



# Saranda Forest Range: A Fragile Ecosystem at the Crossroads of Development and Conservation

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## Abstract:

The Saranda Forests in Jharkhand, India, confront a critical juncture as escalating mining activities challenge the delicate balance between conservation and economic growth. Once renowned for hosting India's largest Sal forests, the region now experiences a severe decline in biodiversity due to unregulated mining. The juxtaposition of rich biodiversity and coveted iron ore deposits underscores the dichotomy between ecological preservation and economic exploitation. The potential economic benefits, including regional development and employment, must be weighed against threats of habitat destruction, deforestation, and biodiversity loss. Achieving a delicate balance is imperative for sustainable development.

Literature review highlights the adverse impact of mining on tribal communities, marked by economic exploitation and socio-political marginalization. Legal frameworks, such as the Indian Forest Act of 1927, encounter implementation challenges, leading to deviations in forest management. Sustainability assessments reveal a nuanced equilibrium between economic improvements and environmental challenges in mining operations.

Unrestrained mining in Saranda results in habitat destruction, tribal displacement, and social issues, including the exploitation of tribal women. Illicit mining intensifies territorial disputes and contaminates water quality and wildlife habitats. The Union Ministry of Environment and Forests imposes a moratorium on forest clearances, emphasizing sustainable mining practices.

The discussion addresses systemic challenges faced by Adivasi populations due to inadequate forest demarcation, resulting in legal uncertainties. Mining worsens vulnerabilities, leading to economic disparities, socio-political marginalization, and environmental degradation. Urgent interventions are needed, focusing on equitable benefit distribution, tribal participation, and robust environmental safeguards.

Drawing global parallels, the study identifies mining-associated erosion as a primary contributor to environmental contamination. The interconnectedness between iron ore mining, alterations in land use, and community displacement underscores complex environmental and social challenges. The government initiates measures to assess Saranda's carrying capacity, emphasizing legally binding provisions for mining leases. Discrepancies between legal mandates and implementation underscore systemic challenges requiring attention for sustainable and inclusive forest management.

In conclusion, Saranda Forests epitomize the global challenge of balancing economic progress, ecological preservation, and cultural heritage. Mindful mining practices, inclusive policies, and harmonious industry-

environment integration are vital for shaping a sustainable future. Choices made today will resonate through time, influencing the legacy of a region navigating the intersection of progress and preservation.

### Key words:

Forests, Tribal Livelihood, Mining, Sustainability, Cultural heritage.

### Introduction:

Nestled within the undulating terrain of the West Singhbhum district in Jharkhand, the Saranda Forests beckon with a resplendent charm characterized by a rich tapestry of biodiversity and cultural symbiosis. This pristine enclave, once celebrated for housing India's largest Sal forests, now stands at a critical juncture as burgeoning mining activities threaten its delicate ecological balance.

The Saranda Forests unfold as an ecological bastion, boasting an exceptional array of flora and fauna. The undulating hills and valleys, house 11 species of the Dendrobium genus, with the apex of botanical richness found at Tholkobad. This habitat harbours botanical rarities, including *Pecteilistriflora*, and a plethora of fauna, comprising 28 mammalian species, 60 avian species, 20 reptilian species, 8 amphibian species, and 63 species of butterflies. However, recent ecological assessments reveal a stark decline in biodiversity due to unbridled mining activities. (Kayet 2016)

The vibrant cultural tapestry of Saranda is intricately woven with the lives of indigenous tribal communities, including the Ho, Munda, and Uraon. These communities, deeply rooted in their coexistence with the forests, have established sacred groves and sacred spaces, locally known as "SARNA," symbolizing a harmonious relationship with nature. The forest, in turn, sustains their livelihoods, providing resources ranging from honey and medicinal plants to timber and food.

The Saranda forest range presents a poignant dichotomy that encapsulates the tension between conservation imperatives and the pursuit of economic growth. On one hand, this ecological enclave is replete with a diverse array of flora and fauna, constituting an invaluable reservoir of biodiversity. The intricate ecosystems within the Saranda forest harbor numerous endemic and endangered species, fostering ecological balance and contributing to the broader ecological health of the region. This ecological richness is emblematic of the intrinsic value of the Saranda forest as a reservoir of biodiversity with untold ecological benefits.

