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REVIEW

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Sloping Agricultural Land Technology (SALT) based agroforestry for sustainable upland farming

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ABSTRACT

The review was conducted on Sloping Agricultural Land Technology (SALT) and used multipurpose trees sustainable production for upland farming. The SALT proved an excellent agroforestry-based approach to combat soil erosion, restore soil fertility, and enhance productivity on sloping and degraded uplands. Originally developed in the Philippines during the 1970s, SALT integrates contour hedgerows of leguminous shrubs with strips of annual and perennial crops, offering a sustainable solution to land degradation in upland regions. The system's ecological foundation is reinforced through adaptations such as livestock integration, orchard development, agroforest establishment, and organic nutrient cycling. The paper explores four distinct SALT models SALT-1 through SALT-4 each with unique land-use combinations tailored for agriculture, forestry, livestock, and horticulture. Key components such as contour farming, alley cropping, composting, and water conservation structures synergistically improve soil health, water retention, and biodiversity. The adaptability, low cost, and ecological sustainability of SALT make it particularly relevant for smallholder farmers in tropical regions. However, challenges such as labor requirements, delayed economic returns, land tenure insecurity, and limited extension support remains barriers to wider adoption. By aligning traditional knowledge with agro-ecological principles, SALT emerges as a holistic model for climate-resilient, low-input, and community-driven upland farming systems.

KEY WORDS

Agroforestry; SALT; Soil conservation; Upland farming; Biodiversity; Sustainability

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Introduction

The SALT is a sustainable agroforestry-based farming system also known as contour hedgerow intercropping agroforestry technology (CHIAT) designed specifically for the conservation and productive use of sloping lands. Originally developed in the Philippines by the Mindanao Baptist Rural Life Center in the late 1970s [1]. SALT was conceptualized to combat the severe problems of soil erosion, declining soil fertility, and poor yields commonly experienced by upland farmers [2]. This technology integrates contour hedgerows of nitrogen-fixing shrubs and trees with strips of annual and perennial crops grown along the contours, thereby enhancing soil stability, reducing erosion, and improving land productivity [3].

One of the central components of SALT is the establishment of double rows of leguminous shrubs, such as Gliricidia sepium, Leucaena leucocephala, or Flemingia macrophylla, planted along the contour lines of sloping land. These species serve multiple purposes: they act as natural barriers to slow runoff, trap sediment, fix atmospheric nitrogen, and supply organic biomass that can be used as green manure, mulch, or fodder [4,5]. The interspaces between hedgerows, generally 4-5 meters wide, are cultivated with food and cash crops, thus combining soil conservation with economic productivity. Over time, the system enhances soil fertility and builds up the organic matter necessary for sustainable crop production [6,7].

The simplicity, affordability, and adaptability of SALT make it particularly suitable for smallholder farmers in upland areas of Southeast Asia and other tropical regions. Its ecological and economic benefits such as improved crop yields, enhanced soil moisture retention, and increased biodiversity have led to its adoption in several countries facing land degradation challenges [6,8]. Furthermore, SALT can be easily modified into various forms, such as SALT 2 (Simple Agro-Livestock Technology), SALT 3 (Small Agro-fruit Livelihood Technology), and SALT 4 (Sustainable Agroforest Land Technology), depending on local needs and farming objectives [9].

In the context of increasing environmental degradation and food insecurity , SALT represents a time-tested approach to sustainable land management and rural development [10,11]. It aligns with the principles of agro-ecology by integrating biological diversity, nutrient cycling, and local knowledge to build resilient and productive farming systems [12-15]. As such, SALT is more than a soil conservation technique it is a holistic, agroforestry-based strategy that ensures both ecological integrity and long-term livelihood security for upland farming communities.

Types of SALT

Lamichhane elaborated upon various forms of SALT, originally conceptualized and classified by Tacio, highlighting their functional diversity and strategic relevance for sustainable upland farming [16,17]. These SALT models were not merely uniform techniques but adaptive land-use frameworks tailored to integrate soil conservation with food security, livelihood diversification, and ecological rehabilitation. Each model, while rooted in contour farming and agroforestry principles, emphasized a unique combination of crops, livestock, forestry, or horticulture based on land capability and farmer needs. Lamichhane's interpretation emphasized how these SALT variants from crop-dominated systems (SALT-1) to livestock-integrated (SALT-2), forest-centric (SALT-3), and orchard-based (SALT-4) models could be selectively applied to

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rehabilitate fragile mid-hill landscapes, improve soil fertility, and offer sustainable livelihood pathways for smallholders in Nepal and beyond [16].

