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Agrarian changes in the Nyimba District of Zambia

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Summary

Over the past decade issues pertaining to land sharing/land sparing have gained some space in the debate on the study of land-use strategies and their associated impacts at landscape level. State and non-state actors have, through their interests and actions, triggered changes at the landscape level and this report is a synthesis of some of the main findings and contributions of a scoping study carried out in Zambia as part of CIFOR's Agrarian Change Project. It focuses on findings in three villages located in the Nyimba District. The villages are located on a high (Chipembe) to low (Muzenje) agricultural land-use gradient. Nyimba District, which is located in the country's agriculturally productive Eastern Province, was selected through a two-stage process, which also considered another district, Mpika, located in Zambia's Muchinga Province. The aim was to find a landscape in Zambia that would provide much needed insights into how globally conceived land-use strategies (e.g. land-sharing/land-sparing trajectories) manifest locally, and how they interact with other change processes once they are embedded in local histories, culture, and political and market dynamics.

Nyimba District, with its history of concentrated and rigorous policy support in terms of agricultural intensification over different epochs, presents Zambian smallholder farmers as victims and benefactors of policy pronouncements. This chapter shows

the impact of such policies on the use of forests and other lands, with agriculture at the epicenter. Such outcomes will be compared with the experiences of other households and farms in five landscapes in Burkina Faso, Ethiopia, Cameroon, Bangladesh and Indonesia. The results of this scoping study will provide a basis for a comparison of the various scenarios of agricultural modification, productivity, changing forest cover, dependency on forest resources, and integration with local and global commodity markets found across the six focal countries of the Agrarian Change Project.

7.1 Introduction

In Zambia, agrarian change is closely intertwined with forest and other land-use changes that can in turn be related to the country's pre-colonial (pre-1898), colonial (1898–1964) and post-independence (post-1964) epochs (Wood et al. 1990; Chileshe 2005; Moyo and Yeros 2005; Sitko and Jayne 2014). As argued by Bates (1984), in each of these phases the interplay within and among issues central to agrarian change defined macroeconomic policies, commercialization of smallholder agriculture, development programs, and extension and service delivery, and often sets the trajectory of change. The agriculture sector received a lot of support in each of these historical epochs, as this was viewed as presenting the greatest opportunity through which change in the lives of smallholder farmers could be effected (Momba 1989; Mellor 1995; World Bank 1996; GRZ 2002; Sitko and Jayne 2014). Throughout these epochs, smallholder farmers¹ were and are still the primary focus for policy action and programming as seen through their exclusion (colonial) (Zgambo 1983), inclusion (post-independence) (Pletcher 1986) or as active participants in the market-led post-structural adjustment program (SAP) (Machina 1996; GRZ 2013; Sitko and Jane 2014).

The entire rural development thrust has, over the years, continued to be the vanguard of development with programs such the Zambia Agricultural Investment Support Programme and lately the Farmer Input Support Programme (FISP) – previously referred to as the Fertilizer Support Program – providing the strategic direction for agriculture (World Bank 1995; GRZ 2004, 2008; CSPR 2005; Mason et al. 2012, 2013; Mofya-Mukuka et al. 2013). In most cases, these programs became the guiding light for development programs (Kakulwa 2012). In an attempt to move away from what has been viewed as a political social contract between smallholder farmers and the State, and also viewed as public sector sponsored out-grower scheme, the government has been increasingly calling for the involvement and participation of the private sector (EDF 1994; World Bank 1996; Chapoto et al. 2013; Sichoongwe et al. 2014). Cash crops, such as cotton and tobacco, have been presented as part of a strategy to diversify smallholder farming. Contracts with private sector companies cover the provision of both inputs and access to markets. Lately, the National Agricultural Policy, as well as the National Agriculture Investment Plan 2014–2018 have called for strong private sector involvement (Chapoto et al. 2013; GRZ 2004, 2013). Smallholder farmers currently work through these two arrangements and these strongly influence the direction of agrarian change in the country.

1 The sum total of small-scale and emergent farmers (i.e. cultivating 0.1–20 ha) are referred to as 'smallholders' while farmers cultivating more than 20 ha are known as 'large-scale' farmers (Sitko and Jayne 2014).