Conversely, beneath the verdant expanse of the Saranda forest lies a reservoir of considerable economic potential in the form of rich iron ore deposits. These subterranean resources represent a coveted asset for economic exploitation, capable of catalysing regional development, generating employment, and bolstering economic indicators as well as national economic development. The juxtaposition of this natural wealth with the biodiversity above ground sets the stage for a complex and nuanced dilemma at the crossroads of conservation and economic growth.

The dilemma is underscored by the imperative to balance the preservation of ecological integrity with the economic imperatives of resource utilization. The extraction of iron ore, while a source of economic advancement, poses a palpable threat to the delicate ecological equilibrium of the Saranda forest. Mining activities, if undertaken without meticulous consideration for environmental safeguards, risk irreversible damage to habitats, soil erosion, and the depletion of water resources. The dichotomy is further exacerbated by the potential for deforestation, habitat fragmentation, and the concomitant loss of biodiversity, which threatens to undermine the very ecological foundation that renders the Saranda forest invaluable.

This quandary calls for a nuanced and interdisciplinary approach that transcends binary paradigms of conservation versus economic growth. Sustainable development strategies must be devised that recognize and reconcile the dual imperatives at play. Integrating advanced technologies, stringent environmental regulations, and community participation becomes imperative to navigate this delicate equilibrium. The decision-making

process requires a judicious consideration of the long-term ecological consequences vis-à-vis short-term economic gains, acknowledging that the preservation of the Saranda forest's ecological integrity is integral to fostering enduring economic sustainability. This dialectical tension encapsulates a complex challenge demanding thoughtful consideration and innovative solutions that harmonize the imperatives of conservation and economic growth in the Saranda forest region.

## Review of Literature

According to Saha (2008) the prevailing tribal milieu in India is emblematic of pervasive discontent and disillusionment among tribal communities, primarily emanating from the entrenched dynamics of institutionalized economic exploitation and socio-political marginalization. These deleterious processes are embedded within the broader non-tribal framework, perpetuating a cycle of adversity for these marginalized populations. A salient facet of this predicament is the adverse impact of mining activities, which serves as a poignant illustration of the tribals' plight.

Sharma (2005) in her paper vividly illustrates the legal framework governing forest ownership, utilization, and management in India is fundamentally underpinned by the Indian Forest Act (IFA) of 1927. This legislative instrument lays the groundwork for the delineation of rights, particularly concerning the establishment of Reserved Forests (RF) and Protected Forests (PF). The primary intent behind these provisions is to ensure the preservation of pre-existing rights, with specific procedures mandated to prevent the infringement upon such rights. However, an analysis of practical implementations reveals instances of deviation from these legal stipulations, exemplified by circumstances in Singhbhum.

The findings of the study conducted by Hosseinpour (2022) reveal that the aggregate sustainability assessment of mining operations yields a marginal rating, with a total score of 4.20. Within this nuanced evaluation, discernible nuances are evident, suggesting a delicate equilibrium between certain aspects of sustainability and others that manifest unsustainability. Specifically, the discerned impacts delineate a scenario wherein mining activities have yielded modest improvements in economic and social conditions, albeit concomitantly posing a significant challenge to environmental sustainability.

Of particular concern is the plight of tribal communities within the ambit of mining operations. The ostensibly slight enhancement in economic and social conditions tends to obscure the intricate tapestry of adverse consequences experienced by tribal populations. Mining activities, while ostensibly contributing to economic betterment, often result in the displacement and disenfranchisement of indigenous communities. The socio-cultural fabric of these tribal groups, intricately interwoven with their land and natural resources, is subjected to a perturbing disarray. The disruptions extend beyond the economic realm, permeating into the socio-political and cultural dimensions, thereby compounding the multifaceted challenges faced by tribal inhabitants.

Furthermore, the environmental ramifications of mining operations are pronounced, constituting a notable locus of unsustainability. The deleterious effects on local flora and fauna are acutely palpable, engendering a tangible ecological imbalance. The extraction processes, coupled with inadequate mitigation measures, result in habitat degradation and loss, imperilling the biodiversity of the region. Such environmental unsustainability poses a direct threat to the delicate ecosystems that sustain indigenous flora and fauna, thereby perpetuating an enduring ecological predicament.

