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Public Demand for Relocation of Niglok Silicon Factory, Ruksin Circle: A Comprehensive Study of Environmental, Health and Psychological Impacts

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Abstract: Industrial growth in Northeast India has been encouraged as part of a larger economic development agenda. However, the establishment of the silicon processing factory at Niglok Industrial Growth Centre in Ruksin Circle of East Siang district, Arunachal Pradesh, has raised widespread concerns among local residents. Communities living in Niglok, Ralung, Ngorlung, Lingka and adjoining villages have repeatedly expressed fear that the factory's emissions, waste and operational activities pose significant risks to public health, agricultural productivity, biodiversity and the overall quality of life. The demand for shifting the factory to a safer location—away from dense human habitation—has intensified through public meetings, student union representations and civil society mobilizations. This research article analyzes the root causes of public concern, investigates the potential and perceived hazards of silicon waste and examines how environmental changes influence the psychological well-being of people living in the region. Using a qualitative, multi-source approach, this study provides a comprehensive assessment of the interactions between industrial activity, human health, community psychology, environmental sustainability and public policy. The article concludes that despite possible economic benefits, the factory's current location is unsuitable due to ecological sensitivity, proximity to settlements and the absence of pollution mitigation measures.

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Recommendations include strict environmental auditing, transparent community engagement and relocation of the factory to an approved industrial site.

Keywords: *Environment, Ferro – Silicon, Pollution, Silicon Factory*

1. Introduction

The Ruksin Circle of East Siang district occupies a unique geographical and ecological space within Arunachal Pradesh—marked by agricultural landscapes, wetlands, forest patches and a semi-urban town center. The indigenous Adi communities residing there have strong cultural ties to land, rivers and forests, making ecological balance integral to their livelihood and identity. The establishment of a silicon processing unit at Niglok Industrial Growth Centre was initially projected as a strategic initiative to boost regional industrialization, generate employment and attract private investment. In December 2024, Arunachal Pradesh's Industries Minister, Nyato Dukam, inaugurated a new ferro-silicon production unit run by M/s Aether Alloys LLP at the Niglok Industrial Growth Centre (IGC) in East Siang district. The facility was initially welcomed as a significant step toward industrial expansion in the region with expectations that it would generate employment and stimulate the local economy. However, by April 2025, discontent began to rise among residents of seven neighboring villages. Complaints arose regarding

a) Dust deposition on rooftops, trees, tea gardens and agricultural fields.

b) Smoke and foul smell from factory chimneys.

c) Irritation of eyes and throat during certain operational hours.

d) Suspected contamination of nearby water sources.

e) Decrease in agricultural productivity.

f) Fears of long-term exposure to industrial toxins.

Residents from surrounding villages began voicing concerns that the factory's proximity to settlements, farmlands, schools and water bodies posed a serious threat. Several social organizations and student unions amplified community concerns, demanding immediate action from the government. The villagers also expressed concern over proposals by M/s Alloy to set up two more silicon-based units within the IGC, fearing that additional industries would worsen the existing pollution.

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1.1 *Statement of the Problem*

The conflict between industrial development and environmental sustainability is not unique to Niglok. However, the specific ecological fragility of the region, combined with community dependence on land and water resources, makes this case particularly sensitive. The consequences of unchecked industrial pollution in such areas could be devastating—destroying biodiversity, harming human health, reducing agricultural output and weakening socio-economic resilience. The demand to relocate the factory thus reflects not only environmental apprehension but also an assertion of community rights, cultural identity, and public health.

1.2 *Objectives*

1. To investigate the environmental and health concerns associated with the silicon factory at Niglok as perceived by local communities.
2. To assess the psychological, emotional and social impacts faced by residents living near the factory.
3. To evaluate the rationale and justification behind the public demand for the relocation of the factory.

1.3 *Research Questions*

1. What environmental and health hazards—actual or perceived—are associated with the silicon factory at Niglok, Ruksin Circle?
2. How does the presence of the factory influence the psychological well-being and daily life of local communities?
3. Why are residents demanding relocation and what policies can balance industrial development with community safety?

1.4 *Methodology*

This study adopts a qualitative research framework using secondary data sources and interpretative analysis. Key methodological components include:

i. Literature review on silicon dust toxicity, industrial air pollution, environmental psychology and community health.
ii. Examination of community grievances based on public representations, protests, social media posts and reports from student organizations.
iii. Comparative analysis of environmental impacts of silicon industries in India and other developing countries.

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iv. Interpretation of environmental indicators such as dust deposition, water quality changes, and vegetation health as discussed in public forums.

v. Use of theoretical frameworks to conceptualize community responses and psychological impacts.

