International Journal of Development and Sustainability
ISSN: 2186-8662 – www.isdsnet.com/ijds
Volume 14 Number 11 (2025): Pages 914-924
https://doi.org/10.63212/IJDS25052901

A review of factors affecting the sustainability of subsistence agricultural land in Limpopo Province, South Africa

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Abstract

Subsistence agriculture is an important source of livelihood for small-scale farmers in South Africa's rural areas. However, there is a lack of research into the current use and sustainability of subsistence agricultural land. This review summarises secondary data from previous research on agricultural land ownership, current subsistence practices, and factors that threaten land use and sustainability. The search technique employed in this review involved selecting key themes and specifying databases relevant to the study's aim. The review addresses issues such as ownership of agricultural land, the role of the state, and the use of the land, as well as variables that threaten its use and sustainability. The factors affecting agricultural land use and sustainability include the effects of human and environmental factors, such as population growth, mining, drought, floods, and climate change. This review suggests that changes in land use should be strategically planned outside agricultural land, or alternative land should be designated for sustainable survival crops to ensure food security.

Keywords: Agricultural Land; Land Degradation; Communal Land Tenure; Local Authorities; Climate Change; Limpopo Province

Cite this article as: Rankoana, S.A. (2025), "A review of factors affecting the sustainability of subsistence agricultural land in Limpopo Province, South Africa", *International Journal of Development and Sustainability*, Vol. 14 No. 11, pp. 914-924.

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1. Introduction

Subsistence production plays a vital role in rural economic development and food security (Masuku et al., 2017). Many rural households rely on subsistence and agricultural production for their livelihoods (Poulsen et al., 2015). Mugambiwa and Tirivangasi (2017) assert that agricultural production is important in rural South Africa as it reduces poverty and ensures food security. Subsistence agriculture remains an essential part of the South African economy and continues to be a critical sector as a livelihood source (Siphesihle and Lelethu, 2020). This form of production is mainly practised on communal lands held in trust by local authorities. However, subsistence farming is experiencing a significant decline due to various factors, including lack of agricultural land, climate change, resource scarcity, insufficient farming equipment, and limited extension services (Siphesihle and Lelethu, 2020). According to Ngcamu and Chari (2020), many rural communities remain vulnerable to drought, primarily caused by adverse weather patterns and climatic variations that negatively impact subsistence agricultural production. Changes in subsistence farming are driven by factors such as the conversion of traditional agricultural land for development projects and increasing climate uncertainty (Dhungana, 2020). Shackleton (2020) also notes that access to cultivable land remains a major challenge because land is a fundamental resource for agricultural production.

Subsistence agriculture is a land-based livelihood which has a higher impact on rural livelihood (Siphesihle and Lelethu, 2020). The land is acquired by restitution and belongs to the traditional authorities on behalf of the community (Sebola and Masamibolo, 2020). Traditional leaders believe that such land is legitimate property of the community (Sebola and Mamabolo, 2020) and that it is distributed to the inhabitants by indigenous law (Seloa and Ngole-Jeme, 2020). These views support Akinyemi and Mushunje's (2019) observations that the role of land in food production is closely linked to the social, political, and economic lives of most African countries, and agriculture and other related land activities are essential to the livelihoods of many rural communities. Ubink and Duda (2021) assert that this form of land ownership in South Africa is driven by the autocratic interpretations of customary law by legislators and administrators, which conflict with the democratic principles of the post-apartheid era and the perspectives of rural citizens regarding traditional leadership.

Loss of agricultural land for subsistence and small-scale farming and the links between land use and land cover change have been overlooked (Siphesihle and Lelethu, 2020). Multiple factors contribute to agricultural land deterioration. Land use change is fundamentally a spatial phenomenon, arising from the interplay of many socio-economic, institutional, biophysical, and ecological factors (Wu and Wu 2013). A decline in agricultural land and its conversion to several activities can be attributed to an ineffective land use management system, which does not protect land for subsistence and small-scale farming in rural areas characterised by customary land tenure rights (Lidzhegu and Kabanda, 2022). These activities provide a considerable risk to food security and the sustainability of agricultural and forestry product supply systems (IPCC, 2019; Gupta et al., 2024). Gupta et al. (2024) assert that these can profoundly impact food security and the sustainability of global agricultural and forestry product supply chains. Additionally, subsistence agricultural land is negatively impacted by variations in climatic conditions (Ubink and Duda, 2021). Agricultural land is being abandoned by farmers due to unpredictable rainfall and increasing heat, resulting in persistently inadequate crop yields. Moreover, the past decade has witnessed a shift in land-use patterns from agricultural production to non-agricultural objectives, including game farms, golf courses, residential complexes, and vacation estates (Hall, 2011; Pacheco et al., 2018). Kaiser (2021) identifies rapid population growth, severe soil erosion,

