



Shinyanga landscape with abundant livestock

Abundant livestock feed after Ngitili restoration that provides fuelwood and building timber as well as livestock fodder

Photo: World Agroforestry/Lalisa A Duguma

Suggested citation:

Duguma LA, Minang PA, Kimaro AA, Otsyina R, Mpanda M. 2019. Shinyanga: blending old and new agroforestry to integrate development, climate change mitigation and adaptation in Tanzania. In: van Noordwijk M, ed. *Sustainable development through trees on farms: agroforestry in its fifth decade*. Bogor, Indonesia: World Agroforestry (ICRAF) Southeast Asia Regional Program. pp 139–151.

CHAPTER SEVEN

Shinyanga: blending old and new agroforestry to integrate development, climate change mitigation and adaptation in Tanzania^a

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Highlights

- The Shinyanga landscape was severely degraded by past ‘development’ efforts, but still had recovery potential, ecologically and socially
- Challenges of the Shinyanga landscape were multiple and interconnected, they required a comprehensive approach to tackle them
- A menu of practices associated with the traditional Ngitili system of regulated grazing ensured the multifunctionality of the landscapes providing mitigation, adaptation, development and conservation benefits
- Among the factors for the success of the Ngitili expansion in Shinyanga were:
 - 1) multistakeholders’ engagement and institutional collaborations to leverage resources, knowledge and improve overall efficiency of the actions,
 - 2) long-term investments by financing agencies and long-term commitment by actors,
 - 3) favorable and supportive national and local policy processes,
 - 4) use of local practices and knowledge in the implementation scheme.
 - 5) Ownership of the local community of the processes involved in the restoration efforts

7.1 Landscape level processes and their impact on the changing positions of Ngitili in Shinyanga region

The Shinyanga region, a wide semiarid zone receiving an annual rainfall of 600-800 mm, is located in the Northern part of Tanzania¹. Almost two-thirds of the land in the region is used

^a updated from ASB Policy Brief 40^a

for agriculture and around 24% serves as grazing area. The vegetation of the area is characterized as extensive Acacia and Miombo woodlands that were estimated to cover around 15% of the region's land. The majority of the society residing in this area are agropastoralists (dominantly the Wasukuma people) with livestock rearing being among the major economic activity. The region hosts 20% of the livestock population of Tanzania and around 80% of the households in the area have 20 to 500 heads of cattle per household. The prominence of *Trypanosomiasis*, a livestock disease transmitted by tse tse fly contributed to clearing of the woodlands, a measure taken to control its spread (Box 7.2). This measure has changed the ecosystem abruptly and with time drought and desertification became eminent threats to the whole region.

Box 7.1 Blending old and new institutions to achieve restoration²

When President Julius Nyerere visited the Shinyanga Region in 1984 he was shocked by what he saw. Decades of deforestation and inappropriate land management had turned Shinyanga into the 'Desert of Tanzania.' The president immediately launched the Shinyanga Soil Conservation Programme, widely known by its Swahili acronym, HASHI. The HASHI project helped tens of thousands of smallholders to restore degraded land, and in doing so to significantly improve their incomes. One of the project's great achievements was to revive a traditional system of land management which increases the supply of livestock fodder for use during the dry season. When the project began, there were close to 600 ha of documented ngitili – enclosed fodder reserves – in the region according to local experts who were involved in the HASHI programme. The ngitili provides fuelwood and building timber as well as livestock fodder. Its rapid expansion has brought about a significant increase in biodiversity. Species that had disappeared decades ago are now returning to the landscape. The economic benefits have also been considerable. One study calculated the total monthly value of benefits derived from the ngitili to be US\$14 per person – a significant sum in rural Tanzania. The HASHI project also encouraged farmers to adopt a range of other agroforestry technologies, including the planting of woodlots, fodder banks and fertilizer trees. These, too, have yielded considerable environmental and economic benefits.

HASHI was deeply rooted in the administrative structures of Tanzania's central and local governments, and this helps to explain why it has been such a success. Throughout the 20-year project, staff from the Forestry and Beekeeping Division in the Ministry of Natural Resources and Tourism worked closely with local government staff, researchers from World Agroforestry and the region's entire agropastoral communities. The project encouraged village governments and traditional institutions to work together to restore and manage ngitili. The experiences here, we believe, hold lessons that could be a basis for models to help transform lives and landscapes in many other areas in Tanzania and beyond which have suffered from serious environmental degradation.