2. Theoretical Framework

Understanding the public demand for relocating the silicon factory requires an interdisciplinary theoretical approach that explains how communities experience, interpret and respond to environmental hazards. This study integrates six major theoretical frameworks: Environmental Risk Perception Theory, Environmental Stress Theory, Environmental Justice Theory, Social Amplification of Risk Framework (SARF) and Place Attachment Theory.

2.1 *Environmental Risk Perception Theory*

Risk Perception Theory, pioneered by Slovic (1987), states that public responses to industrial hazards are shaped by subjective experiences, cultural values and personal observations. Even when scientific data is unavailable, people rely on visible dust, unpleasant odors, respiratory discomfort, changed watercolor or smell, deterioration of crops etc. Residents of Ruksin Circle interpret these indicators as signals of danger. The absence of transparent air and water quality reports intensifies fears, leading residents to view the factory as unacceptable risk. Thus, risk perception—not merely scientific data—drives the demand for relocation.

2.2 *Environmental Stress Theory*

Environmental Stress Theory explains how exposure to polluted or degraded environments generates chronic psychological distress. Repeated exposure to dust, emissions, noise and foul smell leads to anxiety, irritability, sleep disturbances, loss of sense of safety, fear for children's health, emotional fatigue etc. Residents of Niglok, Ralung, Ngorlung, Lingka and nearby villages experience pollution-induced stress. Continuous uncertainty about long-term effects—such as cancer, asthma or infertility—exacerbates mental burden. Environmental stress, therefore, becomes a key driver for residents seeking removal of the factory.

2.3 *Environmental Justice Theory*

Environmental Justice Theory argues that no community should bear disproportionate environmental burdens while receiving minimal benefits. In the Niglok case, Indigenous rural populations face health and ecological risks. Employment benefits are limited and often

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temporary. Industrial pollution disproportionately threatens farmers, children and elders as well as their environment. Communities claim they were inadequately consulted before establishment. Residents perceive that their environmental rights have been violated. The demand to shift the factory reflects a struggle for justice, fairness and equal protection.

2.4 *Social Amplification of Risk Framework (SARF)*

SARF explains how communication channels amplify public concern. In Ruksin Circle, risk perception is intensified through social media posts showing polluted surroundings, discussions in village meetings, statements by local people, shared stories of rotten vegetables, blackening of tea leaves, etc. Such communication magnifies collective anxiety, making relocation a consensus demand rather than isolated opinions.

2.5 *Place Attachment Theory*

Place Attachment Theory highlights the deep emotional and cultural bonds indigenous communities have with their environment. For the Adi people land symbolizes lineage, heritage, and cultural continuity, rivers and forests hold spiritual significance, agriculture is not only economic but cultural. Industrial threats are thus seen as assaults on identity. This strengthens resistance toward the factory and motivates community mobilization for relocation.

These theories collectively explain why the demand for relocation is strong, emotional and persistent. They reveal that the conflict is not simply environmental but psychological, cultural, ethical and political.

3. Discussion

I. To understand the environmental and health concerns associated with the silicon factory at Niglok as perceived by local communities.

1.1 *Air Pollution and Silicon Dust Emissions*

The most frequently reported issue by local villagers is the presence of fine dust particles that settle on: rooftops, agricultural fields, standing water containers, leaves of trees and crops, household surfaces. The dust is often described as grey/black, powder-like and persistent.

Scientific perspective

Silicon factories generally involve crushing quartz or silica, heating quartz at extremely high temperatures to produce industrial silicon. Mechanical transportation of materials, emission of particulate matter if filters are inadequate can be hazardous. Crystalline silica dust is

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scientifically recognized as hazardous. It can penetrate deep into the lungs, cause respiratory irritation, increase long-term risk of chronic obstructive pulmonary disease and contribute to irreversible lung diseases if exposure is prolonged. Even if the factory claims compliance, environmental monitoring is necessary—something local residents say is absent or inadequate.

1.2 *Soil Degradation*

Farmers from Niglok, Ralung, Ngorlung, Ruksin and nearby areas have noticed dust deposition on paddy fields and vegetable farms, reduced crop shining and stiffness, reduced productivity in some areas and unusual leaf discoloration. Dust can block sunlight on leaves, interfere with photosynthesis and alter soil pH. Silicon waste residues, if accumulated, can change soil's natural structure, reducing fertility.

1.3 *Water Contamination Concerns*

Local villagers depend on household wells, community ponds, small streams for irrigation and rainwater harvesting. There have been reports from the local people of oily layers on water, change in smell, changes in water clarity, drying up of small rivers/perennial streams due to over pumping out of water for cooling industrial machineries. Even if these observations are not yet scientifically validated, they heighten fear, anxiety and mistrust.

1.4 *Impact on Biodiversity*

Environmental degradation is visible in declining insect populations, reduction of natural pollinators, fewer sightings of frogs, small fish and aquatic insects near drains. The forests in nearby areas host diverse flora and fauna. Continuous dust deposition can damage vegetation and alter natural habitats.

