This paper provides policy recommendations for these resource-rich countries to avoid the detrimental effects seen in similar nations with substantive fossil fuel reserves, including promoting transparent resource governance and using mining income to invest in social infrastructure and industrial diversification. Ultimately, this research emphasizes the need for proactive measures for these countries to exploit their critical mineral deposits; with as few risks as possible, thus supporting a sustainable and equitable transition to renewable energy. This approach not only aids in combating climate change but also ensures these countries and their people can benefit socially and economically.

Introduction

It is widely known that climate change is a pressing issue that has affected lives worldwide and will continue to do so without change. The existence of natural resources, such as oil and gas, is a cause of climate change. One thing we need to think about, though, is where these resources originate. Many countries worldwide have abundant critical resources like gas, oil, timber, and diamonds, but for some, it is all they have. These developing and usually poorer countries' economies and governments are thus highly affected by these resources, which we overlook daily. In summary, fossil fuels, one of the most detrimental contributors to climate change, affect the whole planet and have localized effects in the places where the resources are extracted.

We must move away from fossil fuels as we transition to renewable energy. Mining critical minerals has grown exponentially since creating environmentally conscious and renewable energy sources. A simple example is an electric vehicle, whose batteries need many vital minerals, such as lithium, to function. These minerals are mined just like natural gas and oil in countries worldwide. All my life, I was aware of the popular mined resources such as gas and oil, but when I learned about the emerging critical mineral industry, I began to see many parallels between the two. I recognized that many countries were negatively affected by having an

abundance of gas, for example. I realized that if something like that were to occur with critical minerals, irreversible effects could hurt our fight against climate change and our battle for renewable energy. Even though there are many noticeable similarities, it remains to be seen whether the adverse effects mining natural gas has created will remain constant with the transition to critical mineral mining.

Through researching and writing this paper, I learned many things about critical minerals and their relationship to natural resources, some of which I never anticipated, but also a few that followed my original hypothesis. Using an extensive range of sources, I began to understand the depth and significance of the resource curse. I initially thought it was just a way to explain how countries rich in oil and gas failed financially and politically, but as I dug deeper, I grasped just how detrimental it is to the government. I understood how, without proper preparation, it could affect many more countries that learn that they are resource-rich.

In school, we are taught science every year. Biology, Chemistry, and Physics, but this year, I took an extra course titled "Climate Change." While doing a full-class project on renewable energy, I came across the process of how these pieces of equipment are made. I learned that they all use some critical mineral in their production, which led me deeper until I finally got to what seemed like the end. I learned about critical mineral mining and where we get our resources for electric cars and solar panels, but then I learned about the resource curse. I thought, what if this same curse happened with these critical minerals? How would that affect the shift to an eco-friendly planet? That is when I realized that I not only wanted to but felt like I needed to explore whether this was a possibility and, if it was, how to avoid it at any cost.

In this paper, I will discuss the similarities and differences between mining critical minerals and natural resources through an idea known as the resource curse. The research question I will address is whether the effects of mining natural resources also apply to critical minerals. Directly afterward, and before I conclude the paper, I will give policy recommendations to countries who learn they are rich in a critical mineral. These include recognizing their abundance in a resource, efficiently handling the exportation and incoming revenue, and keeping workers and the population content and informed.

When a country has a natural resource that seems hugely beneficial for the state, it has been shown to have unexpected effects. There is naturally a large influx of money. Still, it has been exemplified that for lower and middle-income countries, these resources cause detrimental effects on the political system, such as a rise in authoritarianism and an increased risk of corruption. These countries' fiscal development and overall economic growth grow differently than expected. This has been seen with natural resources, and this concept may extend to the newly popular mining of critical minerals and renewable resources, which I am examining in this paper.

Since the beginning of the mining of natural resources, powerful countries such as the United States and China have meddled in lower-income countries' affairs, which often leads to corruption. Early in mining these critical minerals, we can already see these two global superpowers interfering, with the most straightforward example in the Democratic Republic of the Congo. Both countries have intervened in the Congo's affairs, which has led to corruption in their government.

Another example is lithium, a resource used in batteries. China has banned the export of these critical minerals to the United States, setting the stage for a resource battle between the two. The constant economic battle between powerful countries such as China and the U.S. is something we have seen before and could see again with critical mineral mining.

