



# Understanding the relationship between poverty, environmental degradation, and power dynamics: a qualitative study in Northern Ghana

Stephen Uwumbordo Nachibi<sup>1,2</sup> · Anthony Kwame Morgan<sup>1</sup>

Received: 27 July 2022 / Accepted: 8 October 2023  
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## Abstract

This study investigates the connection between poverty, power dynamics and environmental degradation, focusing on the specific context of Northern Ghana. Within the remits of environmental degradation, agriculture has long been acknowledged as a significant contributor to the depletion of environmental resources, although, recent discussions have highlighted the differential impact of poor and rich farmers. Employing a qualitative approach and utilizing multi-stage sampling techniques, this research delves into how poverty or wealth influences deforestation and water pollution, as well as the persistent narratives surrounding the primary drivers of environmental degradation. Qualitative data were gathered from 35 participants through semi-structured interviews. The interviews lasted between 45 min and 1 h. The data were analyzed thematically to explore the relationships between poverty, environmental degradation, and power dynamics in agricultural practices. The findings reveal that both poor and rich farmers contribute to deforestation, with rich farmers playing a substantial role in the expansion of farming activities. Additionally, the study uncovers that water pollution is predominantly caused by wealthier farmers, through the spillover of agrochemicals. Significantly, the study highlights the exclusion of the poor from poverty-environment studies and their limited power and influence as crucial factors that perpetuate the prevailing poverty-resource-depletion narrative. This study emphasizes the need to contextualize the poverty-environmental degradation nexus, recognizing it as a result of power dynamics and political agendas. The implications of these findings extend to policy formulation, underscoring the necessity of addressing underlying discourses of power for sustainable environmental management.

**Keywords** Endowed/rich/non-poor farmers · Less endowed/poor farmers · Poverty and environmental degradation · Deforestation · Water pollution · Poverty-environment narratives · Northern Ghana

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✉ Stephen Uwumbordo Nachibi  
uwumbordostephen@gmail.com

Anthony Kwame Morgan  
anthoniomorgano280@gmail.com

<sup>1</sup> Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

<sup>2</sup> School of Environmental Science, University of Hull, Hull, UK

## 1 Introduction

The seeming connection between poverty and environmental degradation has been repeatedly and vehemently emphasized in academic and policy discourse. This has somehow created a universal generalization that poverty is the main cause of environmental resource degradation (Masron & Subramaniam, 2019; Khan, 2019; Kassa et al., 2018; Cavendish, 2000; World Bank, 1992; Holden, 1996; Duraiappah, 1996, 1998; World Commission on Environment & Development, 1987). The argument as often put forward is that poor people are desperate to survive and over-extract natural resources since their livelihood activities are environmentally unsustainable and technologically regressive (Jodha, 1998; Kassa et al., 2018; United Nations Development Programme [UNDP], 1990; World Bank, 1992). Environmental degradation among farmers can result from unsustainable land management practices, excessive agrochemical use, deforestation, and improper waste management and can be influenced by both poverty and wealth, albeit in different ways. Poverty can lead to resource constraints and limited access to sustainable farming techniques and technologies, forcing farmers to resort to unsustainable land management practices and excessive agrochemical use (Jocien & Frederick, 2023; Khan, 2019; Mwangu, 2021). Poor farmers may lack the financial means to invest in environmentally friendly alternatives (Khan, 2019), leading to soil erosion, water pollution, and loss of biodiversity. Moreover, poverty-driven pressures for immediate economic gains may incentivize the exploitation of natural resources without considering their long-term sustainability (Jocien & Frederick, 2023; Khan, 2019; Mwangu, 2021). As such, the reduction of environmental degradation is closely linked to the alleviation of poverty. Reducing poverty enable individuals and communities to adopt more sustainable practices and make responsible environmental choices. Contrarily, wealth can also contribute to environmental degradation among farmers (Ravnborg, 2003). Wealthier farmers may have access to more resources and advanced technologies, enabling them to clear larger areas of land for expansion, resulting in deforestation and habitat destruction (Ravnborg, 2003). They may also have the financial capacity to purchase and apply excessive amounts of agrochemicals, leading to water pollution and soil degradation (Ravnborg, 2003). Furthermore, wealthier farmers may engage in intensive farming practices focused solely on maximizing profits, often disregarding environmental considerations (Ravnborg, 2003). In these contexts, the generalization of poverty as the main driver of environmental degradation is overly simplistic and unhelpful in revealing the web of factors that exacerbate environmental degradation (Rai, 2019a, 2019b).

Many scholars have become critical of this overly simplistic generalization of the poor as the primary agents of environmental degradation (Peprah et al., 2017; Aggrey et al., 2010; Ekbohm & Bojö, 1999; Duraiappah, 1998; Leach & Mearns, 1991; Boyce, 1994). Rather than seeing poverty as the primary driver of environmental degradation, another school of thought suggests that power, wealth, and greed are the main factors driving environmental degradation (Dasgupta et al., 2005). Peprah et al. (2017), Duraiappah (1998), and Boyce (1994), for example, describe this approach as one that views environmental degradation as a consequence of the exploitative practices of the rich. These wealthier farmers actively contribute to environmental degradation with their access to abundant resources and advanced technologies, capable of clearing extensive land for agricultural expansion, that leads to deforestation and the destruction of natural habitats. Additionally, their financial capacity allows them to purchase and utilize excessive amounts of agrochemicals, which result in water pollution and soil degradation. Furthermore, driven by profit maximization, wealthier farmers may adopt intensive farming practices that prioritize economic gains

over environmental sustainability, often disregarding the ecological consequences of their actions. These highlight how wealth, rather than poverty, when mismanaged or prioritized without considering environmental considerations, can significantly impact and contribute to environmental degradation.

Based on early theorist studies such as Aggrey et al. (2010), Ekbohm and Boj  (1999), Duraiappah (1998), Leach and Mearns (1991), Boyce (1994), contemporary scholars such as Peprah et al. (2017), Pasanen et al. (2017), and Call et al. (2017) provided evidence that shows that the poor comparatively consumes less of the environmental resources, and do not have the financial muscles to acquire most of the technologies for mining and agriculture which can cause mass environmental destruction. Thus, poor people have a less environmental footprint and cannot be the main degraders of environmental resources.

This counter theory; wealth-and-resource-depletion narrative, challenges the veracity of the universal perception that poor people are the main drivers of environmental degradation, as evidenced by recent studies (Peprah et al., 2017; Pasanen et al., 2017; Call et al. 2017; Cavendish, 2000). Peprah et al. (2017) conducted a qualitative study and found that the rich were the most significant users of environmental resources, thus more likely to have a substantial environmental impact or footprint. Pasanen et al. (2017) found no significant relationship between poverty and deforestation. Call et al. (2017) observed that the relationship between poverty and environmental degradation was too weak to support the widespread perception that poor people are the main culprits. Contrary to the conventional wisdom, it is the rich and the powerful who are the largest consumers of environmental resources and, consequently, the largest contributors to environmental degradation (Peprah et al., 2017; Cavendish, 2000; Boyce, 1994; Duraiappah, 1998). These findings highlight the need to re-evaluate the prevailing narrative and shift the focus toward the role of wealth and power in environmental degradation, emphasizing the importance of addressing the unsustainable consumption patterns and practices of the rich and powerful (Peprah et al., 2017; Cavendish, 2000; Boyce, 1994; Duraiappah, 1998).

Although studies have presented empirical evidence countering this argument, the pervasive and persistent belief that poverty is the primary catalyst for environmental degradation remains unchanged. Why is it so? Why is it so difficult to dispel such a narrative? The persistence of such a narrative can be attributed to several factors. Firstly, such narratives align with prevailing societal norms and beliefs, which tend to associate poverty with negative outcomes, including environmental degradation. This alignment with common perceptions and preconceived notions makes it difficult to challenge or dispel the narrative. Secondly, these narratives serve certain interests and agendas. As highlighted by Fairhead and Leach (1996) and Rai (2019a, 2019b), the persistence of poverty-environmental nexus narratives can be attributed to their utility as political and policymaking tools. Those in positions of power and influence use these narratives to shape public opinion, advance certain policies, or justify resource allocations. By attributing environmental degradation primarily to the poor, attention may be diverted from the contributions of the wealthy and powerful, reinforcing existing power imbalances. Furthermore, the underlying structures of power play a significant role in perpetuating these narratives. Fairhead and Leach (1996) argue that the persistence of such narratives is rooted in the unchanged structures of power, which maintain and reproduce the dominant discourse. The powerful individuals and institutions that benefit from these power structures have the means to shape and control the narrative, suppressing alternative perspectives and reinforcing the perception of poverty as the main driver of environmental degradation.

