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Displacement Without Voice: A Study of Habitat Loss among Non-Human Species Due to Human Land-Use Practices in Ghana

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Abstract

Although land use has been altered by human activities related to mining and estate development in Ghana, the impact of this alteration on non-human species whose habitats are being lost or disrupted has been under-researched. This research explored how habitat loss represents the displacement of other species due to estate development and galamsey (artisanal and small-scale mining) operations in certain mining communities in Ghana. This study used a qualitative multiple-case design, and data were collected through field observations, key informant interviews with community members, miners, environmental officers, and traditional leaders, and relevant policy and regulatory analysis. The results showed that mining operations systematically impact the elimination of microhabitats, fragmentation of ecological landscapes, degradation of aquatic systems, and displacement of aquatic, soil, and freshwater species. These forms of displacement break up ecological connections, compromise the provisioning of ecosystem services (e.g., pollination and soil regeneration), and change human–nature relationships in mining communities. In addition to ecological reactions, the overall study captured emotional, cultural, and ethical reactions to the loss of non-human life, highlighting expressions of grief, moral unease, and the sense of a disruption of cultural connections to land and water bodies.

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The study also discovered that institutional compliance was weak, and anthropocentric development stories normalized non-human displacement and made it almost invisible from institutional mining governance. The researchers concluded that environmental degradation of habitats in mining landscapes cannot only be understood as loss of environment, but as ecological injustice as a result of extractive land-use systems. This calls for more inclusive and ethical mining regulations, environmental impact assessments, land-use planning, and recognition of the intrinsic value of non-human life and its interconnection with human well-being. In simple terms, the study shows that habitat displacement is also an environmental sustainability issue: when non-human habitats disappear, communities lose the natural benefits, such as clean water, fertile soil, and pollinated crops, that they depend on now and will need in the future.

1. Introduction

Human land-use activities are one of the biggest threats to biological diversity in the twenty-first century, worldwide. The spatial size and quality of natural habitats have decreased significantly owing to population growth and increasing demands on resources from agriculture, urbanization, and infrastructure development. Habitat loss is one of the main factors contributing to biodiversity loss and is a pervasive factor influencing species distribution, community composition, and ecosystem function (Socolar et al., 2025). However, such changes mostly occur without the input of the most impacted species, whose evolutionary past and ecological functions are deeply connected to the health of their environments. This research falls within the cross-cutting fields of environmental science and ethical questions and examines the phenomenon of displacement, the involuntary loss of habitat experienced by other species, as a result of human land-use decisions (Chacko et al., 2025).

Human activities not only change land cover but also affect ecosystems in various other ways. They change the structure of ecological communities and alter the conditions required for the persistence of species. A wealth of empirical evidence shows the reduction of specialist species and biotic homogenization (dominance of generalist species at the cost of more sensitive ones) in landscapes following anthropogenic expansion (Ouya et al., 2024). Patterns are not restricted to specific sites, but rather land-use change has been demonstrated to cause extensive

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loss of biodiversity at multiple scales (including biogeographic regions and taxonomic groups), with impacts that are sometimes more severe than those inferred locally (Socolar et al., 2025). These results highlight a key ecological principle: habitat loss due to human activities is a global issue that cascades through ecosystems.

Habitat loss affects not only the abundance of species but also impacts other species. Population fragmentation and loss of genetic diversity also pose threats to long-term population persistence, especially for those with a small range extent and/or specialized ecological requirements (Pinto et al., 2023). Fragmented landscapes restrict dispersal and gene flow, creating the risk of inbreeding, limiting adaptive ability, and hastening the path towards local and/or regional extinction. These biological processes emphasize the synergistic impacts of habitat displacement and the combined impacts of habitat loss and fragmentation, which reduce species resilience.

Although formally protected in areas of special interest, habitat loss and fragmentation continue to be a problem in protected areas. In 2020 alone, nearly one-fifth of the protected areas in the world suffered measurable loss, and more than 1/3 had habitat fragmentation, which affected the flow of species (Yuan et al., 2024). Such evidence helps refute the idea that protected area status is sufficient to protect landscapes, as human land-use pressures are widespread, even in apparently conserved landscapes.

When we consider the lack of agency of nonhuman beings experiencing these changes, the ethical aspect of habitat displacement comes to the fore. The needs and objections of non-human species cannot be directly expressed; they are not directly heard in political forums or legal instruments, as they are with human populations. However, habitat loss involves a loss of reproductive success, changes in trophic interactions, and loss of ecological function, which negatively impact planetary health and the sustainability of ecosystems on which humans rely. With the global trend of land use increasing to over 90% of the Earth's surface, scientists predict that even more of the planet's land will be converted into human settlements by the end of the century, increasing the overlap of people and wildlife and the resulting ecological pressures (de Jager & Pos, 2026).

It is important to recognize the loss of habitat from both scientific and ethical perspectives. Empirical research is necessary to support the evidence base, and ethical reflection is required to change the socioeconomic value of land-use priorities and the underlying values. This study is relevant to both aspects, as it charts the pattern and impact of non-human species displacement while placing them in a wider socio-ecological context that takes into account the intrinsic value of biodiversity.