Yet, much as agriculture has been at the forefront of development, other sectors have also had policies guiding sector activities. Non-agricultural policies coming into effect in the same historical epochs relate to lands (GRZ 2006), forests (GRZ 1998a), wildlife (GRZ 1998b) and national policy on the environment (GRZ 2007). In the forest sector, forest action plans (GRZ 1998c) and joint forest management (JFM) guidelines which sought to bring smallholder farmers into forest management (GRZ 2005) did not progress due to lack of clarity on benefit sharing as well as the non-implementation of the 1998 Forests Act, which was meant to authorize the establishment of JFM areas. Unlike agriculture where incentives were clear, community members under JFM did not have legal access or use rights to the forest and saw no need to support the initiative. Lately, experiences obtained from policy engagement over the epochs have led to the formation of a community-centered forest policy (GRZ 2015). Programs have also been developed such as the National Biodiversity Strategy and Action Plan and the National Biodiversity Strategy and Action Plan Two (GRZ 1999, 2015) to address conservation and management of biodiversity in an environment where agriculture is being favored through significant state investment in maize production (Sitko and Jayne 2014). The negative social and environmental impacts of agriculture were largely ignored and the unraveling unfair distribution of land triggered by these policies was not addressed, for example informal land markets that not only disadvantaged some farmers but also weakened customary authorities (Chimhowu and Woodhouse 2006; Sitko 2010). In the same vein, traditional authorities, such as chiefs and headmen/women who throughout these epochs granted usufruct² rights to individuals, found themselves powerless to prohibit the buying and selling of this land (Ranger 1983; Berry 1993).

The implications of the agriculture policies that were enacted in the colonial, post-colonial and structural adjustment periods in Zambia are examined in selected villages in the Nyimba District. The three villages of Muzenje (forested); Chifukuzi (medium forested) and Chipembe (sparsely forested) were selected on an agricultural intensification continuum from the district's plateau (≥ 900 masl) to the valley (≤ 600 masl). The differences in the levels of forest cover appear to be the result of the extent to which each village has been exposed to agriculture support programs.

7.1.1 National context of agrarian change in Zambia

The existence of multifunctional landscapes that simultaneously provide food security, livelihood opportunities, maintain species and ecological functions, while fulfilling cultural, aesthetic recreational needs is widely recognized in Zambia (GRZ 1999; Dalal-Clayton and Child 2003). The management of land and resources for agriculture, grazing, forest production, water and all other uses are closely interconnected. However, as modern agriculture develops, due to pushes by the government, both farmers and policymakers have focused largely on the farm. These actors have mainly sought to maximize productivity and address food security and poverty issues, without due regard for impacts on other land uses, for example forests. Agriculture is a dominant land use in Zambia, particularly the production of hybrid maize and cash crops such as cotton and tobacco, and has been at the forefront of the country's development thrust. However, this poses a challenge in terms of linking agricultural practices, institutions and policies with other landscape activities.

2 Usufruct: legal right to use another property, in this case land.

Agrarian change in Zambia has been driven by the introduction of improved maize seed varieties among smallholder farmers in the 1970s leading to an increased use of agricultural inputs such as fertilizers and sedentary agriculture among smallholder farmers. Maize is an important crop in Zambia and pre- and post-independence agricultural policies have centered on increasing its production to meet urban demand, especially in the country's copper mining towns (World Bank 1995; GRZ 2004). The role of the smallholder farmers has been central to these efforts. Whatever achievements have been realized through this, the opening up of forests for agriculture stands today as one of the country's primary drivers of deforestation (Chileshe 2001; MTENR 2007; GRZ 2010).

In Zambia, agriculture has been highlighted as the number one strategy for poverty reduction (GRZ 2002). As such, the process of agrarian change can be seen through attempts to convert smallholder shifting cultivation households into sedentary farmers that are active in agricultural markets (World Bank 1995; GRZ 2004, 2013; Mofya-Mukuka et al. 2013; Sitko and Jayne 2014). This has been achieved through an implementation of tailor-made agricultural policies for smallholder farmers. While colonial policies limited agricultural development for native smallholders (Zgambo 1983), post-colonial policies like extension training and visiting, agricultural research and pan-territorial pricing, helped boost agricultural production (Kumar 1994; World Bank 1996; GRZ 2013). The realignment of these institutions and withdrawal of the services provided after the economic structural adjustment presented a new turn in agrarian change as farmers sought new livelihood strategies (Machina 1996). These included opening up forests for additional arable lands or relocation to new areas, where settlements were set up and new lands were opened up for agriculture, leading to loss of forest resources (GRZ 2010). This was a component of previous strategies but was dropped as farmers gained easier access to fertilizers.