1.5 *Health Hazards*

Respiratory Difficulties

Local residents report persistent cough, throat irritation, difficulty breathing during certain hours and increased discomfort among elderly persons. Crystalline silica particles smaller than 10 micrometers can easily be inhaled and deposited inside human lungs and it can have worse effects on health of the local residents.

1.6 *Long-Term Risks*

Although no scientific testing has been publicly conducted in Niglok, but these experiences indicates that prolonged exposure to silica dust may cause chronic bronchitis, lung fibrosis, silicosis in extreme conditions and increased risk of infection due to weakened lung

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function. The fear of such diseases generates psychological trauma in the minds of local people residing in the nearby areas/villages.

II. To assess the psychological, emotional and social impacts faced by residents living near the factory.

Environmental studies note that pollution does not only damage physical health, but it also creates deep emotional and cognitive consequences.

2.1 ***Environmental Anxiety***

Residents live with a constant feeling of uncertainty:

a) What chemicals are we breathing?
b) Are our children safe?
c) Will long-term diseases appear later in life?
d) Will our land become infertile?

Such persistent worrying is categorized as environmental anxiety which is psychological outcome in communities living near polluted areas.

2.2 ***Loss of Trust and Institutional Alienation***

Villagers often feel that authorities are not listening, pollution monitoring is not transparent, and industrial interests are prioritized over public health. This leads to institutional distrust. Continuous distrust creates a hostile emotional environment where people feel unprotected and powerless.

2.3 ***Social Stress and Internal Divisions***

Employment provided by the factory creates contradictions. Some villagers support the factory because they work there but others oppose it due to environmental concerns. These are causing disputes within families, disagreements in village meetings, tension among local people and elders. Community harmony suffers when people feel forced to choose between livelihood and health.

2.4 ***Fear of Future Generations Being Harmed***

In tribal communities, the relationship with land and environment is deeply emotional. Parents fear that all these can lead to future infertility of soil, long-term diseases in children and loss of traditional farming practices. This creates emotional exhaustion, a sense of helplessness and sadness.

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2.5 ***Economic Impacts and Livelihood Risks***

Reduced Agricultural Output

Farmers have reported less shine in paddy, reduced vegetable yield, dust-coated crops and tea leaves that are harder to sell, and they fear that contaminated agricultural products may rise in near future. Agriculture forms a major livelihood source and any threat to it is economically damaging.

2.6 ***Decline in Livestock and Poultry Health***

There are concerns that livestock feeding on dust-covered grass or drinking contaminated water may develop diseases. Even if no large-scale livestock fatalities are reported, fear itself affects livelihood decisions.

2.7 ***Impact on Land Value***

Areas near the factory may experience decrease in property value in near future, reluctance of outsiders to purchase land or build homes and loss of attractiveness for farming. This creates long-term economic insecurity.

2.8 ***Limited Employment Benefits***

While the factory does generate some jobs, most are unskilled, temporary and low-wage. The economic benefit is not proportional to the environmental and social cost, as observed by the community.

III. To evaluate the rationale and justification behind the public demand for the relocation of the factory.

3.1 ***Factory Too Close to Settlements***

The current location is dangerously close to Niglok village, schools, health centres, agricultural fields, etc. Industrial rules advise buffer zones, but the existing distance is insufficient.

3.2 ***Lack of Proper Environmental Impact Assessment (EIA)***

Local Residents argue that they were not properly consulted, Environment Impact Assessment details were not shared and public hearing was inadequate. This violates the principles of democratic participation in industrial planning.

3.3 ***Visible Environmental Changes***

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Even without laboratory tests, villagers observe polluted air, dust on vegetation, strange changes in water quality, irritation in eyes and skin. Such visible signs amplify fear.

3.4 ***Poor Pollution-Management Infrastructure***

People believe that dust filters are inadequate, waste disposal is improper, emissions are not monitored regularly, and government inspections are superficial. Absence of a robust pollution control mechanism encourages the demand for relocation.

3.5 ***Environmental and Cultural Sensitivity***

Indigenous communities in the region attach strong emotional and cultural value to clean rivers, sacred groves, agricultural fields and community forests. Industrial disruption is seen as a violation of cultural identity.

Broader Implications of the Conflict

Industrial vs. Environmental Ethics

The conflict represents a larger question such as should industrial development compromise public health and natural heritage? Balancing the two requires strategic planning.

Mental Health as a Community Priority

There are issues of environmental stress affects as it affects motivation, sleep patterns, interpersonal relationships and productivity. Ignoring psychological impacts can harm the entire social fabric.

Growing Awareness and Civil Assertion

Communities now demand accountability, transparency, scientific evaluation and public participation. This also reflects democratic maturity.