In light of these intricate dynamics, a judicious reevaluation of mining practices is imperative to rectify the extant imbalances and foster a more equitable and sustainable trajectory. Comprehensive measures addressing the concerns of tribal communities, encompassing equitable resource distribution, participatory decision-making, and robust environmental safeguards, are indispensable. This recalibration seeks not only to redress the prevailing environmental unsustainability but also to ameliorate the adverse impact on the livelihoods and cultural heritage of indigenous populations, fostering a holistic paradigm that balances economic development with ecological and social well-being.

The once-pristine Saranda landscape now bears the scars of unrestrained mining, legal and illegal alike. The region's rich deposits of high-grade iron ore have become the focal point of industrial endeavours, resulting in

widespread habitat destruction and ecological degradation. The consequences are evident in the decline of plant species from over 300 to a mere 87, highlighting the urgent need for intervention. (Hussain & Anand 2017)

According to Idrobo et al, (2014) the economic viability of illicit mining endeavours has engendered territorial disputes among unlawful armed factions, each vying to assert dominance over specific regions to monopolize the extraction of valuable minerals. Despite the inherent conflict associated with such territorial contests, it is noteworthy that illegal mining, particularly in the context of iron ore extraction from forested lands, is characterized by a labour intensive nature. This labour intensity factor may serve as a mitigating force, counteracting the incentives of illegal armed groups to forcibly displace local populations from their land. This discernment contributes to a nuanced understanding of the complex interplay between economic incentives, territorial dynamics, and the socio-political considerations inherent in iron ore mining within forested environments.

The cultivation of crops in environments contaminated by iron ore mining in forest lands presents a potential pathway for the translocation of metals into the edible components of these crops, thereby posing potential risks to human health. Despite the absence of a definitively established quantification of relative contributions, the ingestion of food crops emerges as a significant avenue for human exposure to heavy metals in regions affected by iron ore mining activities in forested areas. This observation underscores the imperative of comprehensively understanding and addressing the repercussions of iron ore mining on local agricultural practices and, consequently, the health of the resident population. Ji, Kyunghee et al, (2013)

According to Roy (2001) mining activities engender two overarching environmental repercussions that can be construed as deleterious. Firstly, the alteration of land use, specifically the transformation from forested or arable areas to degraded wastelands, manifests as a primary environmental consequence. This transformation is primarily attributed to the improper disposal of overburden, accentuating the ecological degradation inherent in the process. Secondly, and intrinsically related to the first, is the displacement of entire villages, encompassing families who have traditionally cultivated crops, tended to livestock, and maintained a symbiotic coexistence with the forest over extensive periods, often spanning centuries, if not millennia.

Purty (2017) in her reseach highlights the plight of tribal women and youngsters mentioning about the escalation of mining activities in the Saranda Forest region has engendered a notable surge in human mobility within the forested areas. The augmented loading of iron ore, coupled with infrastructural developments such as road construction, railway sidings, and hutting, has exponentially heightened the vulnerability of the forests to irreparable damage. Beyond the ecological ramifications, the intensification of human presence has given rise to a spectrum of social challenges, notably the distressing phenomena of molestation and harassment directed towards young women within their local environs and market outlets.

Compounding this social predicament is the distressing exploitation of tribal adolescent girls who, enticed by promises of employment opportunities and an ostensibly improved quality of life in urban centers like Mumbai and Delhi, fall prey to unscrupulous agents and traffickers. A noteworthy report from a leading women's organization in Chaibasa, West Singhbhum district, underscores the distressing trend wherein adolescent girls and women are predominantly channelled towards domestic work in locales such as Faridabad, Delhi, and Gurgaon. The pernicious undercurrents of these exploitative practices extend further, with instances of young girls being coerced into the harrowing milieu of brothels, exemplifying the depths of human exploitation in the area.

The uncontrolled mining activities in Saranda have led to the degradation of wildlife habitats and disrupted the traditional migration routes of elephants. The intricate ecological tapestry, vital for the sustenance of local communities, is unravelling. Indigenous populations, heavily reliant on the forest for their livelihoods, face the loss of resources and disruptions in agricultural endeavours due to the alteration of hydrological dynamics.

