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Influence of the Spatial Distribution of Russia's Oil, Gas, and Mineral Reserves on Its Regional Development and Geopolitical Strategies

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Abstract

The way Russia has developed internally (regionally) and externally (geopolitically), is influenced heavily by the fact that almost all of Russia's vast oil, gas and mineral resources lie in Siberia, the Arctic and the Far East which can be very challenging to access and extract from. Due to the geographic concentration of Russian resources, there exists large disparities in economic development among Russia's regions with high levels of resource abundance leading to rapid increases in investments; whereas many other regions experience de-industrialization and increased environmental degradation. Therefore, to transport these geographically remote resources to global markets via pipelines and/or marine routes through the Arctic is essential to achieve the infrastructure investment necessary to accomplish this task. Internationally, this massive resource base provides Russia with an aggressive energy foreign policy and supports claims to territory (including the Arctic); as well as, limits the ability of other countries to diversify their exports away from primary commodities. Through a synthesis of academic literature, policy documents, and geospatial analysis; this study identifies two opposing outcomes; i.e., while resource wealth greatly expands government revenue (frequently above 50% of the federal budget), and enhances Russia's ability to expand its influence globally; at the same time, it significantly expands vulnerabilities to international sanctions, climate change impacts, and changes in global market dynamics. The results of this study indicate that while reserves in Western Siberia and the Arctic Shelf provide Russia the opportunity to promote an export driven economy; at the same time, the reserves create greater regional disparities and increased tensions in Russia's relationships with neighboring countries. This study concludes by providing recommendations for sustainable resource management, and emphasizes the importance of diversifying exports, and increasing international cooperation, as methods to reduce the natural vulnerabilities associated with these reserves.

Keywords: Natural Resources, Geopolitics, Russia, Regional Development, Geopolitical Strategy, Oil, Natural Gas, Minerals

1. Introduction

Russia has one of the largest land masses on the planet at over 17 million square kilometres, and consequently holds some of the most extensive and valuable natural resource reserves globally. These include: the world's largest natural gas reserves; massive oil reserves; and important minerals such as: nickel, palladium, and rare earths. However, geographically speaking, Russia's natural resource reserves do not have an even distribution. In fact, most

Russian natural resource reserves are in difficult to access and remote areas of the country such as: Siberia; the Arctic zone; and the far east. This unevenness in the geographic location of Russia's natural resource reserves greatly impacts how Russia develops internally economically, as well as internationally politically. Thus, the primary research question for this thesis— "What role does the spatial distribution of Russia's oil, gas, and mineral reserves play in shaping Russia's regional development and its geopolitics?"—seeks to explore the very complex interrelationship between the natural resource management practices in Russia and its geopolitical posture.

After 1991 Russia's economy became heavily dependent on natural resource exportation, which accounts for up to fifty percent (50%) of federal budgetary income and have a strong influence over the developmental trajectory of the regions. While this dependence creates a significant amount of economic inequality, creating significant economic growth within resource rich peripheral areas; it simultaneously leads to de-industrialization and growing environmental pressure within Russia's central and southern regions. Geopolitically, Russia uses its natural resources as an instrument of leverage with examples including pipeline diplomacy, militarizing the Arctic; and Russia is vulnerable to international sanctions and global changes in the energy sector. In this paper we will draw upon evidence from multiple academic and policy sources to explore these complex issues and provide insight into possible paths toward sustainable resource management.

2. Literature Review

Much existing literature on Russia's geo-political relations with its natural resources emphasizes the "resource curse," in that countries rich in natural resources experience distortions in their economies and are at increased risk of consolidating their authoritarian regimes (Yang et al., 2021). Examples of the "Siberian Curse" can be seen as examples of how Soviet-era policies may have created too much development in the far reaches of the country and subsequently hindered the cost of modernizing these areas (Kryukov & Селиверстов, 2021). In addition, spatial analyses show the vast majority of hydrocarbons located in western Siberia and minerals in eastern regions, which has contributed to the pattern of uneven development, along with the export-oriented nature of Russia's economy (Kusurgasheva et al., 2019). Further, the linkages between the availability of natural resources and the level of political stability also greatly affect the economic performance of countries with large quantities of natural resources, requiring the development of strong resource management strategies and mechanisms for resolving conflicts to reduce the negative impacts on revenue from geopolitical risks (Ahmad et al., 2023).