7.1.2 Policy and agrarian change in Zambia

As with most countries, policies aimed at maintaining forest cover, protecting biodiversity and increasing agricultural production often combine to drive landscape change. Prior to 1964, efforts were made to develop agriculture among smallholder farmers, but agricultural and related policies, like land alienation and dual-pricing systems, were structured to benefit settler farmers (Zgambo 1983; Chileshe 2005; Moyo and Yeros 2005). This contributed to the underdevelopment of smallholder agriculture. After 1964, the Zambian government promoted policies that encouraged smallholder farmers to participate in agricultural markets. These policies were, on one hand, aimed at guaranteeing increased income for smallholder farmers, while, on the other hand, keeping maize prices low for urban consumers (Momba 1989). This meant heavy financial support from the government. Key features of these post-independence policies include provision of extension services, introduction of fertilizer subsidies and credit facilities for smallholder farmers (World Bank 1995; Chomba 2004; GRZ 2004).

Policies in the forest and wildlife sectors also impacted smallholder farmers. Prior to the colonial period, the management and use of forests and wildlife were under the control of traditional authorities. The first form of wildlife legislation in Zambia was the Ostrich Export Prohibition in 1912, which was followed by the Plumage Bird's Protection

Ordinance of 1915 (Chomba et al. 2011). The game (wildlife) ordinance of the 1930s vested all wildlife in the state and provided for the delineation of game reserves, such as North Luangwa in 1935, which was later turned into a national park in the 1940s. One of the largest national parks in the country, the Kafue National Park was created in 1950 (Chomba et al. 2011). The 1960s also witnessed the enactment in 1965 of the country's first forest policy in Zambia, which consisted of a set of instructions to the Forest Department. Under this policy, an exclusive mandate over forest protection was given to the government. This covered the management of forests, especially forest reserves, and forests were subsequently policed by forest guards (Chileshe 2001).

The development of these policies and legislation was driven by a global commitment toward the protection of biodiversity. It resulted in the creation of 432 forest reserves (4 of which are in Nyimba District), 59 botanical reserves, 2 bird sanctuaries, 19 national parks and 34 game management areas (part of the West Petauke Game Management Area is in Nyimba), in total covering an area of over 30 million ha (GRZ 1999). Most of these were excised from customary land, thereby reducing the amount of land available to smallholder farmers and restricting access to the wildlife and other resources that they had previously enjoyed. The early forest policies had no provisions for participatory forest management, but a new policy was formulated in 1998, supported by the Forest Act of 1999, aimed at promoting a participatory approach in management, planning and protection of forests, among other things (Chileshe 2001).

Flagrant disregard of laws protecting conservation areas combined with a laxity in enforcement has led to encroachment onto these protected areas as smallholder farmers expanded their agricultural fields (GRZ 2007). Encroachment onto protected areas can also be seen from the point of view of land claims being made by the local farmers who consider these areas as lands they lost as part of the drive for conservation (Anderson and Grove 1989; Hansungule et al. 1998). The SAP in Zambia led to massive retrenchments forcing some people to occupy protected areas next to urban areas (Palmer 2001). Agricultural expansion has been identified as one of the leading causes for loss of forest cover (GRZ 2010). In recent years, efforts have been made to formulate policies aimed at reducing forest loss and are bolstered by the 2007 national policy on the environment. This categorically states that increased agricultural production should be based on improved agricultural systems as opposed to land expansion (GRZ 2007).

7.1.3 Selection of focus landscape

The search for a landscape where the Agrarian Change Project could be studied started with a collation and review of information on agriculture, forests and other land-use changes across four districts. These included Chadiza (2674 km²), Nyimba (10,509 km²), Mpika (40,935 km²), and Mumbwa (21,103 km²), which are located in the Eastern, Muchinga and Central provinces of Zambia (Figure 7.1), respectively. In addition, smallholder farmers located in these districts have diversified their agricultural activities to include the growing of cash crops such as tobacco and cotton through a combination of public and private sector support.