In the context of Ghana, the study conducted by Peprah et al. (2017) stands out as one of the few attempts to challenge the prevailing notion that poverty is the primary driver of environmental degradation. Their study focused on the middle belt of the country,

providing valuable insights into this specific region. However, it is important to note that, to the best of our knowledge, there is a lack of considerable evidence on the relationship between poverty and environmental degradation in the northern belt of the country, an area characterized by high poverty rates and environmental challenges such as desertification (Ghana Statistical Service [GSS], 2018). Given the significant presence of poverty and environmental issues in the northern belt of Ghana, it becomes crucial to examine and scrutinize the commonly accepted wisdom regarding the role of poverty in driving environmental degradation. Therefore, we conducted this study in Northern Ghana to determine the extent to which the notion of poverty as the main driver of environmental degradation is erroneous and to expose the reality regarding the environmental degradation practices of “less endowed farmers” and “endowed farmers.” In the context of this study, the term “less endowed farmers” refers to those who have limited access to resources such as land, capital, technology, and infrastructure, which can affect their agricultural productivity and overall well-being. On the other hand, “endowed farmers” are those who have greater access to resources, enabling them to engage in more productive and sustainable agricultural practices. In this research, we defined poverty in the wider multidimensional phenomenon to include lack of income and basic needs such as food, shelter, and clothing, including power for the enjoyment of life and human dignity. We also defined environmental degradation as the deterioration through depletion and pollution of resources such as forest, water, and soil, and the subsequent destruction of ecosystems. This study focuses on the depletion, pollution, and degradation of water and forest resources as examples of environmental degradation (Etongo et al., 2016).

The novelty of this research—which examines the extent to which the notion of poverty as the main driver of environmental degradation is erroneous and the reality regarding the environmental degradation practices lies in its comprehensive analysis of the factors driving environmental degradation, going beyond the conventional perception that poverty alone is the main driver. By considering power, wealth, and greed as significant contributing factors, this study offers a nuanced understanding of the complex dynamics involved in environmental degradation. Moreover, this research contributes to the existing literature by examining the environmental footprint of both less endowed and endowed farmers, providing insights into their respective roles in environmental degradation. In comparison to the most recent state-of-the-art literature in similar discourses, this research advances the understanding of the poverty-environmental degradation nexus by focusing on a region with unique characteristics and environmental challenges. Additionally, this paper advances the existing literature by providing a comprehensive analysis of the poverty-environmental degradation nexus, focusing on the dimensions of land clearing/deforestation and agrochemical usage. It addresses gaps in previous studies by examining the disparities in practices between less endowed farmers and endowed farmers, considering their resource endowment and socioeconomic status. While previous studies often focused on either deforestation or agrochemicals separately, this research integrates both aspects to provide a more holistic understanding of the relationship. By incorporating a multidimensional definition of poverty and employing a comprehensive analysis of water and forest resource depletion, pollution, and degradation (Etongo et al., 2016), this study offers a more nuanced perspective on the complex relationship between poverty and environmental sustainability. Finally, to enhance environmental sustainability and promote a green economy (an economic system that aims to promote sustainable development by integrating environmental considerations into all aspects of economic decision-making), a range of measures must be implemented (Bergius et al., 2020; Kamara et al., 2019; Khan et al., 2022; Lee et al., 2022; Yu et al., 2023). Critical among these are: a) promoting sustainable

agricultural practices, such as organic farming and integrated pest management, which minimize the use of harmful chemicals and promote ecological balance; b) effective land management strategies, including conservation tillage and reforestation, can also be employed to prevent soil erosion and preserve natural habitats; and c) raising awareness among farmers about the importance of environmental conservation and providing them with training and resources for adopting sustainable practices is essential (Khan et al., 2022; Yu et al., 2023). However, to effectively tailor these green economic initiatives, it is crucial to have a clear understanding of which group, whether less endowed or endowed farmers, contributes the most to environmental degradation. Without this understanding, the design and implementation of interventions may miss the mark, resulting in unaccomplished targets. Indeed, the aims of this study align perfectly with the mentioned objectives. By addressing the identified gaps and offering fresh insights, the research strives to make a significant contribution to the current body of literature. Shedding light on the relationship between poverty, environmental degradation, and sustainable development, the study aims to inform policy discussions and decision-making processes regarding environmental management and sustainable development not only in Saboba, Ghana but also in broader contexts.

## 2 Theoretical framework

We employed the Environmental Kuznets Curve (EKC) theory (Ahmad et al., 2021; Chen et al., 2019; Dkhili, 2022) and the political ecology framework (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005) to understand the relationship between poverty, economic development, and environmental degradation. EKC theory posits an inverted U-shaped relationship, suggesting that as countries undergo initial economic growth, environmental degradation increases (Ahmad et al., 2021; Dkhili, 2022). This is attributed to resource-intensive practices and industrialization-induced-pollution. However, beyond a certain income level, environmental degradation is expected to decline due to improved environmental regulations, technological advancements, and increased awareness of sustainable practices. In the context of this study, the EKC theory is relevant as it seeks to explore the impact of poverty on environmental degradation (Ahmad et al., 2021; Dkhili, 2022), in Northern Ghana. Investigating whether the relationship between poverty and environmental degradation follows the pattern proposed by the EKC theory, the study sheds light on the dynamics of this relationship in a specific geographic and socioeconomic context.

The application of the EKC theory in the study aimed to ascertain the extent to which poverty acts as a primary driver of environmental degradation (Jocien & Frederick, 2023; Mwangi, 2021; Khan, 2019; Masron & Subramaniam, 2019; Khan, 2019; Kassa et al., 2018; Cavendish, 2000; World Bank, 1992; Holden, 1996; Duraiappah, 1996, 1998; World Commission on Environment & Development, 1987), or the contrary viewpoint of resource-endowed farmers contributing more to environmental degradation (Peprah et al., 2017; Pasanen et al., 2017; Call et al., 2017; Aggrey et al., 2010; Ekbom & Bojö, 1999; Duraiappah, 1998; Leach & Mearns, 1991; Boyce, 1994). The theory assumes a linear relationship between income and environmental degradation, overlooking the complexities and heterogeneity of socioeconomic factors that influence environmental outcomes. Additionally, the EKC theory does not account for the influence of cultural, political, and institutional factors on environmental degradation (Ahmad et al., 2021; Chen et al., 2019; Dkhili, 2022), which may have a unique significance in the context of Northern Ghana.

These delimitations of the EKC make it imperative that we bring a complementary framework on board to address these sociopolitical, cultural, and institutional factors affecting environmental degradation.

Political ecology framework is employed in this regard to gain insights into the power dynamics, social structures, and political-economic processes that shape the interactions between poverty, and environmental degradation (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005), and the broader social context in Northern Ghana. Through this framework, we examined how power, wealth, and sociopolitical factors influence environmental degradation and contribute to the persistence of the narrative linking poverty and environmental degradation. The political ecology framework intends to shed light on the disproportionate contributions to environmental degradation by certain influential groups or individuals, regardless of poverty levels (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005). It seeks to understand how power imbalances and unequal access to resources and decision-making processes can exacerbate environmental degradation in the study area. The political ecology framework is highly relevant as it allows for a comprehensive examination of the underlying social and political mechanisms that shape the relationship between poverty and environmental degradation. The study seeks to uncover the complex factors that contribute to the persistence of the narrative linking poverty and environmental degradation in Northern Ghana, by analyzing power dynamics, social structures, and political-economic processes through careful consideration of the cultural and historical contexts specific to the study area.

From our viewpoint, the intersection between the EKC theory and political ecology lies in their complementary perspectives on the relationship between poverty, environmental degradation, and socioeconomic factors. While the EKC theory primarily focuses on the economic dimension and the potential decline of environmental degradation with economic growth, the political ecology framework delves deeper into the social and political dynamics that shape environmental outcomes. Combining these two theories in this study allows for a more comprehensive understanding of the complex relationship between poverty and environmental degradation within the context of endowed and less endowed farmers in Northern Ghana. The EKC theory offers insights into the potential influence of economic development and income levels on environmental degradation, highlighting the need to consider the role of poverty alleviation in sustainable development efforts. The political ecology framework, however, provides a critical lens to examine the power dynamics, social structures, and political-economic processes that contribute to environmental degradation and perpetuate poverty. Together, both theories provide a nuanced approach to understanding the interplay between poverty, environmental degradation, and socioeconomic factors.