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In simple terms, this study also speaks to a wider environmental sustainability issue: the loss of biodiversity. Biodiversity loss happens when many kinds of plants, animals, and small organisms disappear from an area because their habitats have been destroyed. When this happens, nature loses its ability to carry out everyday jobs that people depend on, such as cleaning water, keeping soil fertile, and helping crops grow through pollination. Sustainability simply means meeting today's needs without using up or destroying the resources that future generations will also need. Habitat displacement in Ghana's mining areas is therefore not only a wildlife problem; it is a sustainability problem, because it weakens the natural systems that keep land, water, and food sources healthy for both non-human species and people over time.

1.2 Problem Statement

Ecological degradation in Ghana is exacerbated by increasing human land use (especially related to mining and extractive activities) in both rural and peri-urban areas, affecting habitats and ecological degradation in both areas (Bar-Massada et al., 2018). These include extensive deforestation, soil disruption, and pollution of rivers, wetlands, and farmlands due to artisanal and small-scale gold mining, also known as galamsey, large-scale commercial mining, and estate development. These changes, once widespread, have caused significant displacement of non-human species – insects, birds, aquatic, and soil life species – whose habitats have been mixed into forested and riparian habitats. Although there is increased public awareness of environmental degradation, the impacts of habitat loss for non-human species are not always brought to the fore in mining governance, land use, and development discussions in Ghana (Bonin, 2011).

To date, there have been little studies or policy reports that document the losses of biodiversity, water pollution, and degradation of land associated with mining activities, but most of those that do focus on economic impacts, people's livelihoods, and regulatory compliance. Thus, when it comes to the displacement of other species, it is usually a side issue or a fact of life, not a central ecological or ethical topic. Loss of nesting areas, burrows, foraging areas, and breeding habitats is affected by mining but rarely examined beyond general ecological metrics. The lack of specific research on habitat displacement restricts knowledge of the impact of mining on local and regional ecosystem relationships and ecosystem stability.

In addition, Ghana's mining environments are plagued by an uneven application of laws and regulations, political interference, and conflict over land ownership, all of which help to normalize environmentally harmful practices (Chacko et al., 2025). In these settings, non-human

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species are not represented in decision-making processes, and their removal is invisible and uncounted. Such anthropocentric development narratives (in which land is seen as most useful for its economic output) further marginalize nonhumans and continue to create ecological injustice.

The lack of integration of ecological ethics in mining policy documents and the consideration of environmental impact assessment in Ghana is compounded by this problem. There are rules and regulations in place in the environment, but they seldom consider the cumulative damage to the environment, especially the slow gradual process of the loss of species that are not in focus for conservation efforts. Consequently, ecosystems are slowly losing biodiversity and resilience, making them more susceptible to erosion, floods, and long-term environmental collapse, which in turn will impact natural and human communities (Pinto et al., 2023).

This study thus fills a crucial research gap by exploring the displacement of habitats caused by mining, not only as an ecological issue but also as an ethical one for non-human species. This research aims to raise awareness of the impacts of mining on non-human habitats, which are often overlooked, and to raise awareness of the need for sustainable mining practices that consider non-human life as a valuable part of the Ghanaian environment.

2. Method

2.1 Research Approach

This study used a qualitative research method to explore the phenomenon of habitat displacement among non-human species in the landscapes of mining areas and estate development in Ghana. This was considered appropriate as this research aimed to gain in-depth insight into the context in which ecological changes are felt and understood via different socio-environmental settings rather than quantitatively measuring biodiversity loss. This helped the meanings, perceptions, and observed ecological changes associated with human land use, especially artisanal and small-scale mining, to be examined. This method has been shown to be effective for tackling complex environmental problems that are complex and exist within a social, political, and moral context (Braun & Clarke, 2021; Guest et al., 2024).

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2.2 Research Design and Method

A multiple case study using a qualitative approach was adopted, and the choice of these mining communities in Ghana was based on the fact that the transformation of land use associated with the activities of the estate and galamsey was evident (Curry et al., 2017). The case study approach was used to allow an intensive study of the ecological disruption of a place, and variations in habitat loss were captured depending on the environment of the area. Data were produced from non-participant field observations, key informant interviews, and the analysis of documents, such as environmental reports and policy texts.

Visible signs of habitat displacement were documented, such as deforestation, termite mound and ant colony destruction, loss of nesting sites for birds, and degradation of riverine habitats through field observations. Key informant interviews were held with key informants who were in a position to consider environmental change due to their work or lived experience, such as local environmental officers, community elders, artisanal miners, and conservation advocates. Primary data were complemented with document analysis, which provides an institutional and regulatory perspective on mining-related land use practices (Yin, 2024).