"The Shinyanga Region in central Tanzania, formerly extensively forested with dense woodland and bushland species, came to be called 'The Desert of Tanzania'. Drought, overgrazing, political changes which destroyed Sukuma forest protection traditions, cash crop cultivation and the destruction of forests to wipe out the tsetse fly, reduced forest cover, increased soil erosion, and threatened people's livelihoods in the region. Indeed, most of the goods and services provided by trees and woodlands were lost. It took many more hours to

collect fuelwood, the forage badly needed by the oxen was no longer available, and the wild fruits and medicinal plants became rare to find.”³



Cattle grazing in degraded woodlands. Photo: World Agroforestry/Lalisa A Duguma

Box 7.2 Tse-tse fly control as start of land degradation in Shinyanga

The Tse-tse fly problem has been a major factor in the human ecology of sub-Saharan Africa, as its presence determined the border between ecological zones dominated by crops and livestock, slowing down the ‘savanisation’ of forests. Tanzania in the 1920’s became the scene for one of the most drastic measures to deal with the tse-tse fly risk, by eliminating. To the extent possible, all woody growth from the landscapes in which tse-tse flies might hide.

In 1922 Swynnerton reported success in ‘reclaiming’ western Shinyanga by bush clearing. In 1929 a Department of Tsetse Research was formed that experimented with late grass burning (to more effectively control tree regrowth), fire exclusion, discriminative clearing, game destruction, the biological sterilization of the female tsetse flies, and studies on long-term fluctuations in tsetse numbers.

To the east of Shinyanga, a study of coexistence between traditional societies and wildlife in western Serengeti identified four ways in which customary institutions and practices can contribute to current conservation efforts: regulating the overexploitation of resources; complementing the current incentives aiming at diffusing prevailing conflicts between conservation authorities and communities; minimising the costs of law enforcement and; complementing the modern scientific knowledge in monitoring and responding to ecosystem processes and functions.

The ‘villagization’ programme (Ujamaa) implemented throughout Tanzania, also led to a serious shortage of wood for fuel and construction wood resulting in the overexploitation of the remnant forests and woodlands. Understanding the seriousness of the problem, the government began expanding a traditional fodder reserve management system (Ngitili)⁴

together with other agroforestry interventions such as woodlots, boundary tree plantings, etc. This Ngitili based restoration programme (HASHI project (*Hifadhi Ardhi Shinyanga* - Shinyanga Soil Conservation Programme) commenced in the 1980's and has continued since then to cover around 370,000 ha as of 2004 across the 833 villages of the region⁵. Figure 7.1 illustrates the key milestones in the changes in Shinyanga region. In sum, the region has gone through a severe land use land cover change that has had an adverse effect on the ecosystem and the society.

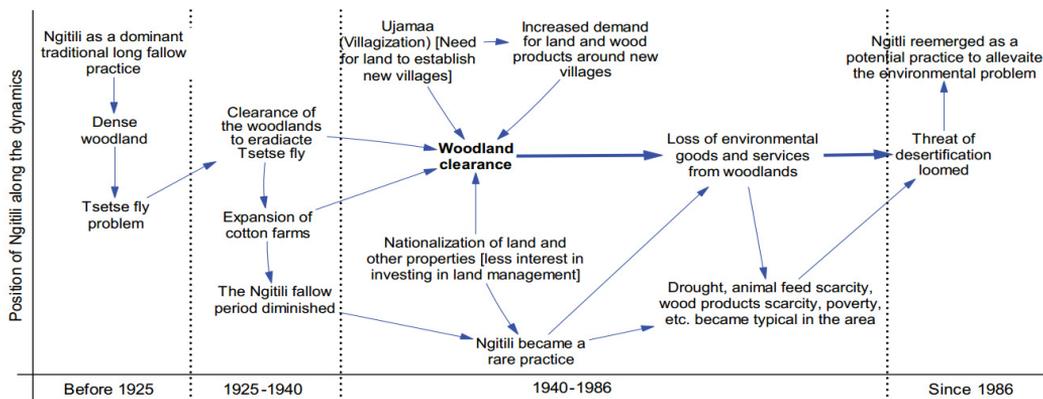


Figure 7.1 Temporal illustration of the position of Ngitili in Shinyanga region and the associated key landscape processes. Note: Recently the Shinyanga region was divided into a number of smaller regions. However, in this brief we refer to the old Shinyanga region when the HASHI project was active