deforestation, overgrazing, insufficient vegetation cover, uneven crop production on steep slopes, erosive rainfall patterns, lack of fallowing, and inadequate conservation measures as the principal causes of land degradation (Tadesse and Hailu, 2024; Kaiser, 2021). However, this review discusses previous research about the ownership of agricultural land, its status and use, and the factors that negatively affect land use and sustainability. The review presents themes such as agricultural land ownership, the land condition and use, as well as the variables that adversely impact agrarian land usage and sustainability. Sustainability of agricultural land may enhance current subsistence practices, thereby ensuring food security at the household level.

2. Methodology

The review's search technique entailed the selection of key themes and the specification of databases pertinent to the study objective. The literature review was performed with ResearchGate and Google Scholar as the principal sources. The researcher systematically utilised themes and sub-themes to optimise the search procedure. The subsequent list delineates the main themes used in the search: subsistence crop production, farmland ownership, land degradation, climate change, and sustainable development.

3. Results and discussion

3.1. Ownership of subsistence agricultural land

Limpopo is one of the provinces in South Africa that is predominantly rural, accounting for approximately 80% of its total area. In rural regions, the state is the legal proprietor of the land; nonetheless, the tribal authority holds the rights of the landowner over it (Development Facilitation Act of 1995). Traditional authority in rural Limpopo plays a crucial role in governance through land allocation, the awarding of occupancy rights, and dispute resolution. The Interim Protection of Informal Land Rights Act of 1996 confers the right to such ownership. Approximately 95% of the territory is governed by traditional authorities (Muthambi et al., 2018). Section 4.1 of the Black Authorities Act No. 68 of 1951 stipulates that tribal authorities are responsible for overseeing the affairs of tribes and communities by providing support and guidance on issues related to the development and enhancement of property within their jurisdiction (Ntlhe, 2022). The Act explicitly delineates the inclusions and exclusions of a tribal authority under a chief's leadership regarding the management, delineation, and administration of tribal territory within their jurisdiction.

Traditional leaders serve as representatives and support systems for their communities, warranting consideration in various contexts. Hull et al. (2016) acknowledge that traditional authorities serve as the custodians of rural land on behalf of the state. Communities exert a significant influence on the land allocation process, although they do not serve as the final decision-makers (Hull et al., 2016). Thus, the process of land allocation is more complex than it seems. A traditional council oversees land administration in rural areas, encompassing tribal and communal land from former homelands (Muthambi et al., 2018). The provincial executive emphasises collaboration between the government and traditional leadership to resolve land tenure concerns, as land occupancy is overseen by traditional leaders (Strauss, 2019). Conversely, traditional areas and old homelands, governed by specific regulations regarding habitation, land utilisation, and various ownership forms (such as the Less Formal Townships Establishment Act of 1990 and the land provisions of

the Black Administration Act of 1927), are administered by the province and are excluded from the urban planning framework. Hull et al. (2016) assert that local chiefs possess the land in fiduciary responsibility for their constituents. Ubink and Duda (2021) attest that traditional authorities provide access to land through their custodial power over land owned by rural populations in traditional communities. These communities were transformed into compact villages featuring grid-patterned streets and standardised plots as part of the villagisation project (Seloa and Ngole-Jeme, 2022). The residential zones were partitioned into plots, cultivable grounds were segmented into units, and a communal grazing pasture was established (Muthambi et al., 2018). The 1913 Natives Land Act and the 1923 Natives (Urban Areas) Act facilitated residential segregation and diminished the land held by Black individuals (Ntlhe, 2022). During the apartheid era, the government regulated settlement patterns and designated zones exclusively for blacks (Ubink and Duda, 2021). The spatial effects of these regulations and the conventional land distribution system led to scattered traditional homesteads (Ntlhe, 2022). Subsistence farmers use part of the communal land, which lacks ownership deeds and is held in trust by local chiefs for agricultural purposes (Maponya and Mpandeli, 2013).

3.2. Use and sustainability of subsistence agricultural land

Agricultural land underpins food production, and food production metrics have been incorporated into poverty assessment frameworks. Rural communities depend on land accessibility for their livelihoods. Subsistence crop production, especially maize production, is essential for local livelihood in communal lands and constitutes, on average, 25% to 50% of a household's food needs (Shackleton, 2020). Subsistence crops ensure food security for impoverished rural households, facilitate monetary savings, and, in certain instances, generate supplementary income (Aliber and Hart, 2009; Baiphethi and Jacobs, 2009). Subsistence production still plays a major role in the economic development of rural areas where crop production is practised on rain-fed arable land during the rainy season (Ussiri and Lal, 2019. Mugido and Schackleton (2020) concede that smallholder production in the rural communities is important for food security, identity, and well-being.