2.3 Population of the Study

The study population comprised stakeholders who are directly and indirectly involved with mining landscapes and estate development in Ghana. This encompassed members of the resident populations of mining communities, artisanal miners, small-scale miners, traditional authorities, local environmental protection officers, and civil society actors who work in environmental advocacy. The main project of this study centred on the non-human displacement of habitat; however, human actors as observers, actors, and interpreters of ecological change were also crucial. As such, the population was described based on their spatial relationships and interactions with altered environments as a result of mining.

2.4 Sampling Technique and Sample Size

The respondents were selected using a purposive sampling technique, and those who had knowledge about the changes in the environment caused by mining activities were selected. The

selection of this type of sampling was suitable for this study because it was exploratory and context-specific, with information-rich cases selected over representativeness. In addition, snowball sampling was used to identify experts on ecological or regulatory matters. Twenty-five (25) participants were involved in this study, including community members (10), artisanal miners (5), environmental officers (4), Estate Developers (3), and environmental advocates or researchers (3). Once data saturation (Guest et al., 2024) was achieved, the sampling process was stopped, and the collected data were analysed.

2.5 Data Analysis

Thematic analysis was used to analyse the data following an inductive coding process. The initial codes were derived from the transcripts and field notes through multiple readings to "immerse" in the data and subsequently organized by the key themes that emerged from the data, indicative of the patterns of habitat loss, displacement processes, and ethical considerations identified in the data. Given the nature of this work, with qualitative data about the environment collected from several sources, thematic analysis was chosen because it is flexible and appropriate for analysing this kind of data (Braun & Clarke, 2021). Themes were developed through an iterative process that involved comparison and drawing on field observations.

2.6 Trustworthiness and Validation

To increase the validity of the study, a few validation strategies were used. Triangulation methodology was used to validate the data from three sources (interviews, observations, and documents) and enhance the reliability of the results. The selection of members was done by sharing initial interpretations with selected members to check the degree of accuracy and resonance with their experiences. To support transferability, a thick description was used, and an audit trail of methodological decisions was developed to support dependability. The researcher also used reflexive journaling, which added to the confirmability of the study by tracking the researcher's interpretive stance and positionality throughout the study (Nowell et al., 2017).

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3. Results and Discussion

3.1 Systematic Destruction of Micro-Habitats and the Erasure of "Small Life"

The results showed that mining activities affected the habitats of nonhuman species that are considered ecologically unimportant, but for which important microhabitats were systematically destroyed. Studies at several locations have revealed that topsoil layers and termite mounds, ant mounds, and decaying vegetation, which provide the basic habitat for insects, soil organisms, reptiles, and microorganisms, respectively, were extensively removed. The landscapes described by the participants were continually represented as biologically active prior to the start of mining activities and biologically inactive afterwards. Although they are small in size, these microhabitats are important for aeration, nutrient cycling, and food webs of soils, indicating that their loss may have widespread ecological consequences.

"With the soil, the ants and termites were present, but now it is dead." **(Community elder, Wassa Akropong)**

Environmental officers interviewed stated that these organisms were not typically considered for an environmental impact assessment; rather, it is larger fauna or forest cover measurements that are looked at. This neglect reflects the wider anthropocentric land-use governance bias of not including the ecological value of "small life" forms (Luoto et al., 2003). The research noted that after such micro-habitats were lost, natural recovery was either minimal or non-existent, especially in areas that were frequently excavated and sediment dumped.

3.2 Mining-Induced Displacement of Avian and Arboreal Species

The disappearance of insects and birds was also associated by community elders with decreasing soil fertility and yields, suggesting that social and ecological breakdowns can have real-world impacts. These observations are consistent with those worldwide that microecological changes that reduce habitats lead to a loss of ecosystem resilience and productivity. Mining activities cause the displacement of avian and arboreal species (Díaz et al., 2019).

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The other large-scale conclusion was the displacement of bird species and other arboreal organisms due to deforestation and vegetation clearance, both due to artisanal and mechanised mining. Mature trees surveyed were seen to be extensively being felled as nesting, roosting, or feeding sites. Birds were reported to have decreased in number significantly, especially species that depended on large amounts of canopy cover, or certain tree species for breeding.

Pits and tailing heaps had replaced former forests, with no structural complexity to accommodate arboreal life. Environmentalists interviewed said such habitat reduction had driven birds away from their natural habitat to farm land or dwellings, leading to escalating human-wildlife conflicts and heightened predation risks. This type of displacement is consistent with findings that biodiversity loss from land-use change is not immediate, but rather species are redistributed (Ouya et al., 2024).

"When the large trees fell, the birds went away and haven't come back yet, even after the rains."
(Environmental volunteer, Tarkwa)

Local inhabitants also linked bird loss to a rise in insect outbreaks, implying trophic imbalances due to habitat loss. Such observations underscore the effect of the displacement of one species upon the regulation mechanisms of the other. Importantly, the replanting attempts (where present) were sometimes only done with monoculture species, which did not restore functional habitats.