7.2 Menu of land uses in Ngitili dominated landscapes and implications for development, adaptation and mitigation

Table 7.1 shows a synthesis of the role of menus of practices existing in Ngitili dominated landscapes for achieving development, adaptation and mitigation objectives, blending local ecological knowledge⁶ with new policy objectives, technical and social-ecological understanding. Practices such as cotton farming, maize farming, cotton, sunflower farms and livestock rearing were among those having significant positive impacts for development and adaptation benefits though affecting mitigation efforts.

Table 7.1 Relative importance of landscape level practices for development, adaptation and mitigation objectives

Practice	Development objectives	Adaptation objectives	Mitigation objectives
Ngitili	++++	++++	+++++
Maize farming	+	-	-
Cotton farming	++	++	--
Mixed cotton and sunflower farming	++	+++	-
Livestock rearing	++++	+++	---

Practice	Development objectives	Adaptation objectives	Mitigation objectives
Agroforestry (e.g. fertilizer tree systems & woodlots ^{7,8})	+++	+++	++++
Beekeeping	+	+	+
Tree nursery	+	+	+++
Fodder banks	+	+	++

NB: + and - indicate promoting and demoting effects respectively on the objective being examined. The number of +s and -s show the extent of impact.

Ngitili and other agroforestry practices were among those with strong positive impacts for all the three objectives i.e. development, adaptation and mitigation (Table 7.1). Such integrated approaches that involved natural regeneration mechanisms and expansion of agroforestry practices have helped enhance the restoration of the ecosystem as a whole thereby, promoting the provision of ecosystem services. The agroforestry practices minimized the pressure on the remaining forest resources for energy and construction wood⁹. The communities were also able to generate income by raising tree seedlings that are to be planted in the agroforestry schemes.

Other practises that contributed to the climate smart nature of the Ngitili dominated landscapes include:

- Water harvesting in dams using Ngitili vegetation as a protective means/measure against surface runoff and siltation,
- Dry season livestock feed management and income from grazing contracts,
- Growing drought resistant crops like sorghum, cotton and sunflower,
- Use of wild fruits, insects, mushrooms, honey and herbal and tree-based medicines¹⁰ to maintain a healthy society,
- Adoption of improved stoves and biogas for household energy demands with the support of Tanzania Traditional Energy Development and Environmental Organization,
- Rainwater harvesting from rooftops for the purpose of growing vegetables,
- REDD+ piloting to reduce GHG emissions¹⁴.

Figure 7.2 shows linkages, interconnections and pathways of impact among the dominant practices identified in the Ngitili dominated landscapes and how they relate to adaptation and mitigation efforts besides providing other basic developmental and conservation objectives.