A lot of research around geopolitics is looking at how Russia strategically uses its energy supplies — especially through natural gas cut-offs and pipeline construction — to influence neighboring countries. Additionally, research concerning the Arctic region shows an increase in military presence due to interest in natural resources, especially considering climate change (Ibekwe et al., 2024). Recently, researchers have also studied the effects of international sanctions and have seen a shift toward Asia-based markets for Russian exports of key resources, and how they are developing strategic plans for critical minerals (Thatcher, 2024). A significant void within the literature today is the integration of spatial data and resource

sustainability over time; this research intends to help fill that void by creating a comprehensive synthesis of prior knowledge.

3. Methodology

A qualitative and descriptive methodology has been used in this research to combine secondary data from academic publications, government reports, and geospatial analysis; the methodologies included systematic searching of the web for geospatial data and influence analysis, and a thorough review of official digital documents and authoritative websites to obtain contextually relevant information. Data triangulation has been employed to ensure the validity of the results by collecting data from multiple stakeholders regarding controversial areas (e.g., territorial claims). However, there are limitations to the data collection methods used; primarily relying on publicly available sources which may exclude unclassified strategic planning or development.

4. Findings

4.1 Spatial Distribution of Reserves

Russia's large natural resource wealth is mainly located in geologically difficult and environmentally unforgiving areas. Although there are many obstacles to overcome in terms of logistics in those locations, their dense location – particularly in the Yamalo-Nenets Autonomous Okrug – has enabled the establishment of very productive extraction sites. Those extraction sites require large amounts of money to be spent on infrastructure initially; however, they have many advantages for both the economy of that area and Russia overall because of their production and therefore have been instrumental in increasing local economies and increasing revenue for the state. West Siberia is Russia's largest source of oil and natural gas, and it is primarily in the Yamalo-Nenets Autonomous Okrug where approximately two-thirds of Russia's gas reserves can be found (including massive fields like Urengoy and Yamburg) (Owen et al., 2023). There is also an estimated 35,700 billion cubic meters of natural gas along the Russian Arctic Shelf, a largely unexploited frontier, with most of this being in the Yamal and Gydan peninsulas (Shapovalova et al., 2020). In addition to this, Russia has numerous large deposits of important minerals throughout Siberia, including large deposits of nickel and palladium in Norilsk, rare earths in Yakutia, and uranium in Chita (Schenk et al., 2008). The extreme distance between these deposits and the need for them to be extracted mandates the creation of vast amounts of new infrastructure, such as the strategically important Northern Sea Route, and over 10,000 km of pipelines connecting the remote deposits to markets (Steiner & Barnet, 2021). These vast networks of pipelines will be required to extract oil and gas from the Arctic Ocean, which are critical to the long-term sustainability of Russia's oil and gas industry (Kirsanova et al., 2020). It is estimated that Russia's Arctic territories account for a major portion of the world's hydrocarbon reserves, approximately 13% of the world's oil and almost 30% of the world's natural gas, making the region a key strategic resource base for Russia (Borozna, 2023).

Region	Key Resources	Reserves Estimate	Accessibility Challenges

Western-Siberia (Yamalo-Nenets)	Oil, Gas	48.8 tcm gas (extractable)	Permafrost, depletion of old fields
Arctic-Shelf (Kara/Barents Seas)	Gas, Oil	>7.1 tcm free gas	Ice cover, low exploration (20%)
Far East/Siberia	Minerals (Nickel, Rare Earths)	28.7 mt rare earths	Remoteness, infrastructure deficits
Urals	Iron Ore, Coal	Substantial, but secondary	Transport bottlenecks