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Figure 1: *Cleared mining landscape formerly occupied by secondary forest and bird nesting sites.*
Source: Field Observation Photograph, 2025

3. Degradation of Aquatic Habitats and the Displacement of Freshwater Life

The study also identified that mining operations were causing significant degradation of rivers and wetlands, causing aquatic life, including fish, amphibians and macroinvertebrates to be displaced. Dense sedimentation, stream changes and chemical pollution were observed in streams downstream from mining areas. The rivers which used to be suitable for fishing and domestic use were characterized as "brown, slow and lifeless" by the participants.

Environmental officers also confirmed that sediment load from mining pits caused depletion of oxygen level in the water body, which was not suitable for aquatic life. This discovery is consistent with other studies indicating that water pollution caused by mining is among the main causes of freshwater biodiversity loss in the Global South (Pflüger et al., 2019). Its absence was an indicator of not only the displacement of aquatic species, but also food systems and cultural practices associated with rivers.

"*The river no longer has fish, it only has mud*" **(Resident, Prestea)**

The loss of community members went beyond the material, as they saw rivers as alive and referred to their degradation as a moral failure. The cultural framing supports arguments that

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the effects of an environment on a human cannot be completely measured through scientific indicators, but instead should be placed in a socio-cultural context (Whyte, 2019).

Figure 2: *Sediment-laden River downstream from an active mining site.*
Source: Field Observation Photograph, 2025.

3.4. Normalisation of Non-Human Displacement Through Anthropocentric Development Narratives

One final important discovery was the acceptance of non-human habitat destruction in the dominant development discourses. The interviews revealed that mining caused non-human species to be displaced, which was generally viewed as the price people have to pay for economic survival. Often the internalisation of development discourses in the minds of the artisanal miners allowed them to make environmental damage appear acceptable and even acceptable in the short term.

Study of policy documents also reflected a focus on economic indicators with little recognition of non-human habitat loss except in compliance checklists. This corresponds to criticisms of extractivist governance systems which have made non-human life 'invisible' to decision-making processes (Temper et al., 2020). This normalisation decreased public urgency for measures to protect habitat and undermined accountability processes, according to the study.
But the anti-narratives (deliberately avoids traditional conventions) started to grow from the traditional leaders and environmentalists who saw the destruction of the habitat as a moral and

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ancestral duty violation. These viewpoints point to possible avenues of culturally-based conservation approaches that defy anthropocentrism.

Table 1: *Dominant versus alternative narratives on mining and non-human habitat loss, derived from interview data and policy document analysis*

Narrative Dimension	Dominant Anthropocentric Development Narrative	Alternative Ecological and Cultural Narrative
View of mining	Mining framed as essential for economic survival and livelihood security	Mining viewed as a practice that must coexist with ecological balance and ancestral land ethics
Perception of non-human species	Non-human species seen as expendable or secondary to human needs	Non-human species regarded as co-inhabitants with intrinsic and cultural value
Interpretation of habitat loss	Habitat destruction considered inevitable, temporary, or reversible	Habitat loss viewed as moral harm and long-term ecological rupture
Policy emphasis	Focus on economic indicators, output targets, and regulatory compliance	Emphasis on stewardship, sustainability, and intergenerational responsibility
Accountability mechanisms	Environmental damage normalised; weak enforcement and limited public concern	Community-based accountability grounded in customary law and moral obligation
Temporal perspective	Short-term economic gains prioritised	Long-term ecological resilience and continuity prioritised
Ethical framing	Utilitarian: nature as a resource for human use	Relational: humans as custodians within a living ecological system

Source: Field Data, 2025

3.5. Fragmentation of Landscapes and the Breakdown of Ecological Connectivity

In addition to the direct effects of habitat loss, the authors found that mining operations created highly fragmented landscapes, which did not support ecological connectivity, especially for non-human species. Field observations revealed that mining pits, access roads and waste heaps were creating physical barriers that were breaking up contiguous habitats into discrete patches of habitat. This disconnection restricted insect, reptile, small mammal and ground-nesting bird movements, making them more susceptible to predation, inbreeding and local extinction.

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"The animals are stuck between the pits and they cannot move around anymore." **(Local forestry officer)**

Animals crossing these modified environments were often subjected to human conflict, or perished in disused pits of contaminated water, participants observed. Environmental officers described how habitat fragmentation makes it difficult for species to move between habitats and move seasonally, especially in dry times when organisms need to move to a connected ecosystem in order to survive. These findings are similar to those of ecological studies which have found that habitat fragmentation can often have more detrimental effects on biodiversity than habitat loss alone, particularly in the tropics (Díaz et al., 2019; Elmore et al., 2023).

More importantly, fragmentation effects were found to be cumulative. Where any green space was still present it was poorly connected and had a diminished ecological value. The study noted that these "island habitats" were not long-term sources of viable populations, due to limited resources. Nevertheless, fragmentation was not always discussed in environmental assessments, and was instead geared toward surface area lost, rather than connectivity.

This discovery underscores the long-term ecological implications of mining-induced land-use change, which will have significant impacts on species' survival pathways that are not apparent on the surface.

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Figure 3: *Spatial fragmentation of forest patches caused by mining pits and access roads.*

Source: Field Observation Photograph, 2025.