The abandonment of large areas of previously cultivated land in Limpopo Province presents a major challenge (Akinyemi and Mushunje, 2019). Under-farming is especially evident in the more unsettled communal areas of the province. Furthermore, the previous decade has witnessed a shift away from agriculture, with land-use patterns transitioning from agricultural production to non-agricultural uses, including game farms, golf courses, residential developments, and vacation estates (Hall, 2011). Similarly, a historical trend analysis of land use in the Transkei reveals that the abandonment of arable land commenced in the early twentieth century, with a marked acceleration during the 1960s and 70s (Andrew et al., 2003). In some areas of the Eastern Cape and KwaZulu-Natal, extensive tracts of once-cultivated land are reported to be abandoned (Andrew et al., 2003). Researchers in Africa observed that local agricultural production from available land barely meets their subsistence requirements. For instance, Abebaw (2019) indicates that land degradation has an adverse impact on the Ethiopian economy, diminishing agricultural productivity by depleting the fertility of arable land. Land degradation constitutes the most critical issue in arid regions and poses a significant threat to the global objective of eradicating hunger (Bekele et al., 2020). Degraded rangelands result in decreased subsistence crop productivity, heightened susceptibility to climate variability, and poor food security (Slayi et al., 2024).

Sustainable utilisation of common land is essential to ensure subsistence production, while the management of local natural resources is crucial for cultural identity, community cohesion, and social capital

and resilience (Shackleton, 2020). An effective approach to improving land productivity in the face of degradation is to address the rise in food production and the environmental issues linked to land alienation and degradation (Shackleton, 2022). Giller et al. (2021) propose that techniques such as agroforestry, crop rotation, soil conservation, organic farming, integrated soil fertility management, water harvesting, conservation agriculture, and climate-smart agriculture can sustain land and enhance its production. To ensure sustainable food production systems and promote ecosystem management, the FAO (2023) asserts that securing land for agricultural production is essential for food security. The four variables adversely affecting the use and sustainability of subsistence agricultural land should be addressed to mitigate land alienation and degradation, hence ensuring sustainable subsistence production to alleviate poverty, hunger, and malnutrition. This review identified three factors that have diminished the area available for subsistence agricultural production.

3.3. Factors impacting negatively on the use and sustainability of subsistence agricultural land

Subsistence farming has markedly diminished over the previous century due to land alienation for settlement and mining, while the remaining land is compromised by severe environmental challenges (Shackleton, 2020). These observations corroborate Hall's (2011) observation that the previous decade has experienced a transition from agriculture, as land-use patterns have evolved from agricultural production to non-agricultural uses such as game farms, golf courses, residential developments, and vacation estates. A significant reduction in agricultural land utilisation and land-based subsistence activities is reported by several researchers who suggest that the deterioration of subsistence agricultural land in Limpopo Province is chiefly attributable to three sources. These factors contribute to significant declines in subsistence crop productivity, adversely impacting household food security.

3.3.1. Climate change

Despite extensive study on climate change in Limpopo Province, South Africa, there is a paucity of evidence regarding its effects on land, particularly the land utilised by subsistence farmers in rural areas for crop production. Exploratory research is suggested to elucidate the impact of drought, reduced precipitation, and increasing temperatures on agricultural land use and sustainability. This section of the review provides views on the impact of climate extremes on agricultural land. A study conducted by Akinyemi and Mushunje (2019) demonstrates that South Africa has been undergoing climate extremes that adversely impact human livelihoods and subsistence production. Increasing temperatures, erratic precipitation, water shortages, and bush encroachment have diminished the productivity of land used for subsistence agriculture (Akinyemi and Mushunje, 2019). A recent study by Rankoana (2022) in Limpopo Province indicates that most land utilised for subsistence crop production is no longer viable due to the removal of fertile topsoil resulting from soil erosion caused by floods, droughts, and winds. Kilroy (2015), supported by Dhungana (2020), acknowledges that alterations in precipitation, temperature, or both influence biophysical pathways and systems, encompassing land and soil, water resources, fluctuating growth seasons, and biotic stresses. Kahumba and Tefera (2023) reported climate change as the principal factor contributing to rangeland degradation. Environmental challenges such as heightened soil erosion, intensified bush proliferation, and climatic alterations adversely affect communal rangeland conditions throughout Africa (IPCC, 2019). Climate change is exacerbating land degradation, diminishing biodiversity, facilitating bush encroachment, and promoting the

proliferation of pests and invasive species (IPCC, 2019). Extreme precipitation and temperature events (Shrestha et al., 2022) negatively impact low-income rural populations that rely on antiquated agricultural systems or marginal lands with insufficient adaptive capability.