4.2 Influence on Regional Development

The high degree of geographic concentration of the nation's natural resources has contributed to a significant increase in economic development in areas where most of the primary production occurs. As a result, regions, especially those containing large amounts of hydrocarbons, have had a very significant impact on the overall national economy. For example, while the Khanty-Mansi region is one of several that contain vast hydrocarbon reserves, it is the Yamalo-Nenets Autonomous Okrug that contains the largest portion of Russia's hydrocarbon resources, with estimates indicating that this area supplies approximately two-thirds of all of Russia's hydrocarbon resources (Owen et al., 2023). Because of the large volume of hydrocarbon produced in this area, it also contributes to a significant percentage of the national GDP; hydrocarbon revenue makes up 49.4 percent of the country's total revenue (Limon & Tasik, 2024). However, this model of economic development based primarily on the exploitation of natural resources has exacerbated regional disparities. As a direct consequence of the extreme dependence on natural resources, the extraction process in Siberia is extremely expensive due to the harsh climate and widespread environmental damage. This, in conjunction with the high costs associated with operating in the remote areas of the region, has placed significant strain on local budgets, leading to a rapid decline in population and an economic "compression" in the area. On the other hand, some argue that the strategic concentration of key resources in remote locations can facilitate the creation of highly specialized and efficient extraction operations, which in turn help to protect national energy security and generate export income that can be used to fund broader national development projects. Although new infrastructure, such as the Northern Sea Route, will likely provide greater connectivity between the remote areas of Siberia and the rest of the world, it will also further exacerbate the vulnerability of the fragile Arctic environment to human-induced impacts. Additionally, while the agricultural regions in southern Russia are facing their own unique set of problems due to lack of sufficient resource-based subsidies to adequately offset the large-scale regional disparities (Leßmann & Seidel, 2015). This phenomenon of uneven development is indicative of the complex inter-relationship between resource availability, national economic planning

and socio-economic issues at the regional level (Olesen & Sørensen, 2019). The Russian Arctic zone is confronted with many distinct challenges, including underdeveloped infrastructure, decreased profit margins from mining due to limited power energy systems, and the clear distinction in terms of both economic and innovation development among its diverse constituent territories (Cherepovitsyn et al., 2020). Furthermore, this imbalance is compounded by the fact that despite the vast hydrocarbon resources found in the Yamalo-Nenets Autonomous Okrug, the average standard of living of the indigenous populations in this region remains extremely low, largely as a function of severe environmental conditions and increased living costs (Limon & Tasik, 2024).

Indicator	**Resource-RichRegions (e.g., Siberia/Arctic)**	**Central/Southern Regions**
GDP Contribution	High (e.g.,17% from Arctic hydrocarbons)	Lower, deindustrialized
Population Trends	Depopulation due to harsh conditions	Urban concentration
Environmental Impact	High pollution, disturbed lands	Secondary effects from imports
Infrastructure Investment	Pipelines, ports (e.g., NSR expansion)	Limited, focused on transport

4.3 Geopolitical Strategies

Russia's geopolitical strategies are based primarily upon where Russia's large amounts of natural resources are geographically concentrated, particularly in the vast and largely underdeveloped Arctic area (Borozna, 2023). The geographic configuration allows for a resource-based military strategy that is meant to secure and defend the very large areas claimed by Russia and protect access to the Northern Sea Route, a route that is an important path for accessing oil and gas from the Arctic marine environment (Kirsanova et al., 2020). Post-European sanctions, Russia has successfully developed export diversification strategies, one example being the development of the Power of Siberia pipeline to China, which allowed Russia to redirect roughly 59% of its fuel exports to Eastern markets (Thatcher, 2024). Furthermore, critical minerals, including uranium, are used to maintain international influence, while also pursuing the goal of acquiring critical mineral sources abroad through programs like the one in Africa that is part of its larger critical minerals strategy (Shapovalova et al., 2020). Although the multifaceted approach does enhance national resilience, it increases geopolitical tension, especially with NATO, regarding who will be able to control and utilize these critically important Arctic resources (Cherepovitsyn et al., 2020). Although there are obvious economic benefits from this dependency on Arctic resource extraction, there are significant social and economic risks present as evidenced by the various terms that describe them such as "the resource curse," "the staples trap," "Dutch disease," and the practice of rent-seeking that is so prevalent throughout the Russian Arctic (Gritsenko & Efimova, 2020). In addition to these economic challenges that exist due to the extraction of resources in the Arctic, the

environmental vulnerability of the Arctic area creates additional environmental requirements that increase the complexity of projects in terms of time, cost, and technology required to execute a project or prepare for emergencies (Nørtoft et al., 2018). Therefore, it is necessary to understand the complex relationships between the availability of resources and the trajectory of development to assess the long-term sustainability and fairness of economic policies employed in these Arctic areas (Gritsenko & Efimova, 2020).