3.6. Disruption of Ecological Functions and Ecosystem Services

Perhaps the most important one was the disturbance of important ecological processes when non-human species were displaced. Participants associated this loss of insects, birds and soil organisms with the observed reduction in pollination, natural pest control and soil regeneration. Farmers said pests damaged their crops and yields were lower, due to the lack of birds and predatory insects which used to control insect numbers.

Field observations confirmed these reports, and included compacted soils, diminished regrowth and increased erosion in mining affected areas. The ecological literature also indicates that the displacement of species reduces the ecosystem services which sustain biodiversity and human livelihoods, especially in agro-ecological systems next to extractive areas (Jan et al., 2025; Janas, 2014).

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Environmentalists pointed out that the loss of ecosystem services is not always considered as part of the compensation or rehabilitation process. Where restoration was attempted, it was on the surface rather than restoration of ecological interactions. Thus, the study concluded that displacement of the habitat did not just result in the displacement of the species, but rather in the collapse of the functional ecosystem.

This outcome highlights the interdependency of non-human species, and human health and wellbeing, demonstrating that a failure to take account of the non-human displacement impacts ultimately has a negative effect on socio-economic resilience in mining communities.

Table 2: *Observed ecological functions lost following habitat displacement in mining landscapes, based on field observations and interviews.*

Ecological Function	Non-Human Species Affected	Observed Consequences of Loss	Implications for Human Communities	Evidence Source
Pollination	Bees, butterflies, other insects	Reduced pollination of crops and wild plants	Lower crop yields; reduced food security	Field observations; Interviews
Natural pest control	Birds, predatory insects	Increase in pest populations	Increased crop damage; economic loss for farmers	Interviews; (Kuipers et al., 2021)
Soil aeration and fertility	Termites, ants, soil microorganisms	Compacted soils, reduced nutrient cycling	Decline in soil productivity; hindered vegetation growth	Field observations; Liang & Li (2024)
Seed dispersal	Birds, small mammals	Reduced regeneration of native plants	Slower ecosystem recovery; biodiversity loss	Field observations
Water regulation and erosion control	Vegetation, riparian organisms	Accelerated soil erosion, reduced water retention	Increased flooding, sedimentation, and degraded farmlands	Field observations; Thompson (2025)
Decomposition and nutrient cycling	Soil microbes, fungi, detritivores	Accumulation of organic waste; reduced nutrient availability	Impaired soil health; hindered agricultural productivity	Field observations

Source: Field Data, 2025

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3.7. Psychological and Cultural Responses to the Loss of Non-Human Life

Further results indicated that habitat loss and species loss provoked emotional and cultural reactions from people in the community. Loss of familiar animal life and degraded landscapes were seen as a cause of grief, guilt and moral unease by elders and long-term residents. Loss of habitat was often said to be the destruction of "relatives", "guardians", or "spiritual companions", as part of a cultural shift along with the loss of nature. Habitat loss was not just ecological loss; it was also a cultural loss, as rivers, forests, and particular species were frequently described as "relatives", "guardians", or "spiritual companions".

The ideas offer a different vision of nature than those that are currently dominant in the development narratives which see nature as inert or disposable. This same effect has been documented in research related to ecological grief and environmental loss, which portrays the psychological impact of loss of biodiversity that impacts communities that are especially close to their environment (Yuan et al., 2024; Zihua et al., 2011).

Participants in their younger years were, however, sometimes ambivalent and noted generational changes in environmental attachment. This difference indicates a potential for adaptation to degraded landscapes to become a norm, continuing cycles of indifference and exploitation.

The study, which recorded such emotional and cultural aspects, showed that the non-human displacement impacts social memory, identity, ethical worldviews, which are frequently not included in environmental governance frameworks.

"With the river's passing, so passed an inalienable part of our own" **(Traditional leader)**

3.8. Weak Institutional Protection and the Invisibility of Non-Human Displacement

Lastly, the research revealed conflicts on non-human habitat displacement were not adequately addressed by Ghana's institutional frameworks related to mining and land use. The assessment of environmental impacts and regulatory checks focused primarily on compliance factors like permits, royalties, reclamation periods, and were short on considerations of biodiversity, other than the list of protected species. This is what led to the general destruction of habitat of "ordinary" species which went entirely unrecorded and unrewarded.

Interviews with the regulatory officers showed that these officers were constrained by political pressure, poor logistics and institutional fragmentation. This is a common criticism of

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extractive governance in the Global South, where regulatory frameworks are generally inadequate in protecting the environment (Socolar et al., 2025; Singh, 2018).

The research found that institutional neglect to the detriment of the non-human is likely to silence the non-human, thereby enabling habitat destruction to continue with no real consequences.