(Source: ICMOD Site: https://www.icimod.org/activities/sm-sloping-agricultural-land-technology-salt/)

SALT-1: Sloping Agricultural Land Technology (3:1 - Agriculture: Forestry)

SALT-1 is the foundational model of SALT, conceptualized to integrate sustainable farming on hilly terrains. This model employs a land-use distribution of 3 parts agriculture to 1-part forestry, where annual or seasonal crops are cultivated between hedgerows of leguminous trees planted along contour lines. These trees, often species like Gliricidia sepium or Leucaena leucocephala, not only stabilize the soil but also contribute to nutrient cycling through nitrogen fixation and organic matter addition. Such contour hedgerow intercropping has been widely recognized for its role in arresting soil erosion, conserving moisture, and improving soil fertility [18,19].

Several studies have confirmed the effectiveness of SALT-1. For instance, reported that SALT-based hedgerow systems reduced soil erosion by more than 60% compared to traditional upland cultivation [20]. Similarly, highlighted that integrating nitrogen-fixing trees in contour lines significantly enhanced soil organic matter and sustained crop productivity in Mindanao, Philippines [3]. In the Indian context, emphasized that adopting hedgerow intercropping on sloping land minimized runoff and nutrient loss, offering a practical model for resource-poor farmers [21].

Thus, SALT-1 serves as an ideal strategy for subsistence farmers, enabling them to maintain food production while progressively rehabilitating their fragile sloping farmlands, ensuring both livelihood security and long-term ecological stability.

SALT-2: Simple Agro-Livestock Technology (2:2:1 - Agriculture: Livestock: Forestry)

SALT-2 introduces a more diversified system that integrates crop cultivation, livestock rearing, and forestry in a 2:2:1 ratio. This model is particularly suitable for upland farmers who rely equally on crops and animal husbandry for sustaining their livelihoods. Crops are cultivated on designated plots with contour hedgerows, while adjacent areas are allocated for forage grasses and livestock housing. Nitrogen-fixing trees and multipurpose shrubs planted along contour lines act as erosion barriers, fodder sources, and soil fertility enhancers. The recycling of livestock manure back into the fields creates a closed-loop nutrient cycle, promoting organic enrichment of soils and reducing dependency on external inputs [22,23].

Studies have highlighted the efficiency of integrated systems like SALT-2. For instance, demonstrated that smallholder agroforestry-livestock systems improved both soil fertility and household food security in the Philippine uplands [24]. Ramachandran emphasized that integrating livestock into agroforestry contributes to diversified income streams and resilience against climatic and market fluctuations [25]. Similarly, Yu observed that the inclusion of fodder trees and grasses in sloping lands of India reduced soil erosion and enhanced livestock productivity, thereby strengthening overall farm sustainability [26].

Thus, SALT-2 emerges as a robust model of integrated rural development, offering multiple livelihood options while simultaneously rehabilitating fragile upland ecosystems.

SALT-3: Sustainable Agroforest Land Technology (2:3 - Agriculture: Forestry)

SALT-3 is essentially a landscape restoration strategy tailored for rehabilitating unproductive or severely degraded uplands, converting them into ecologically and economically viable agroforests. With a land-use ratio favoring forestry (2 parts agriculture to 3 parts forestry), this model prioritizes the establishment of perennial crops, timber species, and fruit trees. During the early years, annual food crops can be cultivated between young trees, ensuring short-term subsistence while the system develops. Over time, the maturing forest component stabilizes the ecosystem, improves soil fertility, enhances biodiversity, and generates diversified income streams through timber, fruits, and non-timber forest products [4,27].

Several studies corroborate the potential of forest-oriented agroforestry systems like SALT-3. Campbell reported that forest-based agroforestry significantly reduces soil erosion and enhances carbon sequestration in the Philippine uplands [28]. Similarly, Sharma highlighted that the introduction of multipurpose trees in Indian degraded hills improved soil structure and provided sustainable timber and fuelwood [29]. Mulia also noted that strategic integration of trees enhances water use efficiency and long-term ecosystem resilience in semi-arid regions [30]. These findings suggest that SALT-3 not only contributes to landscape rehabilitation but also strengthens livelihood opportunities in fragile terrains.