My plan for the paper is to examine whether the resource curse applies to critical minerals. I'll start with a lit review of the resource curse and then compare essential minerals and natural resources. The similarities and differences between the two will then be discussed, as well as the political and economic effects in countries rich in critical minerals. The paper will conclude with policy recommendations that exemplify what countries must follow to succeed with critical mineral mining. My comparison shows that although there are many parallels between natural resources and critical minerals, a few significant differences are essential to mention. Unlike natural resources, which consist of oil and gas, there are many more prevalent critical minerals. Thus, many more countries, such as the Congo, Bolivia, Argentina, and even the United States and Afghanistan,

are rich in these minerals. These countries are also mindful of what has happened to past countries with mining and exporting resources and will thus have more knowledge going in. Whether they use it or not remains to be seen.

Literature Review of Resource Curse

This section is a lit review of the resource curse and how the ideas and conclusions around it have altered over the years. There is no exact agreement on the definition, as some focus more on oil and petroleum, whereas others focus on minerals. In summary, it can be defined as significant social, economic, and political challenges unique to countries rich in one material. People agree and disagree on many aspects of the resource curse, as it was initially focused on oil and the oil industry. Still, it can range from oil to diamonds to even lumber or cocoa. Almost all authors initially concluded that single resource-rich countries tend to have many issues, such as higher rates of conflict, authoritarianism, and corruption, as well as much lower rates of economic stability and growth.

The National Resource Governance Institute examined what the resource curse is, but also its causes and effects. They concluded that resource-rich countries, precisely oil wealth over the past thirty years, are more likely to become or stay authoritarian, which is explained by how taxation works in these different countries. They also noted that resource-rich countries are much more inefficient in spending and borrowing money than others. This happens because of changes in commodities prices and production, and over time, can hurt the economy. Ultimately, they concluded that low-income countries are more susceptible to resource curse challenges, although not inevitable.

Jeffrey D. Sachs and Andrew M. Warner examined the resource curse and how wealth grows in these resource-rich countries versus others. They concluded that resource-abundant countries have stagnated in their economic growth since the 1970s, which inspired the term resource curse. At the same time, though, they were still determining whether the resources were causing the economy to be poor or if the poor economy and government were causing the production and exportation of only one resource. In sum, they agree that it exists, and resource-rich countries still need to achieve strong export-led or, in that matter, any kind of growth, but they are still determining whether the resource caused the issue or bad policies in general.

Addisu Lashitew and Eric Werker commented on whether natural resources, in general, are entirely positive or have adverse effects. They explained that although early research on the resource curse documented a relatively strong negative correlation between natural resources and GDP growth, some new contradicting evidence has emerged. They summarized that natural resources have a positive economic effect but a negative institutional effect on development. They stated that the curse is more apparent in lower-income countries or countries that seem to have only that one resource but end up unsure and needing more evidence to fully understand the links between resources and a country's development.

In a journal for the American Economic Association, Frederick van der Ploeg discussed whether natural resources are a curse or a blessing. Through evidence, he explained that either outcome is possible, which means that in his mind, natural resources are not a curse but more a source of funds that needs to be managed and handled well. He argued that adverse effects, such as deindustrialization and bad growth prospects, are more severe in volatile countries with poor governments and laws.

Mauricio Villafuerte discussed how to escape the resource curse in his IMF blog. He states that despite extensive research, there needs to be a consensus on how to run fiscal policy and manage budgets in resource-rich countries. He and other researchers concluded that budgetary policy in these countries rests on seven principles. These include A framework reflecting country-specific characteristics such as revenue dependency, ensuring the sustainability of fiscal policy, a framework that is sufficiently flexible to enable the scaling up of

growth-enhancing expenditure, having sufficient precautionary budgetary buffers, and more. Villafuerte concludes that each principle is essential to the long-term success of resource-rich countries and their escape from the "resource curse."

Another article covering what we have learned about the resource curse, by Michael Ross, explains that there is robust evidence that at least petroleum has at least three harmful effects. These are making authoritarian regimes more durable, increasing some types of corruption, and triggering violent conflict in low-income countries. According to extensive research from 2001 to 2013, Ross summarized that there is an undeniable "political resource curse" on countries rich in petroleum. He ends by saying that petroleum is the only resource consistently correlated with less democracy and worse institutions.