Similar references and benchmarks can be found in many parts of the world. Study conducted by Zibret et al, (2018) delineates four reference sites as focal points for investigation, with each site characterized by a unique historical context of mining and ore processing. Boasting an extensive history exceeding 500 years, represents a locus of mercury (Hg) mining and ore smelting. Similarly, the Meža Valley, with a comparable historical timeline, stands as a paradigm of lead-zinc (Pb-Zn) mining and smelting activities spanning five centuries. The Celje area, in turn, emerges as a distinctive locale where zinc (Zn) was subjected to smelting processes for a



duration of a century. The fourth reference site, the Drava River alluvial plain, is discerned as a region marked by contamination, attributable to historical lead-zinc mining activities upstream.

Sincovich et al, (2018) conducted a thorough examination through a critical literature review, synthesizing existing Australian research to illuminate the intricate social consequences of mining activities within local communities. The synthesis identified 68 studies, organized into seven thematic categories, providing comprehensive insights into the diverse social impacts of mining in the Australian context. These categories encompass challenges related to an expanding non-resident workforce, strains on local infrastructure and housing, income inequality, adverse effects on child development and education, societal pressures on familial relationships, instances of substance abuse, and discernible impacts on Indigenous communities, specifically Aboriginal and Torres Strait Islanders.

The rivers of the Saranda region which earlier used to carry crystal clear water have now changed their colour in to red. Gallay et al, (2018) are of the opinion that the alteration in sediment flux balance holds consequential implications for water quality and the vitality of freshwater ecosystems, a well-established fact within environmental science. The discernible reduction in water clarity, commonly associated with elevated turbidity levels, presents a cascade of adverse effects on aquatic environments. Turbidity diminishes the penetration of light into the water column, thereby influencing fundamental processes such as photosynthesis, the production of dissolved oxygen (Boyd, 2015), and visibility for aquatic organisms. This reduction in visibility detrimentally impacts the essential activities of aquatic organisms, including foraging, reproductive behaviors, and the developmental stages of eggs and larvae (Alabaster & Lloyd, 1982; Dedieu et al., 2015).

Recognizing the dire ecological consequences, the Union Ministry of Environment and Forests has imposed a moratorium on forest clearances for new projects in Saranda. The directive emphasizes sustainable mining practices, comprehensive impact assessments, and the formulation of a mine reclamation model. Striking a balance between industrial needs and environmental preservation, this intervention seeks to safeguard the fragile ecosystem and uphold the region's ecological integrity. (Ramanathan 2014)

Concomitantly, the flux of sediments serves as a pertinent indicator of the concentration of bacteria, nutrients, and pollutants within aquatic systems (Pourabadehei & Mulligan, 2016). The intricate interplay between sediment transport and water quality is exemplified by empirical evidence, such as observed correlations between sediment-associated Mercury (Hg) concentration and fine sediment content in rivers and streams, as evidenced in specific instances, such as within the water bodies of French Guiana. These dynamics acquire heightened significance when contextualized within the purview of iron ore mining activities conducted in forested landscapes, where sediment mobilization and its subsequent impact on water quality contribute substantially to the ecological ramifications of such extractive processes. This academic elucidation endeavors to articulate the interconnectedness between iron ore mining, sediment flux alterations, and the ensuing repercussions on water quality and freshwater ecosystems.

## **Discussion:**

In response to the alarming ecological decline, the government has undertaken measures to assess the carrying capacity of Saranda. Justice M B Shah led a commission of inquiry, and a multidisciplinary expert committee evaluated the impact of mining on biodiversity. The need for legally binding provisions governing mining leases in ecologically fragile areas has been underscored, urging a conservation transition and the categorization of Saranda as a protected wildlife sanctuary.

In Singhbhum, a region characterized by a substantial Adivasi population with historical and extensive land rights, the legal prescriptions under the Indian Forest Act were not adhered to diligently. Specifically, the Act mandates meticulous demarcation procedures, particularly concerning lands designated as Protected Forests. Despite the Adivasis' well-established and specific rights in the demarcation of lands, the requisite demarcation processes were inadequately executed, resulting in a lacuna in legal clarity. Consequently, this oversight has plunged forest land dwellers into a quagmire of legal uncertainties and challenges.