Thus, SALT-3 stands out as a restorative approach, particularly valuable in steep and erosion-prone landscapes where conventional farming is unsustainable, aligning ecological recovery with rural livelihood development.

SALT-4: Simple Agro-fruit Livelihood Technology (2:2:1 - Agriculture: Horticulture: Forestry)

SALT-4 is tailored for farmers seeking a diversified, fruit-based livelihood system on sloping lands. In this model, land use is distributed in a 2:2:1 ratio for agriculture, horticulture, and forestry, respectively. The system emphasizes the establishment of orchards and horticultural plantations, such as citrus, banana, papaya, or guava, intercropped with annual food crops during the early establishment phase. Hedgerows of multipurpose leguminous trees are maintained along contours for soil stabilization, erosion control, and fertility enhancement. By combining short-term yields from annual crops with medium- and long-term returns from fruit and forest species, SALT-4 creates a balanced system that improves food security, ecological resilience, and rural livelihoods [27,23].

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Research supports the integration of horticultural crops into sloping land agroforestry. Palsaniva demonstrated that intercropping guava with pulses and cereals enhanced land-use efficiency and household nutrition in semi-arid India [31]. Ghimire reported that fruit-based agroforestry systems in Nepal reduced soil erosion while improving farm incomes through diversified products [32]. Similarly, Akter observed that citrus-based agroforestry in Bangladesh provided sustainable income opportunities while contributing to slope stabilization [33]. These studies highlight the dual role of SALT-4 in land rehabilitation and income diversification, making it a practical choice for smallholder farmers in hilly and upland regions.

Thus, SALT-4 offers a strategic pathway for upland farmers, ensuring continuous income flow, ecological stability, and sustainable land use, with fruit crops serving as the economic backbone of the system.

Principles of SALT

SALT is founded on a set of ecological, agronomic, and socio-economic principles that collectively aim to address the complex challenges of upland agriculture, such as soil erosion, declining fertility, and low farm productivity. The design of SALT reflects a systems-thinking approach that integrates soil conservation, agroforestry, and sustainable farming practices tailored for sloping and degraded landscapes. The following key principles form the backbone of SALT:

Contour farming and soil conservation

The fundamental principle of SALT is the establishment of contour hedgerows strips of perennial, nitrogen-fixing shrubs or trees planted along the natural contours of the slope. This practice is designed to reduce surface runoff, minimize soil erosion, and encourage water infiltration. By following the land's contour, the hedgerows serve as natural barriers that trap eroded soil particles and reduce the velocity of water flow, thereby preserving topsoil and improving water retention in the soil profile [3,34].

Integration of agroforestry systems

SALT promotes the integration of trees and shrubs with annual and perennial crops in a spatially organized manner. The leguminous hedgerows such as *Gliricidia sepium*, *Leucaena leucocephala*, or *Flemingia macrophylla* fix atmospheric nitrogen and generate significant quantities of biomass that can be used as green manure or mulch. These trees enrich the soil with organic matter and nutrients while providing additional resources like fuelwood, fodder, and stakes for farm use [35]. This agroforestry approach not only enhances soil fertility but also increases biodiversity and ecological resilience.

Maximization of land use efficiency

A central tenet of SALT is to maximize productivity per unit area through multiple cropping systems. The space between the hedgerows (typically 4-5 meters apart) is cultivated with a diverse mix of annual crops (e.g., maize, upland rice, beans) and perennial crops (e.g., pineapple, banana, coffee), depending on local conditions and farmer preferences. This diversified cropping strategy ensures a continuous supply of food and income throughout the year and reduces the risks associated with mono-cropping [8]. The system is designed for full-year utilization, with a rotation and relay cropping system that supports both subsistence and market-oriented production.

Low-cost and farmer-friendly approach

SALT is specifically tailored to the needs and capacities of smallholder farmers in upland and resource-poor regions. The system uses locally available plant species, requires minimal capital investment, and emphasizes farmer participation and traditional knowledge. It is a labor-intensive yet low-cost technology, making it accessible and practical for rural households without requiring expensive inputs or machinery [9]. This principle is critical for the widespread adoption and sustainability of the system in the Global South.

Sustainability and soil fertility regeneration

SALT functions not just as a soil conservation method but as a land regeneration system. By continuously adding organic matter through pruned biomass and maintaining ground cover, the system gradually builds up soil fertility and improves physical soil properties such as structure, porosity, and moisture retention. As the system matures, the need for external inputs decreases, making it a self-sustaining and regenerative farming approach [12].