### 3 Methods and materials

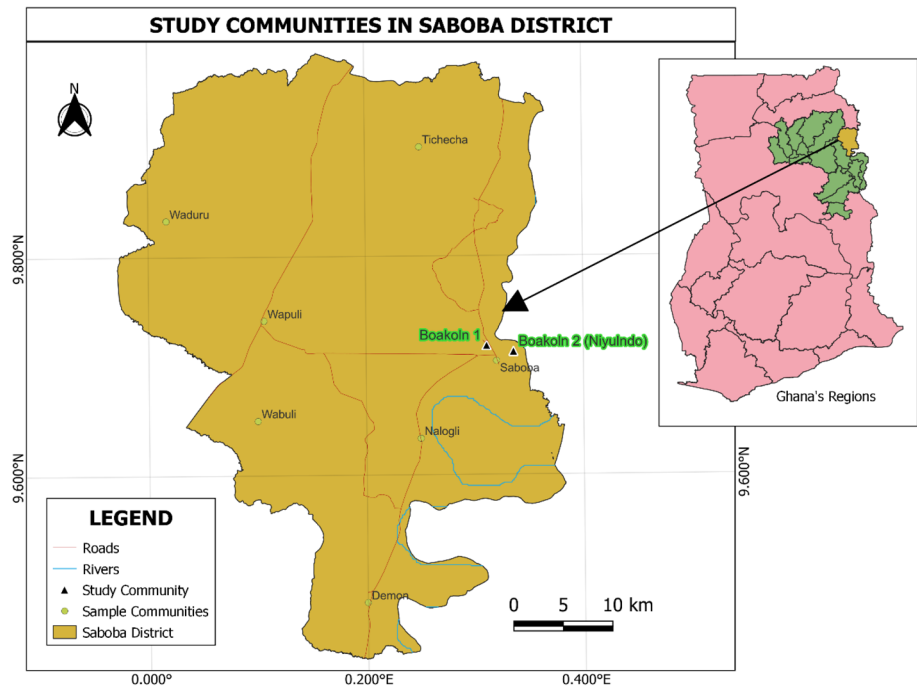
#### 3.1 Study setting

The study was conducted in the northern region of Ghana. The northern part of the country has a high poverty incidence (GSS, 2015, 2018). The region was chosen for the study because of its poverty profile. For example, it contributes more than any other region to extreme poverty in Ghana (Table 1). The study was specifically carried out in the Saboba District of the northern region (Fig. 1). Crop farming is the dominant economic activity

**Table 1** Poverty incidence by region for 2016/17 (%) Poverty line = GH¢1,314

Region	Poverty incidence	Contribution to total poverty incidence
Western	21.1	9.1
Central	13.8	5
Greater Accra	2.5	1.7
Volta	37.3	13.6
Eastern	2.6	5.8
Ashanti	11.6	9.5
Brong Ahafo	26.8	10.8
Northern	61.1	26.1
Upper East	54.8	9.8
Upper West	70.9	8.5

Source GSS (2018)



**Fig. 1** Map of Saboba District showing the study communities

in the district, with the major crops including sorghum, millet, groundnut, maize, yam, and cowpea, which are grown for both income and home consumption (GSS, 2018). The district was chosen because it is one of the poorest districts in the region. For example, in 2015 the district had a total household of 64,927 out of which 25,757 were poor (GSS, 2015). The Saboba District just like other districts in the northern parts of Ghana is witnessing an increased pace of environmental issues such as desertification and land

degradation. Specifically, Boakoln communities were used for the study. Boakoln is a common name given to two adjoining neighboring communities: Boakoln No. 1 and Boakoln No. 2. Boakoln No. 2 is also known as Niyulndo, however, Boakoln is usually used in the local area (Saboba) to refer to the two communities. Boakoln communities were chosen because the first author is very familiar with the communities. No. 2 (Niyuldo) is his native village. This author understands the dynamics of the communities which made data gathering easier.

*NB* The data was gathered from the previous 10 regions before the regional demarcation of Ghana into 16 regions took place.

The study specifically focused on farmers. The majority of the people in Northern Ghana are into agriculture as their primary occupation (GSS, 2019). Moreover, agriculture and its practices are crucial in achieving environmental sustainability (Adomako & Ampadu, 2015; Gołaś et al., 2020). More importantly, to the best of our knowledge, there are limited studies that compared the poor and non-poor farmers and environmental degradation in West Africa (Etongo et al., 2016; Moseley, 2004) and in the case of Ghana, we did not find any available studies.

## 4 Research approach

The research used the qualitative approach in its data gathering. The study design is subscribed to the constructivist's paradigm of ontological consideration which allows researchers to grasp the subjective meaning of social action (Bryman, 2012). Concomitant with this is the interpretivists' epistemological position that knowledge is subjective, socially constructed, and interpreted based on the interaction of actors in socio-historic settings (Creswell, 2014; Crotty, 1998). The good thing about the paradigm in this study is that it centered prominently on the subjective, original feelings, beliefs, and experiences of the participants about the subject—poverty and environmental degradation. These approaches as Guba and Lincoln (1989) put it, allow for the generation of a more flexible framework that ensures an adequate and deep dialogue between the interviewer and the interviewee to generate data that is close to, if not, the reality.

### 4.1 Participants and recruitment procedure

The source of data determines how meaningful that data contributes to the broader theory under which the topic is being explored. As such, researchers need to make a sound judgment of who possesses relevant knowledge and information about the topic to reveal the reality as it pertains on the ground (Etikan et al., 2016). This is even particularly critical in qualitative studies that seek to offer an in-depth understanding of less explored and less understood phenomena. Critically identifying the study population helps in recruiting appropriate respondents or participants for data collection. In this study, the population of farmers refers to individuals residing in the research area of Northern Ghana who are actively involved in agricultural activities, including both less endowed farmers (those with limited access to resources and support) and endowed farmers (those with comparatively more resources and support).

Considering the overarching objective of the study, two sampling techniques were employed. The purposive sampling technique was used to select key influential persons in



the communities as key informants, such as opinion leaders and other influential and powerful individuals. The selected key informants in the communities met specific criteria: a) residents of the study communities; b) occupied influential positions; c) had extensive local knowledge; and d) willingness to participate. These criteria guided the purposive sampling process, enriching the study's findings. For the less endowed farmers, a multistage sampling technique was employed. Twenty farming households were first selected purposively. Together with the key informants, the poorest households were selected. To avoid introducing selection bias, a multistage sampling technique was used to select the less endowed farmers in a fair and representative manner. Objective criteria based on socioeconomic indicators were defined to guide the selection process. Careful consideration was given to including a diverse range of participants who met the criteria. The purposive selection method was employed to choose twenty farming households, ensuring transparency and minimizing subjective judgment. These systematic procedures aimed to minimize selection bias and enhance the reliability of the study's findings.

In addition, twenty farming households were purposively selected based on defined criteria and key informants' guidance for the endowed farmers. The objective was to include the endowed households in the study. In the second stage, ten households were randomly selected using a simple random sampling technique. This was done by having the heads of the households pick folded papers labeled "YES" or "NO" from a bowl. The ten households that picked a "YES" paper were included in the study. Combining purposive and simple random sampling methods, the study aimed to minimize selection bias and obtain reliable and diverse insights from the participants. In all, the total sample for the study was 35 comprising thirty farmers and five key informants.

In the sample of 30 farmers from Table 1, there were 16 male and 14 female participants. The age range of the respondents varied, with 5 participants falling in the 30–40 age range, 10 participants in the 40–50 age range, 10 participants in the 50–60 age range, and 5 participants in the 60–70 age range. When it comes to education level, 6 participants had a primary education, 9 participants had a secondary education, 3 participants had a university education, and 12 participants had no formal education. The farmers showed diverse agricultural production behaviors and resource endowments. In terms of resource endowment, the majority of the participants (20 out of 30) were categorized as less endowed, facing limitations such as limited land, access to credit, and modern inputs. Only a small proportion (10 out of 30) were considered endowed, having access to advantageous resources like large land holdings and advanced technology. In terms of agricultural production behavior, the participants engaged in a wide range of practices including subsistence farming, crop rotation, and livestock rearing. This highlights the diversity of farming practices and resource utilization among the farmers in the sample. In addition to the 30 farmers, there were also five key informants involved in the study. Among the participants, there were 21 males and 14 females, indicating a slightly higher representation of male participants.

The analysis of the data reveals that deforestation practices differ between less endowed and endowed farmers. Less endowed farmers, characterized by limited resources and lower socioeconomic status, were found to deforest between 0 and 4 acres of land per year (Table 2). On the other hand, endowed farmers, who possess more resources and higher socioeconomic status, were responsible for deforesting more than 4 acres of land per year (Table 2). In terms of agrochemical usage, the study indicates that less endowed farmers typically used below 8 L of agrochemicals per farming season (Table 2). In contrast, endowed farmers tended to use higher quantities, often exceeding 15 L, but it should be noted that the specific values could go beyond 50 L per farming season. These emphasize