The violation of established legal protocols in the demarcation of Protected Forests has, therefore, engendered a predicament for the Adivasi communities inhabiting these areas for centuries. The lack of accurate and comprehensive demarcation has led to a conundrum where the Adivasis, with a historical and legitimate connection to these lands, find themselves entangled in legal intricacies. The oversight not only jeopardizes the customary rights of the Adivasi inhabitants but also places them at a disadvantage in navigating the legal landscape surrounding forest land ownership and utilization.

This discrepancy between legal mandates and practical implementation underscores a systemic challenge that has implications for the well-being and sustenance of Adivasi communities reliant on the forest ecosystem. Addressing this disjunction between legal intent and on-the-ground realities is imperative for rectifying historical injustices, upholding the rights of indigenous communities, and fostering a more equitable and just legal framework that aligns with the principles of sustainable and inclusive forest management.

Mining operations in tribal regions have emerged as a crucible of exacerbation for the already vulnerable tribal populace. The extractive nature of mining activities, driven by a profit-centric motive, engenders a systematic exploitation of natural resources within tribal territories. This exploitation, often bereft of equitable benefit-sharing mechanisms, further deepens the economic chasm between the tribal communities and the entities overseeing these extractive processes.

Simultaneously, the socio-political ramifications of mining in tribal areas compound the tribals' predicament. The decision-making processes associated with mining ventures frequently sideline the voices and concerns of tribal communities, resulting in a disenfranchisement that exacerbates their marginalization. The intricate socio-cultural fabric of these communities, intricately interwoven with their land and natural resources, faces a perilous unravelling under the pressures imposed by mining operations.

Moreover, the environmental toll exacted by mining activities disproportionately burdens tribal habitats. The ecological disruption wrought by mining not only jeopardizes the sustenance patterns of tribal communities but also jeopardizes the delicate balance that sustains their traditional way of life. The confluence of environmental degradation and socio-economic disenfranchisement intensifies the tribals' vulnerability, pushing them further to the peripheries of societal well-being.

In this context, urgent and comprehensive interventions are imperative to redress the multifaceted challenges faced by tribal communities due to mining activities. These interventions should encompass robust mechanisms for ensuring the equitable distribution of benefits derived from mining, active participation of tribal representatives in decision-making processes, and stringent environmental safeguards to mitigate the ecological impact on tribal territories. Failure to address these issues expeditiously not only perpetuates the historical injustices meted out to tribal populations and Mother Nature, but also threatens the very fabric of India's socio-economic and environmental sustainability.

This dualistic environmental impact is particularly connected to the context of iron ore mining within forested terrains. The discourse on the environmental ramifications of such mining operations is underscored by the observed shifts in land use and the consequential degradation of ecosystems. Simultaneously, the dislocation of established communities, deeply rooted in agrarian practices and longstanding ecological harmony, further accentuates the multifaceted challenges and ethical considerations associated with iron ore mining in forest lands. This academic exposition seeks to illuminate the interconnectedness between iron ore mining activities, alterations in land use, and the displacement of traditional communities, fostering a comprehensive understanding of the environmental complexities inherent in such undertakings.

The proliferation of such social maladies in this geographical expanse is intricately linked to a confluence of socio-economic factors. Abject poverty, pervasive illiteracy, diminishing land holdings, rampant deforestation, and the relentless surge in mining activities collectively contribute to an environment conducive to the flourishing of these deleterious practices. The nexus between these socio-economic determinants and the burgeoning social challenges delineates a complex paradigm that warrants rigorous academic scrutiny to comprehend the multifaceted implications of the evolving dynamics in the Saranda Forest region. Addressing this conundrum necessitates an interdisciplinary approach, engaging insights from ecology, sociology, and policy analysis to inform strategies that mitigate both the environmental and social repercussions of burgeoning mining activities in this delicate ecological setting.

The focus within these themes is directed towards the significant challenges faced by Indigenous populations, highlighting the unique adversities arising from mining activities. The struggles of these communities underscore the intricate interplay between economic development imperatives and the imperative to preserve cultural heritage. Mining operations often encroach upon ancestral lands, disrupting longstanding relationships with the environment and posing a threat to the traditional lifestyles and spiritual affiliations of Indigenous communities. This encroachment amplifies their vulnerability, exacerbating historical injustices and emphasizing the need for a nuanced approach to mining governance that aligns economic development with the preservation of Indigenous rights and cultural integrity.