Flexibility and adaptability

SALT is not a rigid prescription but a flexible framework that can be modified based on agro-ecological conditions, farm size, labor availability, and farmers' needs. Variants such as SALT 2 (incorporating livestock), SALT 3 (forest-based), and SALT 4 (fruit-based) demonstrate the adaptability of the system to different farming goals and ecological zones [9]. This adaptability makes SALT a versatile technology suitable for diverse contexts across tropical and subtropical regions.

Components of SALT-based Agroforestry

SALT integrates agroforestry principles with soil and water conservation measures to sustainably manage upland farming systems. The effectiveness of SALT lies in its strategic combination of components that work synergistically to control erosion, enhance soil fertility, and optimize land productivity. Each component plays a specific role in supporting the ecological and economic viability of the system.

Contour hedgerows of leguminous shrubs

At the heart of SALT-based agroforestry lies the strategic planting of double rows of leguminous trees or shrubs along contour lines on sloping lands a practice fundamental to conserving soil and optimizing land productivity. Species such as *Gliricidia sepium*, *Leucaena leucocephala*, and *Flemingia macrophylla* are frequently employed due to their rapid growth, deep root systems, and ability to fix atmospheric nitrogen, enriching the soil naturally [3]. These contour-aligned hedgerows perform a suite of essential ecological functions. Their roots anchor the soil, effectively curbing erosion, while their structure disrupts surface runoff, promoting water infiltration and moisture retention. Regular pruning of the hedgerows yields substantial green biomass, which is returned to the cropping areas as mulch or green manure, significantly improving organic matter content and reducing dependence on chemical fertilizers. Additionally, the presence of hedgerows helps moderate the microclimate by providing partial shade and wind buffering for crops growing between the strips. This integrated approach not only safeguards the fragile upland ecosystems but also boosts crop productivity in a low-input, sustainable manner [35].

Alley cropping strips for food and cash crops

In the spaces between the contour hedgerows, farmers implement alley cropping an intensive cultivation system

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utilizing a diverse mix of regionally adapted annual and perennial crops. These inter-hedgerow strips, typically spanning 3 to 5 meters in width, are managed to maximize productivity throughout the year. A wide range of crops is grown, including staple cereals like maize, upland rice, and sorghum; nitrogen-rich legumes such as cowpea, mung bean, and pigeon pea; and high-value vegetables like tomato, chili, and eggplant. In many areas, perennials like pineapple, banana, coffee, and cacao are also incorporated, contributing to long-term income and ecological stability. This spatially optimized cropping pattern not only allows for continuous harvests but also improves overall land-use efficiency. Furthermore, it facilitates effective crop rotation and biodiversity, which are key to breaking pest and disease cycles and sustaining soil fertility over time [8].

Soil and water conservation structures

Certain adaptations of the SALT system incorporate physical soil conservation structures such as earthen dikes, stone bunds, and small check dams alongside the vegetative hedgerows, especially in landscapes with steep slopes or regions experiencing intense rainfall. These engineered elements are strategically placed to bolster the erosion-controlling capacity of contour plantings by intercepting runoff, slowing its velocity, and trapping sediments and organic debris. In doing so, they not only prevent soil loss but also enhance the retention of moisture in the root zone, which is particularly beneficial during dry periods. This combined use of biological and mechanical barriers creates a synergistic effect, reinforcing the structural stability of sloping farmlands while accelerating the recovery of soil fertility and ecological balance [12].

Livestock integration

SALT 2 systems extend the agroforestry model by integrating small livestock such as goats, pigs, or poultry into the farming landscape, creating a dynamic and self-sustaining nutrient loop. These animals are primarily nourished with readily available farm resources, including pruned leaves from nitrogen-fixing hedgerows like Gliricidia sepium, along with crop residues and processing by-products. In return, their manure is systematically applied to the cropping zones, enriching the soil with organic nutrients and enhancing fertility over time. This holistic integration not only broadens the range of farm products boosting household food supply and income but also ensures efficient resource use by utilizing spaces unsuitable for cultivation. By closing the nutrient cycle, SALT 2 promotes long-term soil health while strengthening farm resilience and sustainability [9].