The final piece, written by the Royal Institute of Madrid, Spain, explores the resource curse theory and the evidence backing its existence. Their introduction, as well as the conclusion, comes to the consensus that "Natural resources, for most poor countries, are deemed to be more of a 'curse' than a 'blessing.'" Collecting data proved that the median GDP growth in developing countries abundant in minerals was lower than that of those without an abundance. Following the previous point, the data also showed higher levels of corruption in these countries. These data points proved their initial argument that natural resources are more of a curse than a blessing in developing countries. They still ended by stating that much more research is needed to reach an undeniable conclusion.

Each of these papers argues varying points and uses different examples, but they all agree on certain aspects of the resource curse. They agree that the curse exists in low-income countries rich in one resource, especially petroleum. The resource curse causes political and institutional issues, including more authoritarian regimes and violent uprisings. In sum, each article acknowledges the existence of a resource curse and how being resource-rich in a low-income country can be institutionally detrimental.

Although all seven pieces agree on certain aspects, they disagree and are left wondering about many more. First, one article argues that resources are not a curse but something that needs to be handled well, and countries that experience the "curse" handle it poorly. Others say this is not the case, but instead, low-income countries need help to handle being rich in just one resource, which causes detrimental economic and political effects. The other articles agree primarily on this, but some say it applies to low- and middle-income countries, while others say it only applies to low-income countries. One article comments that there is only conclusive evidence that being rich in one resource causes adverse political effects. Overall, many of these pieces are left wondering what exactly falls under the umbrella of the resource curse and how to manage and escape it. They're still determining if it's possible to avoid it in lower-income countries, and even though some have ideas, they are still determining if they will work.

Comparison

The discovery of critical minerals essential for clean energy technologies in lower and middle-income countries presents similarities and differences to the historical "resource curse" associated with natural resources. On one hand, both resources hold the potential to destabilize low and middle-income countries (NRGI 2015, Ross 2015). Just as the United States and China vied for influence in oil-rich regions, competition for critical minerals could lead to geopolitical power struggles (Ibid.). Additionally, critical minerals may dominate the economies of these countries, replicating the economic dependence on oil (Werker et al. 2001). Furthermore, lower-income countries remain particularly susceptible to the resource curse, lacking the infrastructure and governance to manage resource wealth effectively (Lashietew 2020, Werker et al. 2001).

However, critical minerals also present distinct challenges. Unlike fossil fuels, their extraction doesn't directly contribute to climate change, offering a potential advantage. Furthermore, the global power dynamic surrounding critical minerals differs from the oil market. While countries like Saudi Arabia hold immense control over oil, critical minerals are more geographically dispersed, with Bolivia, Argentina, the Democratic

Republic of the Congo, and even Afghanistan holding significant reserves (NRGI 2015). This diversification could limit the influence of any single nation.

A crucial question remains: Can nations rich in critical minerals learn from past mistakes and avoid the resource curse? Extensive research on the topic offers valuable insights, but its effectiveness in preventing history from repeating depends on a country's willingness to implement good governance practices (Villafuerte 2012, Van der Ploeg 2011). In conclusion, critical minerals present a complex scenario similar to previous cases.

While the potential for economic dependence, geopolitical tensions, and societal disruption exists, the lack of direct climate impact and the more dispersed distribution of resources offer potential advantages. Ultimately, the success of these nations hinges on their ability to harness the benefits of critical minerals while mitigating the risks, learning from the historical experience of the resource curse. Now, I will discuss the similarities and differences between the two.

Similarities and Differences of Critical Minerals and Natural Resources

Even though critical minerals are seen as the environmentally friendly version of natural resources, they may be the better of two evils, as they share many similarities. First, according to the research conducted for the lit review, the level at which a country would be at risk of chaos or political turmoil would not be any better for critical minerals if they are handled the same as natural resources. For already low or middle-income countries, the critical mineral or minerals they are rich in will dominate their economy, much like how natural gas or oil has dominated economies in countries such as Saudi Arabia. Additionally, world powers like China and the United States will fight over these new countries and interfere in their relations and business to gain the upper hand in the global economy. We saw this previously for natural resources, and according to research, if we continue down our path, this will remain the same. Finally, lower-income countries will only be susceptible to all aspects of the resource curse that many natural resource-rich countries face if they are assisted by others or prepared beforehand. These similarities exemplify how critical minerals can easily follow in the footsteps of other natural resources.