**Table 2** Profile of the participants

Farmer	Gender	Age range	Education level	Socioeconomic characteristics	Resource endowment	Agricultural production behavior	Deforestation (acres)	Agrochemical usage (liters)
1	Male	40–50	Primary	Less endowed	Limited land, few tools	Subsistence farming	≤ 4	≤ 8
2	Female	50–60	None	Less endowed	A small plot of land	Growing staple crops	≤ 4	≤ 8
3	Male	60–70	None	Less endowed	No irrigation	Mixed farming	≤ 4	≤ 8
4	Male	30–40	Secondary	Less endowed	Shared equipment	Crop rotation	≤ 4	≤ 8
5	Female	50–60	Primary	Less endowed	Limited access to credit	Small-scale farming	≤ 4	≤ 8
6	Male	60–70	None	Less endowed	Traditional farming methods	Selling surplus produce	≤ 4	≤ 8
7	Male	40–50	None	Less endowed	Basic farming knowledge	Hand cultivation	≤ 4	≤ 8
8	Male	50–60	None	Less endowed	Limited access to markets	Bartering with neighbors	≤ 4	≤ 8
9	Female	50–60	None	Less endowed	Inadequate storage facilities	Growing cash crops	≤ 4	≤ 8
10	Male	40–50	Secondary	Less endowed	Lack of mechanization	Family farming	≤ 4	≤ 8
11	Female	40–50	University	Less endowed	No modern storage facilities	Small-scale production	≤ 4	≤ 8
12	Male	40–50	None	Less endowed	Limited access to land	Livestock rearing	≤ 4	≤ 8
13	Female	50–60	Primary	Less endowed	Traditional farming methods	Subsistence agriculture	≤ 4	≤ 8
14	Male	60–70	None	Less endowed	Lack of modern inputs	Rainfed farming	≤ 4	≤ 8
15	Male	40–50	Secondary	Less endowed	Limited financial resources	Organic farming	≤ 4	≤ 8
16	Female	50–60	Primary	Less endowed	Limited access to markets	Rainfed farming	≤ 4	≤ 8
17	Male	60–70	None	Less endowed	Limited knowledge and skills	Mixed farming	≤ 4	≤ 8
18	Female	40–50	Primary	Less endowed	Limited access to credit	Mixed farming	≤ 4	≤ 8
19	Male	50–60	None	Less endowed	Limited access to credit and quality seeds	Grain cultivation	≤ 4	≤ 8
20	Female	50–60	None	Less endowed	Limited access to technology	Hand cultivation	≤ 4	≤ 8
21	Male	30–40	University	Endowed	Large land holdings	Large-scale farming	> 4	15+
22	Female	40–50	Secondary	Endowed	Modern machinery	Large-scale production	> 4	15+
23	Male	50–60	Primary	Endowed	Access to credit	Diversified crops	> 4	15+
24	Female	40–50	Secondary	Endowed	Established network	Intensive farming	> 4	15+
25	Male	30–40	Secondary	Endowed	Advanced techniques	Export-oriented production	> 4	15+

**Table 2** (continued)

Farmer	Gender	Age range	Education level	Socioeconomic characteristics	Resource endowment	Agricultural production behavior	Deforestation (acres)	Agrochemical usage (liters)
26	Female	40–50	None	Endowed	High-quality seeds	Monocropping	> 4	15 +
27	Male	50–60	University	Endowed	Advanced technology	Adopting new technologies	> 4	15 +
28	Female	50–60	Primary	Endowed	Access to training	Intensive farming	> 4	15 +
29	Male	40–50	Secondary	Endowed	Well-established network	Adopting new technologies	> 4	15 +
30	Female	40–50	None	Endowed	More storage rooms	Large-scale production	> 4	15 +

the disparities in deforestation practices and agrochemical usage patterns based on the farmers' resource endowment and socioeconomic characteristics.

## 4.2 Data collection process

Participation in the study was purely voluntary and each of the participants volunteered and consented to participate in the study. Face-to-face interviews were conducted in the native Konkomba language in the case of the unlettered participants and in English in the case of those who were formally educated and opted to be interviewed in English. Two interviews were conducted in English and the rest in Konkomba.

Each of the interviews was held at a place, mostly at their houses, that was most convenient and comfortable for the participants. Each of the interviews was between the researchers and the participants. After introducing the purpose of the study, the participants were asked to candidly share their experiences and observations regarding the notion that poverty drives environmental degradation, specifically focusing on water pollution and deforestation. They were also encouraged to express their views on why the perception persists and why the poor are often considered the main agents of environmental degradation. Additionally, participants were allowed to share any additional views or comments they had on the topic. The interviews took place at a location convenient and comfortable for the participants, mostly at their own houses. After each interview, the participants were thanked for their contribution and dismissed from the session. The interviews lasted between 45 min and 1 h. Each interview was audio-recorded with the participant's consent. The recordings were listened to several times and transcribed appropriately.

## 4.3 Data analysis

The researchers engaged in a rigorous process of transcription and analysis to ensure the accuracy and reliability of the qualitative data. The audio recordings from the interviews were carefully listened to multiple times, and relevant sections pertaining to the research questions were transcribed. This approach allowed for a focused analysis of the data, capturing the most meaningful and insightful responses from the participants. The interviews conducted in English were transcribed separately by all the authors, demonstrating a collaborative effort to maintain accuracy and consistency in capturing the participants' voices. The first author, who was fluent in the Konkomba language, personally transcribed the interviews conducted in Konkomba, taking into account the nuances and cultural context embedded in the language. To enhance the reliability and credibility of the Konkomba transcriptions, an independent researcher, who was also a native Konkomba speaker and had expertise in qualitative studies, was engaged. The researcher meticulously examined the transcripts in comparison to the original audio recordings, ensuring that the translations accurately captured the participants' intended meanings. This additional step of verification by a qualified native speaker added a layer of quality assurance to the analysis process, enhancing the validity of the findings.

Using an iterative thematic approach (Morgan & Nica, 2020), all the authors independently immersed themselves in the transcripts, reading them repetitively and taking detailed notes. We applied thematic analysis to identify recurring patterns, themes, and categories within the data (Morgan & Nica, 2020). The coding process involved systematically assigning labels and codes to meaningful segments of the transcripts, facilitating the organization and interpretation of the data. The authors engaged in discussions to reach a

consensus and resolve any discrepancies in the coding process, ensuring the reliability and validity of the emerging themes. The final results were presented in thematic categories, supported by compelling quotations from the participants, providing rich and authentic evidence to support the study's findings.

## 5 Results

This research assessed the notion that poverty is the main driver of environmental degradation using Northern Ghana, specifically Saboba, as the study setting. A total of thirty-five participants were used for the study comprising five key informants and thirty farmers. The perspectives of the participants on environmental degradation in the context of Northern Ghana were then constructed from the data gathered from the field. The constructs were organized into land clearing/deforestation; agrochemicals use; and systems and structures that make the narratives that poverty is the main driver of environmental resource degradation pervasive. In the subsequent sections, these themes were thoroughly explored and analyzed, delving into the complexities and nuances surrounding the relationship between poverty and environmental degradation.

### 5.1 Land clearing/deforestation

The findings from the in-depth interviews shed light on the relationship between land cover destruction and socioeconomic factors. It was strikingly evident that the participants, except for one, unanimously shared the view that the rich, powerful, and influential individuals were responsible for a far greater extent of land cover destruction compared to the poor. This insight highlights the disproportionate impact of the affluent segments of society on the environment, emphasizing the role of power dynamics and wealth in driving ecological degradation. As espoused by the participants, the endowed farmers had the financial ability to acquire more equipment and hire more labor to clear bushes and trees for new farms. It was revealed from the interviews that the wealthy even cut down the trees on their farms because they simply feel that the returns from the farm are more than the economic value of the trees. The less endowed farmers actively protected trees like Dawadawa on their farms and also planted other economically valuable trees. Their approach prioritized the preservation of these trees over maximizing short-term returns from their farms, as they recognized the significant economic value associated with these trees. The poor farmers emphasized that their limited resources prevented them from investing extensively in their farms, which in turn prevented them from generating higher returns that could potentially lead to greater land cover degradation through farm expansion. Their viewpoints challenge the notion that the poor are the primary drivers of land cover destruction, highlighting their conscious efforts to balance economic sustainability with the preservation of valuable trees and the environment.

*This assertion has lingered for far too long and I have always prayed for an opportunity like this to pour out my frustrations. We the poor farmers, what is our farm size? Very little. A farm of small acres and a farm of several acres, which one will slash and burn more trees? (50 years old male participant).*

*We the poor are usually hired by these people who are okay (rich) to cut down trees on uncultivated land for new farms. Is it because they hire us that is why they say we are those causing deforestation? (43 years old female participant).*

*...Let me take you to my farms, you will see that all the Dawadawa trees and other trees on the farms are protected. I don't have much to put into farming. I make money from these trees. But these people who are okay (rich) have cut down all the trees on their farms. (35 years old female participant).*

The endowed farmers expressed a collective disagreement with the notion that the less endowed farmers were the primary contributors to deforestation. While they acknowledged that the less endowed farmers have a significant impact on the environment due to their heavy reliance on it for their livelihoods, the endowed farmers emphasized that the scale of their contribution cannot be compared to what they, as endowed farmers, contribute through their farming activities. This highlights the perception among the endowed farmers that their agricultural practices and economic activities have a more substantial impact on deforestation compared to the less endowed farmers, challenging the assumption that poverty alone drives environmental degradation.