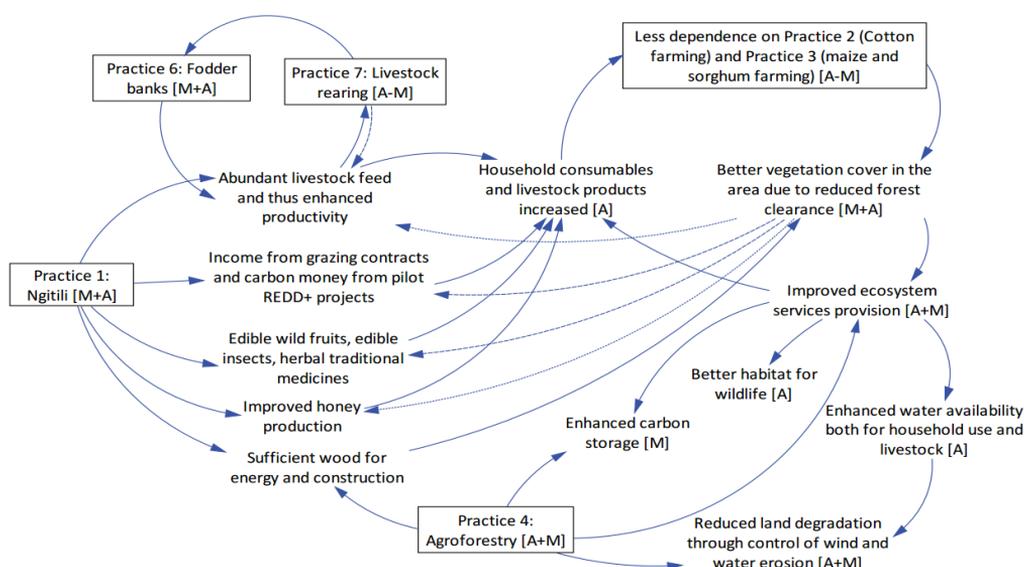


Figure 7.2 The interconnectedness of various practices in Ngiti dominated landscapes in relation to climate change adaptation and mitigation and development needs of the community. Practices are put in boxes. Broken arrows show indirect reverse positive impacts. A - Adaptation, M - Mitigation, A+M - Practices contributing positively to both adaptation and mitigation, A-M - A practice which by nature is an adaptation but negatively affecting mitigation



Restored degraded areas after long-term investments. Photo: World Agroforestry/Lalisa A Duguma

7.3 Multifunctionality of Ngiti dominated landscapes: set of indicators

Climate smart landscape refers to processes that entail strategic planning in which a set of sustainable intensification and sustainable land management practices are prioritized and supported through policy and investments to simultaneously address climate, environment and development objectives. Table 7.2 presents how Ngiti dominated landscapes are

evolving into climate smart landscapes; using a set of functions and respective indicators that justify multifunctionality of the landscapes.

Table 7.2 Indicator sets eliciting the importance of the Ngitili system for development, climate change mitigation and adaptation and biodiversity conservation at a landscape level, summarized from an IUCN study¹¹

Key functions	Specific indicators	Quantity/number
1. Consumables from/associated with Ngitili (Annual consumption per household)	Vegetables	78.9 kg
	Edible insects	10.9 kg
	Milk	533.7 litre
	Bush meat	14.00 kg
	Mushroom	30.3 kg
	Honey	33.4 litre
2. Economic value of Ngitili (as of 2004)	Fruits	30.4 kg
	Average value per person per year	168.57 USD
3. Carbon sequestration	Change in C stock 1986-2004	17 Mton C
	Carbon in all pools within Ngitili	47.1 t/ha
4. Biodiversity conservation after Ngitili restoration	Bird species re-emerged	22-65
	Mammal species re-emerged	Up to 10
	Plant species (trees, shrubs and climbers) recorded in the restored Ngitilis	152

7.4 Multi-stakeholder engagements and long-term commitments in restoring Ngitili in Shinyanga Landscapes: Actors, roles and responsibilities

The success of the Ngitili system is the result of a multistakeholder engagement process over a long period of time. The various stakeholders brought in various expertise, resources and motives to foster the recovery of the Shinyanga landscapes. The strong commitment by the local government, national government and international donors and actors is exemplary. For example the Norwegian Agency for Development Cooperation (NORAD) committed itself in supporting the HASHI Programme on a long-term basis and in establishing institutions and local capacities and infrastructures that continued functioning even beyond the programme. World Agroforestry (ICRAF) was among the key actors involved in the programme from the beginning through provision of technical support to NAFRAC (Natural Forest Resources and Agroforestry Management Centre) and through generation of appropriate agroforestry technologies that complement the Ngitili.

Those at the local and national levels were also engaged and committed in facilitating the Ngitili restoration and management. For example there are numerous local traditional and formal institutions with considerable roles in fostering the protection, development and use of the Ngitili landscapes. Table 7.3 highlights, the key stakeholders and their roles and responsibilities in the transformation of the Shinyanga region with the help of Ngitili. There was also a strong political support and will in restoring the Ngitili system dating back to the inception of the HASHI programme in 1984 by the then president of the country, Julius K. Nyerere.