Although there are many similarities between the two, they still share a multitude of differences. Primarily and most obviously, critical minerals, such as natural resources, will not negatively contribute to climate change. Along those same lines, critical mineral mining and its products are not perceived in the same negative light as natural gas. This is because, over time, we have learned all of the adverse effects of natural resources on our climate; thus, many view it negatively. Another significant difference is that new countries are in charge and rich in critical minerals. Unlike Saudi for oil, Bolivia, Argentina, the Congo, and many more countries are rich in critical minerals, such as lithium and cobalt. New countries rich in these minerals could alter how the exportation and distribution are handled, hopefully leading away from the resource curse and towards a stable economy. One final difference is that there is now extensive research about the resource curse available globally, and what remains in question, but is still a key difference, is: does the fact we've done all this research mean countries rich in critical minerals will know how to manage it properly?

To summarize, both types of resources are extracted from the earth, and because much of the world's supply is found in lower-income countries, the two share many similarities. Although this is true, significant time has passed since the beginning of natural resource extraction, and critical minerals differentiate themselves in many fundamental ways, as previously explained. The following section will dive into how these countries rich in critical minerals must handle the process of exportation, government, and fiscal policy to set themselves up for long-term economic success.

Policy Recommendations

Given that we expect critical minerals to have many of the same issues as fossil fuels regarding the resource curse, examining some policy recommendations and best practices to prevent the resource curse from repeating itself is worthwhile. Understanding what a country has to do when it recognizes it is rich in a critical mineral is a process of multiple steps.

1. The country must first know that it possesses a large amount of a critical mineral resource, such as lithium, cobalt, or another.
2. In terms of the political system, if the government is built behind a dictator or is authoritarian, the country must begin building mines and creating jobs for the lower-income community in the mines.
3. If the government is centered around a democracy, they must take views on public opinion and begin building mines and creating more jobs for their people. If this democracy is capitalist, however, wealthy business owners will most likely build said mines and hire their workforce.
4. The government must gather knowledge of the past instances of the resource curse, regardless of whether it is a democracy or an authoritarian regime. With this past knowledge, they can plan tactically to ensure that the income generated by the exportation of the resource enhances the economy for years to come.
5. The government must then determine how to manage fiscal policy best and adequately handle the incoming revenue.
6. Concerning the previous point, the money coming in cannot be wasted or spent poorly and quickly but instead saved. The workers and people need to be kept content with their country's changing conditions so as not to incite revolt and political challenges.
7. Another excellent plan any country should follow is transparency with its people about where the incoming money is coming from and where it is being spent. They should report where it is going, which will, in turn, keep the citizens' trust.
8. Finally, lower-income countries that may need a global giant to support them financially in the opening years must decide who to associate themselves with. This could, in turn, bring back Cold War ideals, and foreign relations between these big countries could additionally take a hit, which must be recognized.

These policy recommendations are designed to set any developing country up for success when they become aware of their abundance of a critical mineral, and by following the laid out plan, they will be able to boost their economy permanently while maintaining a favorable political situation. This plan may be flawed for some countries, but it is designed as an example to show that anyone must extensively plan out what they will do to avoid any future problems. If these new countries follow in the footsteps of those affected by the resource curse, they will fall into the same issues. Not only will their economy and relations be damaged, but it may also cause a negative domino effect.

Conclusion

Fossil fuels have been powering our economy, giving us our energy, light, and gas for transportation for 150 years, and only now are we recognizing that a shift is not just beneficial to the planet; it is necessary. This paper discusses the change the earth is making from natural resources to critical minerals and its effects. To the naked eye, it seems like an easy transition to a new mining resource that will fuel our economy for the next 150 years or more in an environmentally friendly way. Still, this paper has examined how that is not necessarily the case. By studying what the resource curse has done to countries rich in oil and gas, as well as the evolving market around critical minerals, I wanted to ask: Will the effects of the mining of natural resources apply to essential

minerals as well? By examining natural resources and critical minerals, we concluded that the same effects could happen to countries rich in critical minerals without policy changes.

It bears recalling that the exportation and mining of critical minerals affect our planet, the localized countries, and the environments where they are being mined. Although a shift to renewable energy worldwide through critical minerals is essential, the localized effects of mining resources will not go away. If these countries do not follow the policy mentioned above recommendations or their own thought-out process, they will bear the consequences, and the whole world will also.