*Let's be realistic with ourselves. For someone that is struggling to survive, how much does that person have to be able to cut down trees for new farms to have large acres of farms.... clearing virgin lands are not done by the poor. They don't have the resources to do that (42 years old male participant).*

*...I think it is not true. These people don't have the money. How are they able to buy the tools, machines, and chemicals that destroy the trees faster? They are poor. They don't just have the money to do that. They just can't cut down trees on a large scale as we will do for farming (37 years old male participant).*

*I went to one village in Togo to beg for land to farm. Go and see vast land covered with trees but the people don't have money. The chief gave me a vast land to farm and I hired them and they cleared all the trees on the land (45 years old male participant).*

In addition, the study revealed significant differences in land deforestation between the less endowed farmers, characterized by limited resources and lower socioeconomic status, and endowed farmers, who possess more resources and higher socioeconomic status. It was observed that less endowed farmers, who often face limitations in terms of resources and socioeconomic status, were responsible for deforesting up to 4 acres of land each year. This can be attributed to their need for agricultural expansion and livelihood sustenance. On the other hand, endowed farmers, who possess greater resources and enjoy a higher socioeconomic status, exhibited a more significant impact on land deforestation, surpassing the threshold of 4 acres annually. The larger-scale deforestation activities undertaken by endowed farmers can be attributed to their capacity to invest in larger farming operations and utilize advanced machinery for land clearance. These findings highlight the unequal distribution of environmental impacts, with endowed farmers exerting a more substantial influence on land deforestation compared to their less endowed counterparts.

## 5.2 Agrochemicals use

From large to small-scale farming, modern agriculture is heavily chemical-dependent. Chemicals such as pesticides and weedicides used to control pests and weeds have serious environmental and health consequences. The use of chemicals varies with space and the socioeconomic characteristics of the individual farmers involved. Resource-endowed farmers are more likely than the poor to use modern chemicals to control pests and weeds on their farms. During the interviews, participants highlighted the influence of economic factors on their decision to use weedicides and pesticides. They explained that manual weeding was a labor-intensive and time-consuming task, prompting them to opt for chemical alternatives when financially feasible. Affordability played a crucial role, as participants with greater financial resources found it more convenient to purchase these chemical products and reduce the need for extensive casual labor. The use of weedicides and pesticides was seen as a way to streamline farming operations and allocate time to other crucial activities. However, it is important to consider the potential environmental and health impacts associated with chemical use, emphasizing the need for responsible and sustainable agricultural practices. Striking a balance between convenience and environmental stewardship remains a critical challenge in decision-making regarding weedicides and pesticides in agricultural contexts.

From the interviews, it became evident that the extent of chemical usage in farming practices could serve as a measure of one's ability to contribute to environmental degradation. Participants noted that those who could afford to purchase and utilize chemicals for weed and pest control were typically non-poor farmers. The affordability of these chemicals allowed them to bypass labor-intensive manual weeding and opt for more convenient chemical alternatives. However, participants also acknowledged the environmental consequences associated with the usage of these chemicals. They expressed awareness of the potential negative impacts on soil health, water quality, and overall ecosystem balance. This recognition highlights the participants' understanding of the environmental trade-offs involved in their farming practices and indicates a level of concern for the sustainability and long-term impacts of their actions. The interviews provided further insight into the participants' observations regarding the usage of agrochemicals between the poor and the rich, as evidenced by the following quotes:

*How many bottles of chemicals can I buy to control pests and weeds? It is the rich. Their farms are large and they can also buy so many bottles of weedicides and pesticides. These chemicals are not good for our water bodies and even the organisms in the soil. So, if we are all polluting the water, is it me the poor, or the rich who pollutes it the most? (70 years old male participant).*

*Even buying one bag of fertilizer was very difficult for me. Do you know how many bags this man bought, more than ten (10)? And his farms are just by the river. So, you imagine the damage he is doing to the river (34 years old male participant).*

*I always use animal dropping for my crops. I can't buy fertilizer. It is too expensive. We know these droppings don't kill anything in the soil and don't also pollute water that much, unlike fertilizer. So, if there is anybody killing organisms in the soil and polluting the water for human use, it is those who have the money and have been buying chemicals (52 years old female participant).*

Interestingly, it was not only the less endowed farmers who rejected the assertion that they were the primary users of chemicals with serious environmental effects. Most of the key informants, and the endowed farmers themselves, shared the same viewpoint. They agreed with the less endowed farmers and argued that the financial capacity of the poor is a significant limiting factor when it comes to acquiring large quantities of chemicals. This limitation ultimately results in lesser chemical usage by the less endowed farmers, mitigating the potential environmental impacts. The key informants recognized the financial constraints faced by the less endowed farmers, highlighting that their inability to afford chemicals in large quantities sets them apart from the endowed farmers, who have greater financial resources at their disposal. This consensus among the key informants underscores the understanding that the poor farmers' limited financial capacity plays a significant role in their lower usage of chemicals, thereby reducing the environmental consequences associated with chemical-intensive farming practices.

*Weeding is difficult. Who wants to do it? I have the money to buy weedicide, so why should I punish myself with this waist-paining task? It is not like I don't understand that these chemicals wash down to our water bodies and pollute them, I do (55 years old male participant).*

*These people (the poor) do not have the money to buy a large quantity of chemicals for farming. So, I wonder how they will contribute more to water pollution than we who are okay (45 years old male participant).*

The study shed light on significant differences in agrochemical usage practices between less endowed farmers, characterized by limited resources and lower socioeconomic status, and endowed farmers, who possess more resources and higher socioeconomic status. Less endowed farmers were observed to employ agrochemicals in quantities below 8 L per farming season, reflecting their constrained access to and affordability of such inputs. In contrast, endowed farmers exhibited a more intensive use of agrochemicals, surpassing 15 L per season and occasionally exceeding 50 L. These variations in agrochemical usage patterns highlight the influence of farmers' resource endowment and socioeconomic factors in shaping their agricultural practices. The findings underscore the need for targeted interventions and support systems to ensure equitable access to agrochemicals and promote sustainable practices among all farmers, regardless of their socioeconomic status.

### 5.3 Structures and systems make the narratives pervasive

The participants in the study challenge the conventional knowledge that portrays poor people as the primary degraders of the environment. They assert that this narrative will persist as long as the underlying structures and systems that perpetuate poverty remain unchanged. They argue that such narratives conveniently divert attention from the exploitative practices of the rich, wealthy, and powerful individuals who have a larger environmental footprint. The participants' disagreement with these narratives highlights their awareness of the disproportionate impact of rich farmers on environmental degradation. Questioning and contesting these prevailing narratives, the participants shed light on the need to address the structural factors that contribute to poverty and inequality, to achieve a more accurate



understanding of the environmental challenges and to promote more equitable and sustainable practices.

The participants offered insights into why the pervasive narratives depicting the poor as the primary destroyers of the environment persist. They explained that non-poor farmers, being rational actors, are unlikely to endorse findings that advocate for policies directly targeting and impacting their sources of wealth. Additionally, the participants revealed that poor farmers often rely on assistance from non-poor farmers within their communities. Consequently, the non-poor farmers may refrain from taking actions that could jeopardize their role as a source of support and assistance for the poor. These dynamics contribute to the perpetuation of the prevailing narratives, as they serve the interests and maintain the status quo of the non-poor farmers. The participants elaborated on their observations, offering additional insights into the factors contributing to the persistence of the narratives. The following quotations exemplify their perspectives:

*Do you think a farmer that is rich and powerful will agree that he pollutes the water in rivers, streams wells, and underground through his chemical usage? Do you think he will agree that he cuts down more trees for farming than the poor farmer? They will simply not agree, because they don't want their activities to become a target in environmental policies (39 years old male participant).*

*Look, when government officials come here to find this kind of information, they don't ask the poor farmers. They don't involve us. It is the big people that they ask. And you think they will tell them the truth. Why should they? Are they fools? (63 years old female participant).*

*I am a farmer and I am better off. The truth is that we the better-off farmers will not agree and support that we cut more trees by clearing new lands and cutting down the sparsely dispersed trees on our farms because we feel they are taking up space and reducing our returns on the farms. How do you agree to what keeps you okay as bad and detrimental? No, nobody will do that (45 years old male participant).*

*...Even where we the poor are involved when officials of government and NGOs come to gather information on this particular subject, we still do not say that the rich farmers destroy the environment the most. The reason is that we are afraid. These people are better off, influential and powerful. So, you don't say anything against them because when you need help from them, they will use that against you and not help you (35 years old male participant).*

## 6 Discussion

The key findings of the study revolved around three main constructs: land clearing/deforestation, agrochemicals use, and the systems and structures perpetuating the narratives linking poverty to environmental resource degradation. These findings were closely aligned with the study objectives, as they provided valuable insights into the factors contributing to environmental degradation and the underlying dynamics shaping the prevalent narratives. In line with the study's findings, the examination of land clearing/deforestation revealed

that while poor farmers did contribute to deforestation through their land clearance activities, the rich farmers had a more significant impact. The expansion of their farms necessitated clearing new sites, leading to a higher rate of deforestation. This finding challenges the prevailing narrative that poverty is the main driver of deforestation, highlighting the role of wealthier farmers in contributing to environmental degradation. Similarly, the analysis of agrochemicals' use demonstrated that the non-poor farmers, due to their financial capacity, had a higher propensity to purchase and apply large quantities of chemicals, including inorganic fertilizers, on their farms. This resulted in a greater contribution to water pollution compared to the poor farmers, who could only afford smaller quantities or none at all. These findings further debunk the notion that poverty is the primary factor behind water pollution, as it is the wealthier farmers who have a more significant impact. Furthermore, the study shed light on the systems and structures that perpetuate the narratives associating poverty with environmental resource degradation. It revealed that the persistence of these narratives is rooted in the unchanged structures of power and influence, which marginalize the poor and prevent them from refuting the claim effectively. The lack of representation and voice of the poor in decision-making processes allows these narratives to persist, despite evidence to the contrary.