Woodlots or tree plantations

An important feature of some SALT systems is the inclusion of dedicated woodlots, where fast-growing timber and fuelwood species are cultivated to supplement farm income and meet household energy and construction needs. Species such as *Gmelina arborea*, *Acacia auriculiformis*, and *Swietenia macrophylla* (mahogany) are frequently chosen due to their adaptability, rapid growth, and market value [36,37]. These woodlots are typically established on marginal or less productive sloping lands, thereby maximizing land use efficiency without competing directly with staple food crops [38].

Beyond their economic benefits, these tree stands play a crucial ecological role in sequestering atmospheric carbon, enhancing soil cover, and improving microclimatic conditions, while also providing habitats that contribute to local biodiversity conservation [28,39,40]. Integrating woodlots within SALT frameworks therefore strengthens both environmental sustainability and livelihood security, making them a multifunctional component of upland farming systems.

Multipurpose trees and fruit crops

Advanced forms of SALT, particularly SALT-3 and SALT-4, are designed with a strong emphasis on economic resilience by integrating multipurpose trees and high-value fruit crops into the upland landscape. Fruit-bearing species such as Citrus varieties, *Mangifera indica* (mango), and *Lansium domesticum* (lanzones) are strategically planted to provide steady seasonal income and expand market opportunities [3,4,27]. In addition, species like *Azadirachta indica* (neem) and *Moringa oleifera* are introduced for their medicinal, nutritional, and pesticidal properties, enriching the system's functional diversity while offering direct household benefits [41,42].

Several studies underscore the value of incorporating fruit and multipurpose trees into upland agroforestry. Rasul observed that fruit-based agroforestry improved both farm incomes and dietary diversity among hill farmers in South Asia [43]. Ghimire reported that citrus- and mango-based systems in Nepal's mid-hills significantly reduced erosion while providing reliable cash returns [32]. Likewise, Pandey highlighted that integrating neem and moringa enhanced pest resistance and added nutritional security in dryland farming contexts [44].

This blend of perennial crops not only strengthens long-term economic security but also contributes to household dietary improvement and ecosystem resilience, making advanced SALT models particularly beneficial for upland communities striving for sustainable livelihoods and greater self-reliance.

Composting and organic input management

A key sustainability feature of the SALT approach is its strong emphasis on organic soil fertility management through the use of composting pits and natural inputs. Farmers are encouraged to systematically collect and compost farm residues, livestock manure, and pruned hedgerow biomass, transforming them into nutrient-rich organic fertilizers [27,45,46]. This practice enhances the activity of beneficial soil microorganisms, preserves soil organic carbon (SOC) levels, and sustains nutrient cycling for long-term productivity. Research shows that composting within integrated farming systems improves soil fertility and resilience. Place and Yessoufou reported that the application of farmyard manure and compost in hilly agroecosystems significantly improved soil structure and nutrient availability compared to chemical fertilizers alone [45,47]. Mando demonstrated that biomass and organic amendments enhanced microbial activity and reduced soil crusting in semi-arid systems [48]. Likewise, Rivero highlighted that compost application increased cation exchange capacity and stabilized organic matter in tropical soils [49]. By reducing reliance on costly chemical fertilizers, composting not only cuts production expenses but also ensures sustained crop yields, improved soil health, and ecological balance across successive planting cycles, reinforcing the long-term viability of SALT-based agroforestry systems.

Ecological Benefits of SALT

SALT delivers multiple ecological advantages, especially in fragile upland ecosystems prone to degradation. One of its

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primary contributions is soil conservation. The use of contour-planted hedgerows composed of fast-growing, nitrogen-fixing species like *Gliricidia sepium*, *Leucaena leucocephala*, and *Flemingia macrophylla* significantly reduces soil erosion, improves water infiltration, and stabilizes sloping terrain [3,9]. These hedgerows intercept surface runoff, reduce sediment transport, and protect topsoil from being washed away during heavy rainfall events [12]. Moreover, the incorporation of pruned biomass and organic matter into cropping strips enhances soil structure and fertility by maintaining soil organic carbon and stimulating microbial activity [35].

SALT also fosters on-farm biodiversity through the integration of diverse annuals, perennials, fruit trees, and multipurpose tree species, which collectively provide habitat for pollinators, pest predators, and soil organisms [8]. When combined with composting of farm residues and manure, the system promotes nutrient recycling and reduces the need for synthetic fertilizers, thereby minimizing nutrient leaching and environmental contamination [17]. Additionally, SALT's use of woodlots and tree-based systems contributes to carbon sequestration, making it a climate-friendly practice that helps mitigate greenhouse gas emissions while supporting sustainable livelihoods [16]. Overall, SALT not only restores degraded lands but also builds ecological resilience and enhances the long-term sustainability of upland farming systems.