The lit review taught us how the resource curse has affected countries rich in natural resources. It is widely agreed and can be argued definitively that low-income countries rich in a specific natural resource tend to always suffer from the resource curse, which includes economic and political issues. It is additionally agreed that the resource curse causes political and institutional challenges, including more authoritarian regimes and violent uprisings. There is still debate about some aspects of the resource curse, such as how to avoid it and whether or not it is even avoidable in lower-income countries. Some articles also argued that the resources don't cause the curse; instead, a poor political system does.

The resource curse and how it has affected countries rich in natural resources can be easily compared to critical minerals. Through the learnings we have received from how natural resource mining affected low-income countries' economies and policies, and through exploring the curse in the lit review, it can be inferred that the same issues could persist in countries rich in critical minerals. Thus, without the correct policy changes, these countries could go through the same turmoil, which would undoubtedly cause detrimental effects to the global shift to renewable energy and resources.

Finally, with the example policy recommendations listed earlier in the paper, countries can avoid the resource curse. By following these policy recommendations, they will set themselves up for long-term economic and political success, and by exporting their goods across the globe efficiently, they will help assist in the world's shift to clean, renewable energy. Change is not easy, and an entire planet switching its means of generating energy and power is vast. It is certainly not a simple task, and even with these policy recommendations and all our information, it will be complex. Still, if I have learned anything through researching and writing this paper, it is necessary and possible. Foreign relations between countries like China and America may be damaged, but in the long run, we should all fight for the same thing: an eco-friendly planet.

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References

Di John, Jonathan. "The "Resource Curse": Theory and Evidence (ARI)." Real Instituto Elcano, 15 Dec. 2010, www.realinstitutoelcano.org/en/analyses/the-resource-curse-theory-and-evidence-ari/.

Searcey, Dionne, et al. "Hunt for the 'Blood Diamond of Batteries' Impedes Green Energy Push." The New York Times, The New York Times, 29 Nov. 2021, www.nytimes.com/2021/11/29/world/congo-cobalt-albert-yuma-mulimbi.html

Searcey, Dionne, Michael Forsythe, et al. "A Power Struggle over Cobalt Rattles the Clean Energy Revolution." The New York Times, The New York Times, 20 Nov. 2021, www.nytimes.com/2021/11/20/world/china-congo-cobalt.html

López-Calva, Luis Felipe. "Lithium in Latin America: A New Quest for 'El Dorado'?" UNDP, 26 May 2022, www.undp.org/latin-america/blog/graph-for-thought/lithium-latin-america-new-quest-el-dorado

Wright, Lawrence. "Lithium Dreams." The New Yorker, 15 Mar. 2010, www.newyorker.com/magazine/2010/03/22/lithium-dreams

Natural Resource Governance Institute. The Resource Curse: The Political and Economic Challenges of Natural Resource Wealth. Mar. 2015. https://resourcegovernance.org/sites/default/files/nrgi_Resource-Curse.pdf

Sachs, Jeffrey D., and Andrew M. Warner. "The Curse of Natural Resources." European Economic Review, vol. 45, no. 4-6, May 2001, pp. 827–838, https://www.earth.columbia.edu/sitefiles/file/about/director/pubs/EuroEconReview2001.pdf

Lashitew, Addisu, and Eric Werker. "Are Natural Resources a Curse, a Blessing, or a Double-Edged Sword?" Brookings, 16 Jul. 2020, www.brookings.edu/articles/are-natural-resources-a-curse-a-blessing-or-a-double-edged-sword/.

van der Ploeg, Frederick. "Natural Resources: Curse or Blessing?" Journal of Economic Literature, vol. 49, no. 2, June 2011, pp. 366–420, https://www.aeaweb.org/articles?id=10.1257/jel.49.2.366

"Escaping the Resource Curse." IMF, 16 May 2012, www.imf.org/en/Blogs/Articles/2012/05/16/escaping-the-resource-curse.

Ross, Michael L. "What Have We Learned about the Resource Curse?" Annual Review of Political Science, vol. 18, no. 1, 11 May 2015, pp. 239–259, https://doi.org/10.1146/annurev-polisci-052213-040359.