Table 7.3 Synthesis of the main actors and their roles and responsibilities in Ngitili restoration and management in Shinyanga region

Type	Institution	Roles and responsibilities in Ngitili development or management	
Local traditional institutions	Dagashida	Decision making, developing bylaws ¹² , organizing cultural events	
	Sungusungu	Securing the communities and their properties, law enforcement	
	Elder's council	Mediates between traditional and formal institutions Advices the formal institutions e.g. Hamlet leadership	
	Basumba Batale	A group of middle-aged men whose responsibilities are arresting and bringing to charge wrong doers.	
Local formal institutions	Village government	Establishes and institutes local by-laws without contradicting those of the traditional institutions Participate in conflict resolution when issues are not resolved at community level	
	Hamlet leadership	The arm of the village government closest to the community and is actively engaged in Ngitili management usually by enforcing local and formal by laws	
	Environment committee	A committee established by decree to give responsibility of protecting local environments to local communities.	
	Village Ngitili committee		Responsible for day to day management of the Ngitili system
			Implements activities, monitors and reports the development of Ngitili, manages the benefits from Ngitili, maintains the cash flow (revenues and expenditures from the Ngitili) Determines use rights for grazing, fuelwood, construction, etc.
Regional, National and Global institutions	NAFRAC - <i>Natural Forest Resources and Agroforestry Management Centre</i>	Provided technical and infrastructural support to promote Ngitili	
	TaTEDO - <i>Tanzania Traditional Energy</i>	Promoted energy efficient technologies to reduce GHG emissions.	

Type	Institution	Roles and responsibilities in Ngitili development or management
	<i>Development and Environmental Organization</i>	
	DASS - Development Associates Ltd	Conducted carbon monitoring and accounting in Ngitili systems
	Sokoine University of Agriculture	Conducted research on various aspects of Ngitili and other land use
	NORAD - Norwegian Agency for Development Cooperation	Has been the main donor of the HASHI programme for promoting Ngitili in Shinyanga
	ICRAF	Assisted in developing and implementing agroforestry practices complementary to Ngitili, Strengthened local capacities

Currently the Ngitili land management system is being institutionalized in the government system as community-based forestry management under the pilot REDD+ being implemented in the region. The REDD+ project has made considerable progress in introducing community forest management practices into the Ngitili land management systems and organizing owners into formal learning groups to ensure sustainability of the system. A study¹³ of the economic feasibility of sustainable smallholder bio-energy production in the eastern part of Shinyanga region found that rotational woodlots were the most profitable and provided the highest return to labour; they thus complement Ngitili in which rates of biomass production are modest.

7.5 The bigger picture: implications

Our retrospective analysis of the Ngitili system experience in Shinyanga region has given us the opportunity to learn how targeting land use practices that can simultaneously contribute to multiple objectives could help achieve climate smart landscapes. The lessons from this case in Tanzania also provide a good basis for some of the AFR100 landscape restoration targets. Though our analysis is preliminary, it demonstrates a number of lessons for climate smart landscapes:

- a) It confirms that designs based on local knowledge and practices can contribute to the success in achieving climate smart multifunctional landscapes.
- b) Policy processes and financial mechanisms at national level that support local level actions (including agroforestry)¹⁴ are necessary to make climate smart landscapes a reality.
- c) Land use planning that takes into account trade-off and synergies between climate change mitigation, adaptation to climate change, livelihoods, and biodiversity conservation is necessary to make landscape level actions effective and efficient.

- d) d) Local ownership of restoration interventions is crucial as the community are have to be the one to continue working on the investments after projects leave the landscape.
- e) e) Community preferences for restoration interventions and for restoration objectives should be an integral part of the intervention design to make restoration efforts successful.

Box 7.3 Policy recommendations

- More efficient and equitable policy instruments need to be developed to allow the integration of mitigation and adaptation through land use practices that enable simultaneous contributions to livelihoods, biodiversity conservation, etc.
- A co-investment mechanism which engages the private sector; and combinations of financial instruments such as REDD+ (Reducing emissions from deforestation and forest degradation) and payment for ecosystem services (PES) are necessary to sustain the current promising efforts.
- Land-use planning that links landscape level actions to national and subnational policies and strategies is the key to support integrated development and investment in resource management. Such plans should ensure the following:
 - a) Define the thresholds of expansion to maintain the ecological balance in the landscapes where Ngitili systems are expanding very fast.
 - b) Enable linking landscape level experiences and actions to the national processes such as the National Adaptation Plans of Action, and the National Strategy for Growth and Reduction of Poverty of Tanzania.

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