Table 3: *Gaps between mining regulatory frameworks and ecological protection outcomes in Ghana, based on field interviews, document analysis, and observational data.*

Policy / Regulatory Dimension	Stated Regulatory Intent	Observed Practice in Mining Areas	Resulting Ecological Outcome
Environmental Impact Assessment (EIA)	Identify and mitigate environmental and ecological impacts prior to mining approval	EIAs focused largely on paperwork compliance and protected species checklists	Everyday habitat destruction of non-listed species remains undocumented
Biodiversity protection provisions	Safeguard flora and fauna within mining concessions	Limited enforcement beyond legally protected or charismatic species	Soil organisms, insects, birds, and micro-habitats receive no protection
Mine site inspections	Ensure adherence to environmental standards	Inspections constrained by logistics, funding, and political interference	Illegal and destructive practices persist with minimal sanctions
Land reclamation requirements	Restore mined land after extraction	Reclamation prioritises surface levelling over ecological restoration	Ecosystem functions and species interactions are not restored
Institutional coordination	Promote collaboration between environmental and mining agencies	Fragmented responsibilities across agencies with weak coordination	Gaps in monitoring and accountability
Community participation	Incorporate local knowledge into environmental governance	Community ecological knowledge largely excluded from formal processes	Local early warnings of habitat loss ignored
Enforcement mechanisms	Penalise environmental violations	Sanctions inconsistently applied or politically constrained	Culture of impunity around habitat destruction
Policy recognition	Implicitly assumed within	Non-human	Ecological loss remains

of non-human displacement	environmental protection clauses	displacement not explicitly recognised or measured	invisible within governance frameworks

Source: Field Data, 2025

4. Discussion

The aim of this study was to explore the issue of habitat loss as a displacement of non-human species due to land use by humans; in particular, mining landscapes in Ghana. The results as a whole show that there are overlapping and multi-level ecological impacts following from land alteration associated with mining, which go beyond the obvious environmental degradation. In the eight results, habitat displacement did not happen as a stand-alone ecological consequence, but rather as a systemic process, which is part of a logic of development that is anthropocentric, institutional weaknesses, and extractive political economy.

The reduction of micro-habitats identified in the study highlights the importance of less apparent but vital organisms in the ecosystem like insects, soil organisms and microorganisms. The destruction of termite mounds, ant colonies and organic soil layers along with the evidence of biodiversity loss in other ecosystems clearly demonstrates that the loss of biodiversity can occur at the smallest scale of the ecosystems, and have cascading effects on nutrient cycling, soil fertility, and food webs (Díaz et al., 2019; Quesnelle et al., 2013). These results contradict conservation programs that focus on charismatic, or economically important species, and neglect the importance of other species that are essential for ecosystem resilience. An ecological violence without a voice is the loss of micro-habitats in contexts of intensive, repetitive land disturbance, as occurs in mining.

The loss of species can also be seen as a change in ecological relationships as the habitat is lost, as was seen with the displacement of the avian and arboreal species. The overall decline in the number of birds observed after deforestation is consistent with the observed species redistribution which occurred when they were deforested, moving them into suboptimal or human-dominated spaces (Gong et al., 2025). This translates into a loss of the trophic regulation as evidenced by the reported links between bird absence and the outbreak of pests by participants. These results underscore the need to consider habitat loss both in space and in terms of its functional impacts on species regulation in the ecosystem.

One of the most socially and ecologically impactful types of displacement was aquatic habitat degradation. The confluences of sedimentation and contamination of rivers found in this study are similar to the larger issue of freshwater biodiversity loss associated with extractive

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operations in the Global South (Temper et al., 2020). Importantly, the descriptions of rivers by the participants as 'lifeless' or morally violated point to the flaws of technocratic approaches to an environmental assessment that approach rivers as chemical parameters. However, ecological damage cannot be divorced from cultural and ethical connotations, especially in such situations when the river is part of spiritual and living resources of the people. (Whyte, 2019).

The impacts were exacerbated by landscape fragmentation which isolated the remaining habitat and also affected the ecological connectivity. The results corroborate the long-term ecological evidence of the negative impacts of fragmentation over habitat loss, especially in tropical areas where species depend on movement to survive (Kuipers et al., 2021). Even if there is some vegetation, ecological 'islands' created by mining areas decrease population viability, leading to the local extinction of populations. However, fragmentation is under-represented in environmental governance systems based on area as opposed to connectivity.

The study also showed that habitat displacement resulted in loss of ecosystem services vital for human health such as ecosystem pollination, soil regeneration and natural pest control. This is the confirmation of the interdependence of non-human life and rural livelihood, and the narratives to the contrary—that protection of the environment is in opposition to economic survival—are reinforced. This supports the argument of the interdependency of non-human life and rural livelihoods and runs counter to narratives that suggest that environmental protection is somehow a competing interest to economic survival (Liang & Li, 2024). The displacement of non-human beings has a secondary effect in mining areas, as it increases their vulnerability, which means that in the end, environmental damage does not enhance their development goals.

As well critical were the emotional and cultural reactions to ecological losses. The participants' experiences of grief, guilt and moral unease are congruent with some of the young literature on ecological grief and solastalgia (Chacko et al., 2025). The responses suggest that the process of habitat displacement is not just an ecological one but a socio-cultural one as well, altering the ways in which people think about place, memory and identity. Familiarity with the degraded environment, as seen in the generational differences, also suggests a risk of ecological loss becoming a normal way of life, and thus reinforcing cycles of indifference.