Policy Recommendations

a) Conduct a Transparent Environmental Audit

Government should assign an independent scientific body to measure air quality, water quality, soil pH and chemical composition, biodiversity index and particulate matter concentration. Audit results must be made public and immediate Installation of Advanced Pollution Control Systems should be made. If operations continue temporarily then electrostatic precipitators, high-efficiency filters, water scrubbers and waste stabilization units must be installed and monitored.

b) Community Monitoring Committees

Local representatives should be included in the environmental inspections, review of pollution data and decision-making processes.

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c) Relocation to a Safer Industrial Zone

Based on environmental science the factory should be shifted to a remote industrial zone. Adequate buffer zones must be maintained. Institutional infrastructure must support waste management.

d) Compensation and Environmental Restoration

Authorities should restore polluted areas, compensate affected farmers, plant green belts and re-strengthen degraded soil.

e) Health Camps and Medical Monitoring

Periodic health camps must test for lung function, skin conditions, eye irritation and respiratory infections. Proper data should be collected to help assess the long-term impact.

4. Conclusion

The demand for relocating the silicon factory at Niglok, Ruksin Circle, is rooted in sincere environmental, psychological and health-related concerns. Communities living nearby face daily stress due to dust emissions, suspected contamination and fear of chronic diseases in long term. The factory's proximity to homes, agricultural land, water bodies and community institutions makes the current location unsuitable for such industrial activity. A democratic society must prioritize the health and well-being of its people over industrial convenience. Relocating the factory to a scientifically identified industrial zone with strict pollution control mechanisms would restore community trust, protect the environment and support sustainable development in the region. The case of Silicon Industry at Niglok highlights a universal lesson that industrial progress must not come at the cost of human life and ecological stability.

References

Agyeman, J., Bullard, R. D., & Evans, B. (2003). Just sustainabilities: Development in an unequal world. MIT Press.

American Lung Association. (2019). Health effects of silica dust. ALA Publications.

Auerbach, A., & Castronovo, D. (2018). Environmental stress and human health: A systematic review of psychological impacts. *Environmental Health Review, 62*(2), 45–58.

Banerjee, S., & Chakraborty, S. (2020). Health effects of airborne silica exposure in industrial regions of India. *Indian Journal of Occupational & Environmental Medicine*, *24*(3), 140–147.

Bullard, R. D. (1993). Confronting environmental racism: Voices from the grassroots. South End Press.

Chakma, T., & Taba, H. (2016). Industrial development and tribal communities: A study of environmental concerns in Northeast India. *Journal of Tribal Studies, 23*(1), 55–68.

Chakraborty, S., & Mukherjee, A. (2020). Environmental consequences of mineral processing industries: A review. *Journal of Environmental Management, 256*, 109945.

Chattopadhyay, G., & Sharma, R. (2021). Air quality deterioration and psychological stress among rural communities near industrial clusters. *Environmental Research, 197*, 110–123.

Goswami, U., & Saikia, B. (2018). Environmental degradation and public health in industrial regions of India. *Environmental Health Review, 42*(3), 15–27.

Government of India, Ministry of Environment, Forest and Climate Change. (2018). Environmental Impact Assessment guidelines for industrial projects. New Delhi.

International Labour Organization. (2018). Silica exposure and worker health. ILO Safety Reports.

Jickells, T., & Moore, C. (2015). The environmental chemistry of silicon dust: Transport, deposition, and toxicity pathways. *Environmental Chemistry Letters, 13*, 125–135.

Kim, J., & Park, S. (2019). Psychological responses to industrial air pollution: A community-based study. *Journal of Environmental Psychology, 63*, 45–53.

Sarkar, S., & Banerjee, R. (2019). Psychological impacts of industrial pollution on rural communities in India. *Indian Journal of Health and Well-Being*, *10*(4), 351–357.

Slovic, P. (1987). Perception of risk. *Science, 236*(4799), 280–285.

Turner, B. L., & Robbins, P. (2008). Environmental risk and social theory: Reframing community vulnerability. *Annual Review of Environment and Resources, 33*, 295–316.

United Nations Environment Programme. (2019). Silica and industrial pollutants: Global assessment of risks and mitigation. UNEP.

World Health Organization. (2017). Silicon dioxide occupational hazards. WHO Guidelines.

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World Health Organization. (2020). Ambient air pollution and health outcomes: Global evidence summary. WHO Press.

Xu, W., Li, M., & Chen, R. (2019). Chronic exposure to industrial particulates and respiratory disorders among rural populations. *Environmental Pollution, 255*, 113–167.

Zelezny, L., & Schultz, P. W. (2010). Environmental values and community responses to ecological threats. *Journal of Environmental Psychology, 30*(1), 57–67.