Strategy	Key Elements	Implications
Export Diversification	Pipelines to Asia,LNG projects	Reduces EU reliance, boosts BRICS ties
Arctic Control	Military bases, NSR development	Asserts sovereignty, risks escalation
Critical Minerals	Import substitution, overseas mining	Counters sanctions, enhances tech self-sufficiency

5. Discussion

The study reveals a two-sided relationship between spatial concentration, which promotes regional economic development, and the "Siberian curse", which causes the diversion of subsidies to less productive regions. Geopolitically, the resources provide Russia with "energy weapons", but they also cause countermeasures (as shown by the redirection of Russian energy exports after 2022). Climate Change has a dual role; It creates opportunities for navigation in the Northern Sea route, but threatens permafrost infrastructure. There is an opportunity for diversification via renewable energy sources, but currently Russian policy prioritizes extraction. Ultimately, the distribution of resources defines Russia's duality - as one of the world's largest resource powers, and as vulnerable to global trends.

Russia's Far North Zone (Arctic Zone) contains substantial hydrocarbon reserves, which are estimated at 316 billion barrels of oil equivalent, or about 60 percent of all the possible hydrocarbons found in the Arctic (Nørtoft et al., 2018; Kirsanova et al., 2020). Therefore, it can be inferred that the federal state policy regarding the search for and the use of these hydrocarbons is a primary factor that determines Russia's socio-economic and science-technology progress. The contribution of the region to Russia's gross domestic product (GDP), which is currently between 12–15%, as well as its area, which accounts for about 12% of Russia's total landmass, underscores the region's strategic role in expanding Russia's resource base and enhancing the country's international competitiveness (Cherepovitsyn et al., 2020). However, the current level of socio-economic development of the region creates serious obstacles to Russia's ambitious plans for large-scale development of the Arctic zone (Plotnikov et al., 2018). Therefore, there is an urgent need to reevaluate the existing development strategies for the sustainable development of the region, to solve the inherent problems of this Macro region.

6. Conclusion

The majority of Russia's massive oil, gas and mineral resources lie in Siberia, the Arctic, and the Russian Far East – regions with harsh climate conditions that make extracting them difficult; however, they also hold enormous amounts of unexploited potential. This geographically concentrated wealth has an almost direct effect on local economies of resource rich areas such as Yamal and Khanty-Mansi and has an indirect effect on national economies due to the large infrastructure requirements and high operating costs associated with the extraction of such natural resources. In addition to the internal structural barriers that hinder a more balanced national development, Russia's vast natural resource base is a major geopolitical tool which it uses to project its influence abroad, especially given its extensive network of energy export pipelines and expansive claims to the Arctic territories. At the same time, Russia's dependence on this tool, particularly under the duress of international sanctions and changing global circumstances, creates dependencies and vulnerabilities. The complexities of the relationship between having an abundance of natural resources and using those resources for projecting power introduce many risks and issues regarding the environment and security that require the input from a wide range of views on how to achieve sustainability and develop a strategy of diversifying its economy.

Russia's resource development is influenced by the geographic distribution of Russia's resources; as a result, Russia's geographically-based resource availability has contributed to both positive and negative developmental trends and strategic requirements; and this has fostered economic development in some areas while creating additional regional inequality and increasing geopolitical risks related to power projection. Therefore, to manage these issues, policymakers must develop policies that are sustainable, use gasification strategies, and advocate for multilateral governance in the Arctic region. Future research should be quantitative to model climate changes effects to generate more accurate projections.

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