Last, the study shows how the invisibility of the non-human is created by the institutional gaps and anthropocentric development narratives. There was a lack of regulation and environmental impact assessments that considered cumulative ecological damage, which is similar to the inadequate consideration of cumulative ecological damage in other extractive governance settings (Yuan et al., 2024; Pinto et al., 2023). These systems serve to prevent the consideration of non-human interests, treating economic indicators and compliance as more

important than anything else, and thereby allowing ecological destruction to continue unabated and unaccountable.

The individual results collated indicate that there is a need to think about the displacement of non-human species in mining landscapes as an ecological injustice, which is created by a combination of land use, governance failures and values that promote the dominance of humans over ecological coexistence. It is not enough to technically mitigate this problem, it needs a reorientation of land-use ethics, environmental governance and development imaginaries to the more inclusive, relational framework of human–nature interactions.

5. Conclusion

In line with the above, this study investigated displacement of non-human species through habitat loss due to human land use in the mining landscape in Ghana. The study highlighted the ecological, cultural and institutional aspects of habitat loss, revealing that the effects of land transformation caused by mining go beyond environmental degradation. The results indicated that non-human displacement functions at a variety of scales of ecological impacts ranging from erasure of micro-habitats, landscape fragmentation, degradation of ecosystem services, to disturbance of socio-cultural relationships with nature.

It revealed that non-human species are systematically displaced as a consequence of soil stripping, tree felling, modification of river flows and the fragmentation of continuous habitats. These processes disproportionately impact the organisms with no conservation visibility, but with fundamental roles in ecosystem functions. The loss of insects, birds, soil organisms and aquatic life revealed the slow erosion of ecological systems that is frequently not noticed. Where disturbance has been repeated and restoration is limited, this displacement can accumulate and in many cases be permanent, as is the case in mining landscapes.

The study not only shed light on ecological issues but also highlighted the ethical and cultural aspects of habitat destruction. The emotional responses reported in the community narratives were a range of feelings from grief and feelings of guilt to feelings of moral unease, highlighting strong links between people, place and non-human life. The results defy the dominant stories of development, which connect environmental degradation with economic survival. Rather, they propose that the depredation of non-human habitats is a loss of cultural memory, ecological knowledge and moral responsibility. These generational differences also highlight the potential for ecological damage to become “normalized”, and the environmental stewardship implications of this.

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The study also revealed that there are key governance shortcomings that allow non-human displacement to continue. It was observed that the regulatory frameworks and environmental impact assessment are not inclusive to cumulative ecological damage and habitat connectivity, but are only concerned with compliance indicators and economic output. This institutional neglect perpetuates anthropocentric approaches to land-use planning, effectively voicing the "no voice" of non-human interests in decision-making processes. Thus, habitat loss becomes invisible, normal, and acceptable.

The results collectively place the displacement of non-human habitats as an ecological injustice in the context of the mining landscapes of Ghana, and one that is made by the side-effects of extractive economies, governance shortcomings, and value systems of the human experience. This injustice cannot be fixed with only technical fixes or by reclaiming land after a mine's operations. It demands a radical reorientation of valuation of land; a reworking of the assessment of environmental damage; and a reimagining of who is represented in development processes. Co-ordinating ecological ethics, indigenous systems of knowledge and inclusive governance mechanisms into the regulation of mining and land-use planning is crucial to creating more just and sustainable relationships between humans and nature.

Finally, this study helps the field of environmental scholarship to recentre the loss of habitat as the loss of voice, and to invite other scholars, policy makers and practitioners to consider the displacement of the non-human species as part of a shared ecological system. The ability to transcend anthropocentric models and embrace paradigms of coexistence that recognize the intrinsic worth of non-human life and the interdependency of all modes of habitation is essential for sustainable futures in mining regions. Put simply, protecting the habitats of non-human species in mining areas is a practical environmental sustainability issue: it is about keeping the soil, water, and biodiversity that mining communities depend on healthy enough to support both wildlife and human life, today and in the future.

6. Policy Implications and Recommendations

The results of this study have significant implications on environmental governance, mining regulation, and sustainable development policy in Ghana. The research exposes displacement in the form of habitat loss as a displacement that is inherent in extractive land use, revealing key policy gaps that focus on economic outputs and leave ecological and ethical concerns aside. This needs to change from technocratic to more inclusive, ecologically based and ethically motivated policy approaches to fill these gaps.

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6.1 Rethinking Environmental Impact Assessments (EIAs)

An important policy implication is the scope and implementation of Environmental Impact Assessments in the mining industry of Ghana. Current EIAs are more likely to consider quantitative measures like area of land disturbed, water quality thresholds and compliance timeframes, and pay less attention to micro-habitat, ecological connectivity and displacement of non-human species. The study indicates the importance of including explicit habitat fragmentation assessments, loss of ecological functions and impact on less visible species (insects, soil organisms and freshwater invertebrates) in EIAs. EIA guidelines should be updated to incorporate biodiversity connectivity mapping and long-term ecological monitoring as requirements, instead of a consideration.