3.3.2. Rapid population growth

The appropriation of land for settlement significantly contributes to the scarcity of land available for agricultural use. The rise in population leads to the fragmentation of landholdings (Phethi and Gumbo, 2019). The increase in population and the influx of people outside the community have significantly accelerated deforestation, resulting in the establishment of numerous new communities in the area (Lidzhegu and Kabanda, 2022). A new system of blocks of stands is implemented to address the increasing demand for residential plots. Lidzhegu and Kabanda (2022) assert that the reduction of agricultural land and its transformation into developed areas is due to inadequate land management, which inadequately safeguards land for subsistence and small-scale farming in rural areas governed by customary land tenure rights. Land-use patterns underwent significant transformation in the twentieth century, driven by accelerated population increase, urbanisation, and industry. Population growth is one of the factors that affected land use change in the research area (Blair et al., 2018). The increasing population growth rate necessitates a transformation in land use as an increasing number of households pursue new land for residential and agricultural development (Tong and Qiu, 2020). Population growth increases the demand for land for food production and habitation, thus resulting in the intensification of agriculture and the development of arable land (Shackleton, 2020). This phenomenon is corroborated by Naibbi et al. (2014), who discovered that population growth intensified the demand for human settlement expansion into previously untouched territories, resulting in land use alterations that favoured human habitation. The proliferation of human habitation in wetlands in some places serves as a method to alleviate the strain on current land use alterations (Tian et al. 2015).

3.3.3. Mining operations

Rural communities in South Africa remain largely dependent on small-scale agriculture and the utilisation of natural resources (Shackleton, 2020; Ochieng et al., 2010). However, mining operations constitute a significant factor contributing to land loss, with negative implications on subsistence crop production and food security. The deprivation of land access, particularly as a result of mining activities, yields significant adverse long-term effects on the livelihoods of communities in rural areas (Tindwa et al., 2023). In Limpopo Province, numerous subsistence farmers have experienced the loss of their land to mining operations (Wegenast and Beck, 2019), resulting in significant implications for food production and security. A study conducted by the Limpopo Department of Agriculture revealed a discernible trend: a decline in agricultural land use attributed to its conversion for mining purposes (Limpopo Department of Agriculture, 2012). The mining activities within the province constitute the primary factor driving the transformation of land use from agricultural fields to mining territories as arable farmlands are replaced by mining activities (Seloa and Ngole-Jeme, 2022). Furthermore, the absence of effective waste management and disposal sites has detrimental implications for the utilisation of agricultural land (Shackleton, 2020). The expansion of mining operations has resulted in a reduction of our agricultural lands (Seloa and Ngole-Jeme, 2022). The process of mining has led to a decline in crop agriculture, livestock grazing, and the utilisation of non-timber forest products among the households impacted (Mugido and Shackleton, 2019). Comparable findings have been documented in various contexts; for instance, Wu and

Wu (2013), contend that worldwide transformations in land use exert pressure on individuals' capacity to access and utilise land and natural resources within rural communal regions. The transformation of agricultural lands into mining sites in Ghana has resulted in a significant reduction of arable land, consequently undermining the ability of smallholder farmers to engage in food production (Adator et al., 2023). The inability to obtain these terrestrial advantages may heighten the susceptibility of local communities, resulting in profound repercussions for their welfare and resilience. This, in turn, can precipitate social-ecological transformations and conflicts (Tindwa et al., 2023).

4. Conclusion

It is evident from the review that subsistence farmers face a myriad of challenges regarding the sustenance of agricultural land from which they derive a variety of food sources. Among the challenges faced by the farmers are anthropogenic and environmental factors that adversely impact the utilisation and sustainability of subsistence agricultural land. Anthropogenic factors, such as the expansion of residential land into agricultural land, could be avoided by using arid land. The impacts of mining are not unavoidable, as in many instances, farmers have lost their agricultural land to mining activities. This study suggests that land use changes should be strategically planned to occur outside of agricultural land, which is a source of household food security. Alternatively, arid land may be designated for sustainable subsistence crop production to maintain food security. These suggestions could shape further government policy debates on land and concrete plans about the sustainability of subsistence agricultural land.

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