Concurrently, the ecological impacts of mining activities pose a substantial challenge, extending beyond social considerations to the fragile ecosystems supporting local flora and fauna. Extraction processes and associated environmental alterations pose a tangible threat to biodiversity, resulting in habitat degradation, fragmentation, and, at times, irreversible loss. These ecological disruptions resonate across trophic levels, imperilling not only endemic flora and fauna but also the intricate interdependencies sustaining the delicate balance of local ecosystems.

In light of these nuanced findings, there is a compelling call for a holistic re-evaluation of mining practices. Such a re-evaluation should prioritize the mitigation of social inequities, respect Indigenous rights, and integrate comprehensive environmental stewardship. This approach aims to establish a sustainable equilibrium that recognizes the multifaceted impacts on local communities, Indigenous populations, and the intricate ecosystems upon which they depend. Ultimately, this holistic perspective seeks to foster a conscientious and responsible trajectory for future mining endeavours.

In drawing parallels with analogous sites globally, situated within disparate landscapes and climates, the study endeavours to discern overarching patterns and major sources of contamination. The discerned primary contributors to environmental contamination are ascribed to the erosive processes associated with both mining operations and ore processing. The comparison and identification of these salient contamination sources extend beyond the specified reference sites, providing a broader framework for understanding environmental implications, particularly pertinent to iron ore mining endeavours within forested domains.

The academic narrative underscores the relevance of the identified sources of contamination, drawing parallels between historical mining activities in the reference sites and the potential implications for forested landscapes subjected to iron ore mining. By elucidating the shared mechanisms of contamination, the study aims to contribute to the scholarly discourse surrounding the environmental ramifications of mining operations, specifically within forested eco-systems. The Saranda Forests, situated at the confluence of ecological vulnerability and burgeoning industrial demand, serve as a poignant exemplar of the intricate equilibrium imperative for sustainable development. This scholarly discourse posits a compelling argument in favour of a holistic approach, advocating for a nuanced strategy that not only safeguards the rich biodiversity endemic to the region but also upholds the venerable cultural heritage of indigenous tribes. Importantly, it attempts to reconcile the imperative for economic growth through mining activities with the imperative of ensuring the sustainable coexistence of industry and nature. In the crucible of Saranda, the decisions made today carry profound implications, resonating across temporal dimensions and shaping the legacy of a region positioned at the dynamic intersection of progress and preservation.

Within this intricate tapestry, mining activities emerge as a pivotal component for economic growth, constituting a crucial driver of regional development. The mineral wealth embedded in the Saranda Forests represents a reservoir of economic potential, offering avenues for employment, infrastructure development, and increased fiscal capacity. Recognizing the role of mining in catalysing economic growth is fundamental to the imperative of uplifting local communities, mitigating poverty, and fostering overall regional prosperity. However, the imperative of economic growth through mining activities necessitates a judicious and conscientious approach that carefully navigates the potential environmental and social ramifications.

Amidst the imperative of economic progress, preserving the rich biodiversity of the Saranda Forests assumes paramount significance. The forest ecosystem harbours a plethora of unique flora and fauna, many of which may be endemic or endangered. Mindful mining practices, incorporating advanced technologies and stringent environmental safeguards, are indispensable to mitigate the ecological footprint of extraction activities. This

calls for a harmonious integration of industry and environmental conservation, ensuring that the economic gains from mining do not come at the irreversible cost of biodiversity loss.

Equally crucial is the preservation of the cultural heritage of indigenous tribes inhabiting the Saranda region. Mining operations have historically posed challenges to these communities, leading to dislocation, loss of livelihoods, and disruptions to their traditional way of life. A sustainable approach to mining must prioritize the rights and well-being of indigenous populations, involving them in decision-making processes, and respecting the intrinsic connection between these communities and their ancestral lands. This, in turn, ensures that the legacy of the Saranda region encompasses not only economic growth but also the preservation of cultural diversity and social cohesion.

## Conclusion:

In conclusion, the discourse on the Saranda Forests advocates for a comprehensive and balanced approach that recognizes the necessity of mining activities for economic growth while concurrently safeguarding the region's rich biodiversity and honouring the cultural heritage of indigenous tribes. The choices made in navigating this delicate balance will echo through time, shaping the trajectory of a region emblematic of the global challenge to harmonize progress and preservation in the pursuit of sustainable development.

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