6.2 Strengthening Regulatory Enforcement and Institutional Capacity

Lack of institutional coordination and the weakness of regulatory enforcement are reflected in the continued degradation of habitat in mining areas. Environmental protection agencies may be politically pressured, logistically constrained, and have overlapping mandates which constrain their ability to implement current regulations. Building institutional capacity by providing adequate resources, inter-agency collaboration and protection from political interference is critical. Specifically, the Environmental Protection Agency (EPA) and Minerals Commission should be given the authority to impose ecological protection that goes beyond surface reclamation, and that restore ecosystems that are not just made 'cosmetic' but functionally restored.

6.3 Integrating Ecological Ethics into Mining Governance

Findings from the study indicate that anthropocentric development narratives prevail, laying the groundwork for non-human displacement as an acceptable trade-off for economic survival. Policy frameworks need to go beyond the economic value of land and nature. Incorporating ecological ethics within mining regulations, particularly in policy terminology which considers non-human life as having intrinsic value, can help to shift the discussion and the commitment to protecting the environment toward a moral and/or social responsibility as opposed to a regulatory obligation. Such a change could be put in practice by incorporating the concept of "biodiversity protection" in terms of an explicit recognition of the value of non-human habitats in mining leases and land-use permits.

6.4 Recognising Indigenous Knowledge and Cultural Values

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The emotional and cultural reactions observed in the study bring attention to the value of indigenous and local ecological knowledge for environmental governance. Policies which fail to take into account cultural connections and links to rivers, forests and non-human species can threaten both participation and sustainability. In the context of both mining and land use policies, it is important to include policy mechanisms that involve participation of traditional authorities, elders and local communities in decision making processes and incorporate their ecological knowledge and ethical considerations. These can improve the legitimacy, increase stewardship, and improve community monitoring of environmental change.

6.5 Advocating for Post-Mining Ecological Restoration & Accountability

Reclamation is currently being carried out so as to ensure stability of land rather than ecological functions. Results show that the restoration should focus on restoring habitats and ecological interactions, and not just filling the pits or monocultures. Policy should require restoration targets based on science that focus on native species diversity, habitat complexity and recovery of ecosystem services. Both large and small mining operations should also be responsible for long-term ecological effects, by requiring enforceable monitoring and restoration bonds.

6.6 Toward Inclusive and Sustainable Land-Use Futures

Overall, the species not only found in this study but also others were displaced because it is a conflict between extractive development and ecological sustainability. Policy interventions need to be set in a broader rethinking of the priorities of land-use in Ghana. Mining governance frameworks can contribute to more sustainable development by being aligned with national and international sustainability development commitments, including commitments to biodiversity conservation, climate resilience, etc. A transformative perspective of non-human species as co-residents of the same landscapes, not products to be consumed, is needed to forge sustainable futures in mining landscapes.

Overall, the results of this study suggest a need for policy changes aimed at raising the importance of ecological integrity, ethical responsibility, and inclusive governance as key factors in decision making related to mining and land use. If these changes are not made, there will be more non-human species displaced from their habitats, which will continue to affect the environmental sustainability and human health in Ghana's extractive landscapes.

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6.7 Addressing the Environmental Sustainability Issue of Biodiversity and Ecosystem Service Loss

To speak directly to this point in simple terms: the central environmental sustainability issue raised by this study is biodiversity loss and the breakdown of the ecosystem services that come from it. Biodiversity loss happens when many kinds of plants, animals, insects, and soil organisms disappear from an area, usually because their habitats have been cleared or polluted. Once these species are gone, nature can no longer do the "free work" it normally does for people, such as pollinating crops, keeping soil fertile, cleaning water, and controlling pests. This is exactly what was observed in the mining communities studied here: the loss of insects, birds, soil organisms, and river life was followed by lower crop yields, dirtier water, and more soil erosion.

Sustainability means using land and natural resources today in a way that does not take away from what people and other species will need tomorrow. When habitats are destroyed faster than they can recover, as this study found in many mining sites, the land becomes less able to support farming, clean water supply, and flood protection over time. This connects the findings of this study to global sustainability efforts, including the United Nations Sustainable Development Goal 15 (Life on Land), which calls for protecting ecosystems and halting biodiversity loss, and Sustainable Development Goal 6 (Clean Water and Sanitation), which is threatened when rivers become polluted and lifeless, as described by participants in this study.

In practical terms, this means that protecting non-human habitats in mining areas should be treated as a core part of environmental sustainability planning, not as a separate or secondary issue. Mining companies, regulators, and local authorities should track the health of small but important species, such as insects and soil organisms, alongside water and land indicators, because these species are early signs of whether an ecosystem can still support sustainable use. Without this kind of attention, habitat displacement will keep weakening the natural resource base that both wildlife and mining communities depend on, making long-term sustainable development in these areas harder to achieve

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