Adaptations of SALT

SALT has demonstrated considerable flexibility, allowing for numerous adaptations that make it suitable across diverse agro-ecological zones. One of the most effective adaptations is the selection of context-specific tree and crop species. Hedgerow species such as *Gliricidia sepium*, *Leucaena leucocephala*, and *Flemingia macrophylla* are commonly used due to their fast growth and nitrogen-fixing abilities, yet substitutions are made depending on local soil, rainfall, and elevation [3,9]. In SALT 2 systems, small livestock such as goats, pigs, or poultry are integrated to create a closed nutrient loop. Livestock feed on hedgerow prunings and crop residues, and their manure is returned to the soil, enhancing fertility and diversifying income [9].

Advanced SALT models, like SALT 3 and SALT 4, incorporate high-value fruit and multipurpose trees such as *Mangifera indica* (mango), Citrus spp., *Azadirachta indica* (neem), and *Moringa oleifera* to improve economic returns and household nutrition [16,17]. In areas prone to heavy rainfall or steep gradients, farmers have introduced physical conservation structures like stone barriers, check dams, and dikes alongside contour hedgerows to better stabilize soil and manage runoff [12]. Composting practices are also promoted, using animal manure, crop residues, and pruned biomass to produce organic fertilizer, reducing the dependence on chemical inputs and supporting long-term soil health [35].

Moreover, the flexibility of SALT allows for variation in the width of crop strips (typically 3–5 meters) and the spacing of hedgerows based on slope steepness and erosion risk, ensuring that the system can be adapted to a range of topographic and environmental conditions [8]. These tailored adaptations make SALT not only a soil conservation method but also a comprehensive and sustainable land-use strategy for upland areas.

Challenges of SALT

Despite its many advantages, the widespread adoption of SALT faces several challenges. One of the primary constraints is the labor-intensive nature of its initial implementation. Establishing contour lines, planting hedgerows, constructing barriers, and setting up composting pits require substantial time and labor, which may deter resource-poor farmers [12]. Moreover, economic returns from some components of the system particularly perennial fruit trees and timber may take years to materialize. This delay is a significant barrier for farmers needing immediate income to meet daily needs [17].

Land tenure insecurity is another key issue. Many smallholders in upland areas operate under informal or unclear land ownership arrangements. Without secure tenure, farmers are often hesitant to invest in long-term conservation practices like SALT that require several years of commitment [16]. Limited awareness, technical know-how, and institutional support also hinder adoption. In many regions, extension services are weak or absent, and farmers lack access to demonstrations or training in SALT techniques [8,9].

From a technical standpoint, if not properly managed, competition for light, water, and nutrients between hedgerows and intercrops may occur, especially in cases of dense planting or poor species selection. This can result in reduced crop yields and frustration among adopters [3]. Free-ranging livestock can also pose a threat, as they may damage young hedgerows and fruit tree seedlings, necessitating fencing or protective measures that require additional investment [9]. Furthermore, the system requires regular maintenance, including hedgerow pruning, compost application, and barrier upkeep activities that demand consistent labor and planning, which may not always be feasible for households with limited manpower.

Conclusions

SALT represents a transformative strategy for managing degraded uplands through the lens of agro-ecology and sustainable land use. Its core principles contour-based planting, agroforestry integration, and soil fertility regeneration respond effectively to the pressing challenges of soil erosion, nutrient depletion, and food insecurity. The various SALT models (SALT-1 to SALT-4) demonstrate how this technology can be tailored to meet diverse farming objectives, whether focused on crop production, livestock rearing, orchard management, or forest restoration. The ecological benefits ranging from erosion control and carbon sequestration to biodiversity enhancement and water conservation underscore SALT's potential as both a conservation tool and a livelihood strategy. Nevertheless, its successful implementation depends on overcoming socio-economic and institutional barriers, including high labor demands, insecure land rights, and lack of technical support. As climate change and land degradation intensify, SALT offers a replicable and resilient solution for sustainable upland agriculture, empowering smallholders to restore their land while securing food, income, and ecological integrity for future generations.

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