## 6.1 Land clearing/deforestation and agrochemicals use

Agriculture and its practices remain pivotal in the discourse of environmental resource degradation. The discussions about the resource-endowed/rich/non-poor farmers and the poor/less endowed farmers and environmental degradation have become more important (Adomako & Ampadu, 2015). Recent studies (Peprah et al., 2017; Pasanen et al., 2017; Call et al., 2017; Aggrey et al., 2010) have revealed new perspectives on the contributors to environmental resource degradation, indicating that it is the rich rather than the poor who make substantial contributions. These findings challenge the conventional belief that poverty is the primary driver of environmental degradation. It becomes imperative to reassess existing narratives and understand the underlying dynamics that shape environmental resource degradation. The ongoing debate revolves around the relationship between farm size and its impact on the destruction of virgin lands, particularly through the removal of forest and bush cover for agricultural activities (Ravnborg, 2003). Additionally, the discussion focuses on the use of agrochemicals such as herbicides, weedicides, and pesticides, and their potential implications for water quality and the overall ecosystem. Importantly, the debate highlights the disproportionate contributions of wealthy and endowed farmers in these dimensions. It emphasizes that larger farm sizes and greater financial resources enable wealthier farmers to engage in more extensive land clearing and intensive agrochemical use, thereby posing greater threats to the environment (Etongo et al., 2016; Moseley, 2004). This new insight calls for a shift in focus toward addressing the actions and behaviors of the affluent to effectively tackle environmental challenges and promote sustainable resource management.

Through interviews, we uncovered significant insights regarding the environmental impact of agriculture, particularly concerning farm size and the practices employed by farmers. The interviews revealed that the rich/non-poor farmers possessed expansive land holdings compared to their poor counterparts. Interestingly, we observed a direct correlation between farm size and the extent of land cover destruction, specifically trees and bushes, during land preparation. Surprisingly, it was the poor farmers who exhibited a greater inclination toward protecting the trees on their farms, while the non-poor farmers chose to fell trees to optimize production. This finding challenges the prevailing understanding that the

non-poor contribute less to deforestation. In contrast, the poor farmers demonstrated a more sustainable approach to environmental management, with poverty acting as a constraint on their environmental impact. Despite their limited resources, the poor farmers recognized the environment as their primary source of livelihood and actively planted more economically viable trees on their farms. This observation underscores the need to reassess the commonly held belief that poverty is the primary driver of environmental degradation. Instead, our findings highlight the importance of considering both wealth and poverty as influential factors shaping environmental practices among farmers. The larger farm sizes and higher levels of land cover destruction observed among the non-poor farmers align with the theory of resource endowment, which posits that greater financial resources often lead to more extensive land clearance and resource exploitation. In contrast, the sustainable land management practices exhibited by poor farmers align with the theory of livelihood dependence, emphasizing the significant role of poverty in shaping their environmental stewardship.

These findings about the poor and non-poor and vegetative cover destruction are congruent with the empirical findings of Pephrah et al. (2017), Pasanen et al. (2017), Call et al. (2017), and Cavendish (2000). Their separate studies were rather general without any limitation to only farmers. However, Pephrah et al. (2017) still found that the rich degraded more forest than the poor. Pasanen et al. (2017) found no relationship between poverty and deforestation. Call et al. (2017) found that the relationship was rather too weak to warrant this widespread perception that the poor destroy the environment the most. Cavendish (2000) found that though the rural poor were dependent on environmental resources more, the rich used higher quantities of the environmental resource than the poor. The poor's livelihood is dependent on the environment but poverty limits their ability to use more of its resources (Reardon & Vosti, 1995).

Our findings align with previous evidence presented by Etongo et al. (2016) and Moseley (2004) regarding the relationship between farm size and land expansion. It was observed that the increase in farm sizes was primarily driven by the rich, who engaged in clearing new areas for agricultural expansion. This observation was consistently emphasized by the majority of participants in our interviews, who reported that the rich/non-poor farmers were responsible for clearing previously unfarmed lands that were covered with trees and grasses. These findings further support the research conducted by Ravnborg (2003) on Nicaraguan hillsides, which identified non-poor farmers as the immediate agents of environmental degradation, rather than the poorest individuals. Reardon and Vosti (1995) also shed light on the financial constraints faced by the poor, limiting their ability to acquire necessary tools and hire additional labor for clearing bushes and trees to establish new farms.

In contrast to the arguments put forth by the Brundtland Report (World Commission on Environment & Development, 1987) and the World Bank (1992), the findings of this study do not support the notion that poor households engage in excessive and unsustainable resource extraction. Similarly, the observations made by Khan et al. (2021) and Kassa et al. (2018), which suggest that the poor tend to harvest environmental resources excessively and unsustainably, are contradicted by our research findings. The variance in these results can be attributed to several factors. Firstly, it is important to acknowledge the contextual differences between various studies, including variations in geographic locations, socioeconomic conditions, and cultural contexts. Different regions and communities may have distinct resource management practices influenced by their unique circumstances and livelihood strategies. Furthermore, the methodologies employed in these studies may have contributed to the differing conclusions. The measurement and assessment of resource extraction can be complex, involving factors such as resource availability, access rights,

and traditional practices that may not always align with conventional notions of sustainability. Differences in sampling techniques, data collection methods, and the choice of indicators used to evaluate resource extraction can all contribute to divergent findings.

The findings regarding agrochemical usage were not surprising, as they revealed that the rich were the primary users of agrochemicals such as nitrogen fertilizers, weedicides, herbicides, and pesticides among others. Wealthy farmers were found to engage in large-scale agricultural practices that required the extensive use of these chemicals to maximize their production. Their financial capacity allowed them to afford and apply significant quantities of agrochemicals, contributing to potential environmental risks such as water pollution and soil degradation. This disparity in agrochemical usage between the rich and the poor highlights the influence of wealth and resources in shaping agricultural practices and their environmental impact. As succinctly put by one participant, *“the quantity of chemicals used to manage and controls one’s farm is dependent on his/her ability to afford it.”* The study found that the non-poor farmers used larger quantities of chemicals compared to the poor farmers to control weeds and pests. Consequently, the rich had a greater impact on water quality when compared to the poor. Poverty was identified as a limiting factor that constrained the ability of individuals to have a significant influence on the environment, particularly in terms of water quality (Murad & Mustapha, 2010). Farming practices such as the application of fertilizers, herbicides, and pesticides were identified as potential sources of water pollution and degradation. Synthetic fertilizers, which contain nitrogen and phosphorus, can accumulate in the environment and lead to negative impacts such as salinization, acidification, and chemical pollution in water bodies (Adomako & Ampadu, 2015). The excessive accumulation of these chemicals can harm both terrestrial and aquatic ecosystems through a process known as eutrophication (Gołaś et al., 2020).

The findings of this study challenge the conventional notion that poverty is the main driver of environmental degradation. Instead, they highlight the significant role played by wealth, power, and greed in contributing to environmental harm (Aggrey et al., 2010; Ekbohm & Bojö, 1999; Duraiappah, 1998; Leach & Mearns, 1991; Boyce, 1994). Wealthy individuals, who possess more resources and influence, are found to be the primary contributors to environmental degradation. They engage in activities such as clearing new areas for farm expansion, which leads to the destruction of natural habitats and ecosystems. Additionally, their extensive use of chemicals, including pesticides and herbicides, contributes to water pollution and further environmental deterioration. These findings have important implications for understanding the dynamics of environmental degradation. They suggest that addressing environmental issues requires a closer examination of the role of wealth and power in driving unsustainable practices. By recognizing the influential role of the rich in contributing to environmental harm, policymakers and stakeholders can design targeted interventions and regulations to mitigate these impacts. Moreover, these findings emphasize the need for promoting sustainable practices and raising awareness among the wealthier segments of society, who have a greater capacity to adopt environmentally friendly approaches.

We adopted two theories, the EKC theory and the political ecology framework, to analyze the relationship between poverty, economic development, and environmental degradation. In light of these theories, our findings challenge the prevailing notion that poverty is the main driver of environmental degradation. While the EKC theory suggests that economic development can lead to reduced environmental degradation (Ahmad et al., 2021; Chen et al., 2019; Dkhili, 2022), we found that wealthier farmers, who have larger land holdings, contribute more to land cover destruction during land preparation. This contradicts the traditional narrative that the poor are the primary culprits of deforestation and

degradation (Masron & Subramaniam, 2019; Khan, 2019; Kassa et al., 2018; Cavendish, 2000; World Bank, 1992; Holden, 1996; Duraiappah, 1996, 1998; World Commission on Environment & Development, 1987). Our study highlights the sustainable land management practices exhibited by poor farmers, who actively protect trees on their farms and perceive the environment as a source of livelihood. Poverty acts as a limit to their environmental impact and motivates them to plant more economic trees. This supports the argument that poverty alone does not determine environmental degradation and that socioeconomic factors such as land ownership and access to resources play a significant role.

The political ecology framework further contributes to our understanding by emphasizing the influence of power dynamics, social structures, and political-economic processes on environmental degradation (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005). It reveals that wealthier farmers, despite their resources, may prioritize profit maximization over environmental considerations, while poor farmers adopt more sustainable practices due to their reliance on the environment for their livelihoods. This sheds light on the disproportionate contributions to environmental degradation by influential groups, irrespective of poverty levels (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005). It underscores the need to address power imbalances and unequal access to resources and decision-making processes to achieve sustainable environmental management.

The implications of our findings are twofold. Firstly, they call for a nuanced understanding of the poverty-environmental degradation nexus, considering the complexities of socioeconomic factors and the role of power dynamics. Policies and interventions aimed at mitigating environmental degradation should not solely focus on poverty alleviation but should also address wealth disparities, land ownership patterns, and access to resources. Secondly, our findings highlight the importance of integrating sustainable land management practices into agricultural strategies and promoting environmental stewardship among farmers, regardless of their socioeconomic status. This can be achieved through targeted support, capacity building, and the implementation of appropriate incentives to encourage sustainable practices.

The application of the EKC theory and the political ecology framework provides a comprehensive understanding of the complex relationship between poverty, wealth, and environmental degradation. It reveals the limitations of a simplistic poverty-environmental degradation narrative and emphasizes the significance of socioeconomic factors, power dynamics, and sustainable land management practices. Considering these factors and adopting a holistic approach can help develop more effective policies and strategies to promote environmental sustainability and enhance the well-being of farming communities in Northern Ghana and beyond.

## 6.2 Structures and systems make the narratives pervasive

The exclusion of the poor from studies examining the relationship between poverty and environmental degradation has had significant consequences and has contributed to the perpetuation of the argument that the poor are the primary degraders of the environment. As highlighted by Peprah et al. (2017) and Boyce (1994), the absence of the poor in such studies allows the wealthy to make claims in their favor, shaping the narrative in a way that aligns with their interests. This exclusion of the poor from research not only distorts the understanding of the true dynamics between poverty and environmental degradation but also undermines the potential for informed policy decision-making. By neglecting the

perspectives and experiences of the poor, studies that focus solely on the actions of the wealthy can produce misleading findings that reinforce stereotypes and perpetuate misconceptions. The resulting narrative, which portrays the poor as the main culprits of environmental degradation, fails to capture the complexities and nuances of the poverty-environmental nexus. As Peprah et al. (2017) argue, the absence of the poor in research on this topic leaves them without a voice to defend themselves, further exacerbating their marginalization and perpetuating the dominant discourse.

The alignment of this current finding with the observations made by Rai (2019a, 2019b, p.2) highlights an important aspect of the persistent narratives linking poverty and environmental degradation. These narratives are not purely objective and evidence-based, but rather influenced by broader discourses of power that shape and control the narrative to serve the interests of those in positions of power. The emphasis on the role of the poor in environmental degradation conveniently diverts attention from the contributions of the wealthy and powerful, reinforcing existing power imbalances in society. The power dynamics at play within the poverty-environment discourse are significant. Narratives that portray the poor as the main degraders of the environment can serve as useful tools for political and policymaking purposes. By assigning blame and responsibility to the poor, those in positions of power can deflect attention away from their contributions to environmental degradation. This enables them to maintain their privileged positions and protect their economic interests. Furthermore, the narratives that highlight the role of the poor in environmental degradation create a distorted perception of reality. Again, by focusing on the actions of the marginalized and vulnerable, the true extent of the environmental impact caused by the wealthy and powerful remains obscured. This not only perpetuates power imbalances but also hinders efforts to address the root causes of environmental degradation. The influence of power on shaping the poverty-environment narrative has broader implications. It not only distorts our understanding of the relationship between poverty and environmental degradation but also has practical consequences for policy formulation and decision-making. When narratives prioritize the role of the poor, policy interventions may focus on implementing measures that primarily target the marginalized, while failing to address the systemic issues perpetuated by the wealthy and powerful.

The observation that the poor, who would otherwise refute these claims, lack positions of power and influence reinforces the notion that their voices are often marginalized or silenced within the poverty-environment discourse (Boyce, 1994). Even when the poor are involved in such studies, their agreement with the dominant narratives may be influenced by the fear of jeopardizing the structures that provide them with limited support and resources. This finding resonates with the argument put forth by Fairhead and Leach (1996) in their seminal work, which suggests that persistent narratives are produced and perpetuated by underlying power structures that remain largely unchanged. The asymmetry of power between the poor and the powerful can significantly influence the dynamics of the poverty-environment narrative. The poor, lacking access to resources, decision-making processes, and platforms for voicing their perspectives, may conform to the prevailing narratives to protect their limited benefits and ensure the continuity of the support systems they rely on. This creates a paradoxical situation where the very individuals who are most affected by environmental degradation are constrained from challenging the dominant discourse. Furthermore, the observation that narratives persist due to underlying power structures aligns with the understanding that power shapes knowledge production and dissemination. The entrenched power dynamics within society influence the generation of narratives, allowing certain voices and perspectives to prevail while marginalizing others. This perpetuates a status quo in which the powerful maintain control over the narrative and uphold their interests.

The observation that persistent narratives linking poverty and environmental degradation are influenced by underlying power dynamics can be further supported by examining the universal application of the EKC theory. The EKC theory proposes a generalized linear relationship between economic development and environmental degradation, suggesting that environmental degradation initially increases with economic growth but eventually declines as a certain income level is reached (Ahmad et al., 2021; Chen et al., 2019; Dkhili, 2022). While the EKC theory offers insights into the potential influence of economic development and income levels on environmental degradation (Ahmad et al., 2021; Chen et al., 2019; Dkhili, 2022), its universalizing application overlooks the complexities and heterogeneity of socioeconomic factors that shape environmental outcomes. By assuming a linear relationship between income and environmental degradation, the theory fails to account for contextual factors such as power dynamics, political structures, and historical legacies (Ribeiro et al., 2022; Tisdell, 2001). This oversimplification contributes to the perpetuation of narratives that disproportionately attribute environmental degradation to the poor while downplaying the contributions of the wealthy and powerful. The universal application of the EKC theory reinforces existing power imbalances by diverting attention away from the structural inequalities that drive environmental degradation. It places the focus solely on economic development as the primary driver of environmental problems, neglecting the role of wealth, power, and greed as significant forces in shaping environmental outcomes.

In this context, the political ecology framework provides a more valuable lens to understand the persistence of narratives linking poverty and environmental degradation, as it emphasizes the examination of power dynamics, social structures, and political-economic processes that influence environmental outcomes (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005), recognizing that these narratives are not solely based on objective evidence but are also shaped by underlying discourses of power. The framework illuminates how power dynamics restrict the agency and influence of marginalized groups, including the poor, in shaping the discourse (Loftus, 2020; Paulson et al., 2003; Robbins, 2019; Walker, 2005). The fear of jeopardizing existing support systems and resources further reinforces their alignment with the prevailing narratives, despite their potential to challenge them. It also sheds light on the persistence of these narratives by highlighting the structural inertia within power systems. The underlying power structures, which remain largely unchanged, shape and reproduce the dominant narratives over time. This can be seen as a result of the interests and motivations of the powerful, who benefit from the perpetuation of these narratives and the preservation of existing power relations.

The result calls for transformative approaches that address the structural inequalities and power imbalances contributing to environmental degradation and poverty. It emphasizes the importance of empowering marginalized communities, providing them with platforms for participation and decision-making processes. By doing so, it becomes possible to challenge and reshape the narratives surrounding the poverty-environment nexus, ultimately striving for more equitable and sustainable outcomes. In addition, there is a need to adopt context-specific and locally grounded approaches to understanding the poverty-environment relationship. Recognizing that environmental degradation is shaped by diverse social, cultural, and political contexts, it is crucial to move beyond the generalized assumptions such as those proposed by the EKC theory, at least at the local level. This requires conducting in-depth studies that take into account the specific dynamics and complexities of different regions and communities. Such localized approaches can provide a more nuanced understanding of the interactions between poverty, power, and environmental degradation, leading to targeted and effective interventions. Lastly, bridging the gap between research, policy, and practice is essential for

addressing the persistent narratives and power imbalances in the poverty-environment discourse. This involves actively engaging policymakers, practitioners, and communities in the development and implementation of sustainable environmental policies and practices. By fostering collaboration and knowledge exchange between different stakeholders, a more inclusive and informed decision-making process can be achieved.

Further, we argue that incorporating policies implemented by the government in promoting the sustainability of agriculture and forest resources and raising awareness among the population is crucial to environmental sustainability in the area. These policies can include regulations and incentives aimed at promoting sustainable farming practices, protecting forests, and mitigating environmental degradation. A key recommendation for promoting sustainable agricultural practices and maintaining the productive capacity of the land is to encourage resource-endowed farmers to actively engage in sustainable development. The government should play a crucial role in guiding and supporting these farmers in adopting sustainable farming techniques. One approach could be to provide subsidies to farmers who utilize clean energy sources such as solar energy, natural gas, or biogas, which can reduce the environmental impact of agricultural activities. Additionally, promoting the use of efficient stoves that minimize vegetation damage can further contribute to sustainable agriculture. It is also important for the government to enforce regulations that prohibit the burning of straw and incentivize the return of straw to the fields as organic matter. As the local economy develops, these measures can be implemented in the study area to foster sustainable agricultural practices and ensure the long-term health of the environment. By addressing this, we emphasize the role of governance in shaping the poverty-environmental degradation nexus and advocate for policy interventions that contribute to long-term environmental sustainability.

## 7 Strengths and limitations of the study

The study demonstrates methodological rigor by employing a multistage sampling technique. This approach ensured the inclusion of a diverse range of participants and minimized selection bias. By purposively selecting farming households and using objective criteria to guide the selection process, the study enhanced the reliability and validity of its findings. Additionally, the use of a random sampling technique in the second stage further increased the representativeness of the sample. These methodological strengths enhance the credibility of the study's findings and provide a robust foundation for drawing meaningful conclusions.

Furthermore, the study's integration of multiple perspectives is a notable strength. By including the viewpoints of both poor and non-poor farmers, as well as key informants, the study captured a comprehensive understanding of the factors contributing to environmental degradation. This multi-perspective approach allowed for a nuanced exploration of the complex dynamics at play, enriching the analysis and providing a more holistic view of the research topic. The inclusion of direct quotations from participants' interviews adds depth and authenticity to the study's findings, allowing readers to directly engage with the participants' perspectives and experiences.

The novelty of the study lies in its ability to challenge prevailing narratives. By questioning the dominant belief that poverty is the main driver of environmental resource degradation, the study offers a fresh and alternative perspective. The findings highlight the significant contributions of non-poor farmers to land clearing, agrochemical use, and overall environmental degradation. This departure from conventional wisdom adds a novel dimension to the understanding of the poverty-environment nexus and challenges



long-held assumptions. The study's ability to disrupt established narratives contributes to a more nuanced understanding of the complexities involved in environmental degradation processes.

The study made significant contributions to advancing both the EKC theory and the political ecology framework. In the context of the EKC theory, the study expanded its application by examining the relationship between poverty and environmental degradation. While the EKC theory traditionally focuses on the relationship between economic growth and environmental degradation, this study incorporated the dimension of poverty to provide a more nuanced understanding of the dynamics at play. Through exploring whether the relationship between poverty and environmental degradation follows the pattern proposed by the EKC theory, the study challenged the assumption that poverty necessarily leads to increased environmental degradation. This contribution highlighted the importance of considering socioeconomic factors, such as poverty, when analyzing the impact of economic development on the environment. Regarding the political ecology framework, the study advanced its application by explicitly examining the power dynamics and social structures that shape environmental outcomes. By analyzing how power imbalances and unequal access to resources and decision-making processes contribute to environmental degradation, the study shed light on the underlying structural inequalities that perpetuate environmental problems. This contribution highlighted the need to go beyond solely examining individual behaviors or poverty as the main drivers of environmental degradation and instead emphasized the influence of power relations and sociopolitical factors.

The implications of the study are twofold. Firstly, the findings have important policy relevance. By highlighting the substantial contributions of resource-endowed farmers to environmental degradation, policymakers can prioritize targeted interventions and regulations to address the practices and behaviors of wealthier farmers. This recognition can inform the design of more effective and equitable environmental policies that target the main drivers of degradation and foster sustainable practices. Secondly, the study underscores the need to address power imbalances and social structures that perpetuate the narratives associating poverty with environmental degradation. The study's findings emphasize the importance of empowering marginalized communities and ensuring their meaningful participation in decision-making processes. By addressing the structural factors that contribute to environmental degradation and perpetuate poverty, interventions can promote socioeconomic equity and foster more sustainable environmental outcomes.

While the study has notable strengths, it also exhibits certain weaknesses and limitations. One of the limitations of the study was the relatively small sample size used in the research. The limited number of participants may restrict the generalizability of the findings to a larger population. It is important to acknowledge that the perspectives and behaviors of the participants might not fully represent the diversity and complexity of the broader community. This limitation calls for caution when drawing broad conclusions based on the study's results. Another limitation of the study was the reliance on self-reported data. Self-reporting introduces the potential for response biases and inaccuracies in participants' accounts of their actions and behaviors. The study's findings may be influenced by participants' subjective interpretations, recall biases, or social desirability biases. Relying solely on self-reported data may limit the objectivity and reliability of the study's conclusions.

The study focused on the present circumstances and did not consider the long-term perspective of the relationship between poverty and environmental degradation. Environmental changes often occur gradually over time, and their impacts may manifest in the long run. By focusing on a specific timeframe, the study may overlook the cumulative effects of poverty and socioeconomic practices on environmental degradation. A longer-term

perspective would provide a more comprehensive understanding of the dynamic nature of the relationship. Additionally, the study primarily relied on the perspectives of farmers and key informants, potentially neglecting the insights and experiences of other relevant stakeholders. The exclusion of policymakers, local communities, environmental experts, and non-governmental organizations may limit the comprehensive understanding of the socio-economic and institutional factors influencing environmental degradation. Incorporating a broader range of stakeholders in future studies would provide a more inclusive and diverse perspective.

Finally, the study predominantly focused on the socioeconomic aspects of the poverty-environment relationship, neglecting the potential contributions from other disciplines. Environmental degradation is a complex issue influenced by various social, economic, cultural, and ecological factors. A more comprehensive understanding of the problem would benefit from an interdisciplinary approach that integrates insights from multiple fields such as ecology, economics, sociology, and political science. Addressing these limitations in future studies would contribute to a more robust and comprehensive understanding of the relationship between poverty and environmental degradation.

## 8 Conclusion

The objective of this study is to investigate the relationship between poverty, environmental degradation, and power dynamics in the context of agricultural practices in Northern Ghana. The study employed a qualitative approach, involving interviews with farmers and key stakeholders. The interviews provided insights into farmers' perspectives, decision-making processes, and power dynamics, and the examination of patterns and trends in farm size, agrochemical usage, and environmental degradation indicators. The study revealed significant differences in the contributions of poor and rich farmers to both deforestation and water pollution. While poor farmers played a role in deforestation, the findings indicated that rich farmers were responsible for a greater extent of deforestation due to their clearance of new sites for farm expansion. Similarly, in the case of water pollution, the study observed that the rich/non-poor farmers contributed more compared to the poor. The ability of rich farmers to purchase and apply large quantities of chemicals, including inorganic fertilizers, on their farms contributed to increased water pollution. In contrast, the limited financial resources of the poor restricted their access to such chemicals, resulting in lesser pollution. Therefore, if the damage to groundwater and water bodies is proportional to the number of chemicals applied, it suggests that the rich farmers should be recognized as the main polluters of water bodies, challenging the perception that the poor are solely responsible for environmental degradation. Further, the study found that the persistence of the narrative attributing environmental degradation to the poor is a result of unchanged structural factors (Dasgupta et al., 2005). This persistence can be attributed to the lack of power and influence held by the poor, which hinders their ability to challenge and refute this claim. The study's findings challenge the conventional wisdom that poverty is the primary cause of environmental degradation, specifically concerning deforestation and water pollution. It suggests that the poverty-environment resource degradation nexus may be spatially limited, emphasizing the importance of conducting baseline studies to inform environmental degradation policies in different countries.

**Acknowledgements** The authors are grateful for the voluntary participation of all participants in this study and their cooperation.

**Author contribution** SUN conceptualized the idea and was involved in the data collection and the preparation of the manuscript. AKM was involved in the preparation of the draft manuscript and revisions made. All the authors read and approved the final manuscript before submission.

**Funding** We receive no funding from any individual or organization for this study.

**Data availability** The data generated and analyzed during this study are included in the manuscript.

## Declarations

**Conflict of interest** The authors declare that there exist no financial or personal relations that may have inadvertently influenced the findings and the direction of the research.

**Ethical approval** Standard ethical procedures relating to informed consent and anonymity were strictly followed. Individual participants' consent was sought and participation in the study was voluntary. All the participants in this study volunteered. Participants were also informed of the intention to allow a third person to scrutinize the transcripts against the audio recordings. To ensure the safety and security of the sensitive individual data, participants were informed that the transcript and the audio will be destroyed immediately after the write-up was completed. Finally, consent for the publication of participants' views was also sought. All these were made clear to the participants before they volunteered and consented to take part in the study.

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