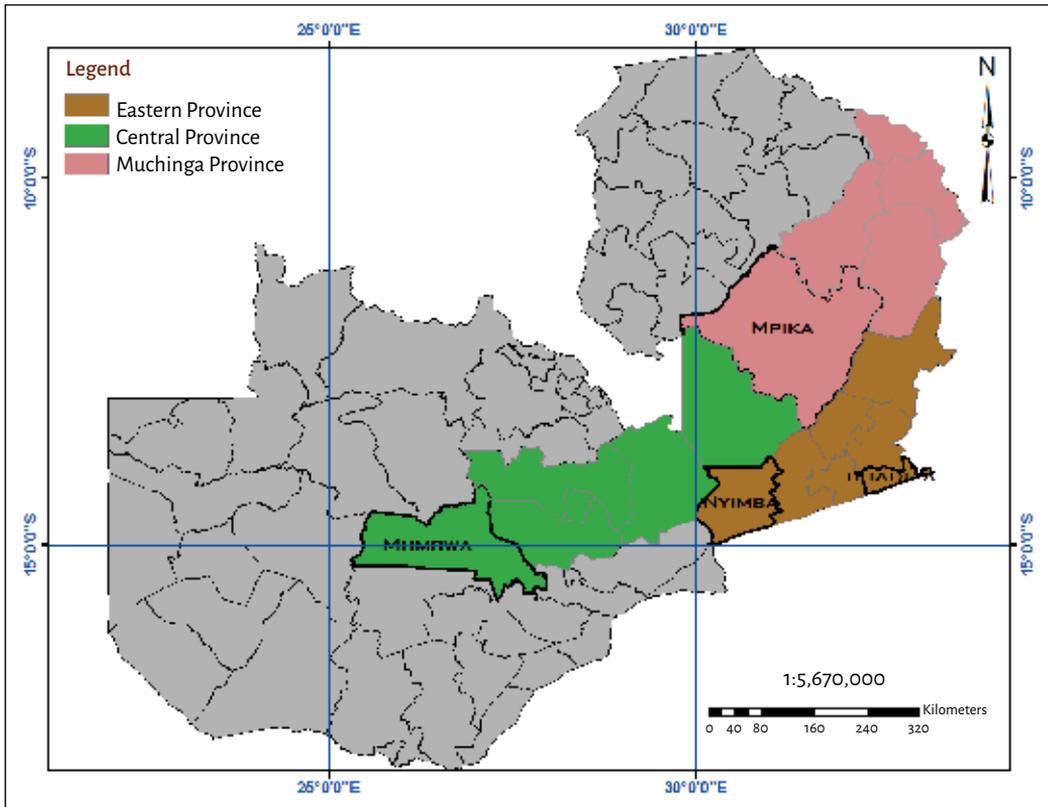


Figure 7.1 Districts considered for the Agrarian Change Project.

While similarities were noted among these districts, data and information collated pointed toward the need for a greater focus on Mpika and Nyimba Districts. To this end, a number of technical field visits and consultations with district-based experts were organized to these districts. The first of such visits was made to Mpika by a combined team from CIFOR Lusaka and Bogor. The Mpika visit presented the first opportunity to develop criteria for the selection of a landscape that would be tested on the ground. Zambia-based staff applied the same criteria in Nyimba a month later and benefitted from the fact that the same team had been implementing a project in Nyimba for 24 months.

In Mpika District, site visits were undertaken to villages and settlements around Mpika District center, including Lwitikila National Forest Reserve. Discussions with district and provincial government officials had led the team to conceptualize that changes in both forest cover and extent would be apparent as one moved away from the forest reserve into the villages. In addition, the district technocrats had also highlighted that older villages had, over time, received support (public or private) for agricultural activities such that they would have in place the necessary support infrastructure (e.g. cooperatives, extension and out-grower schemes) to carry out agricultural activities. The same technocrats reported that these villages would have good access to improved

seed varieties, access to draught power and agrochemicals, as well as markets, which, over time, have resulted in substantial forest areas being brought under cultivation leading to low forest extent and cover. Thus, the team sought to test whether this was true through observations and further discussions with farmers.

Mpika National Forest, which is 28.11 km² in extent and shares a boundary with the district administrative center of Mpika. Personnel from the Forestry Department claimed that the forest has not only been a major source of construction timber, firewood or charcoal, but had been heavily encroached upon so much that some sections had been de-gazetted (excised from the reserve) and turned into residential stands. Mpika Forest Reserve has a limited rural hinterland and the dynamics of forest loss were more related to pressure and demand for land from the inhabitants of the district center. Encroachment started with land being turned into arable fields and, over time, conversion into residential stands. The team concluded that the site was not suitable for an agrarian change project as no continuum of spatial change in forests outside of the forest reserve could be observed. The team shifted its focus onto the 1050 km² Lwitikila National Forest, which shares borders with the chiefdoms of Kopa and Luchembe (see Figure 7.2). Chiefdoms are areas under the jurisdiction and control of a traditional

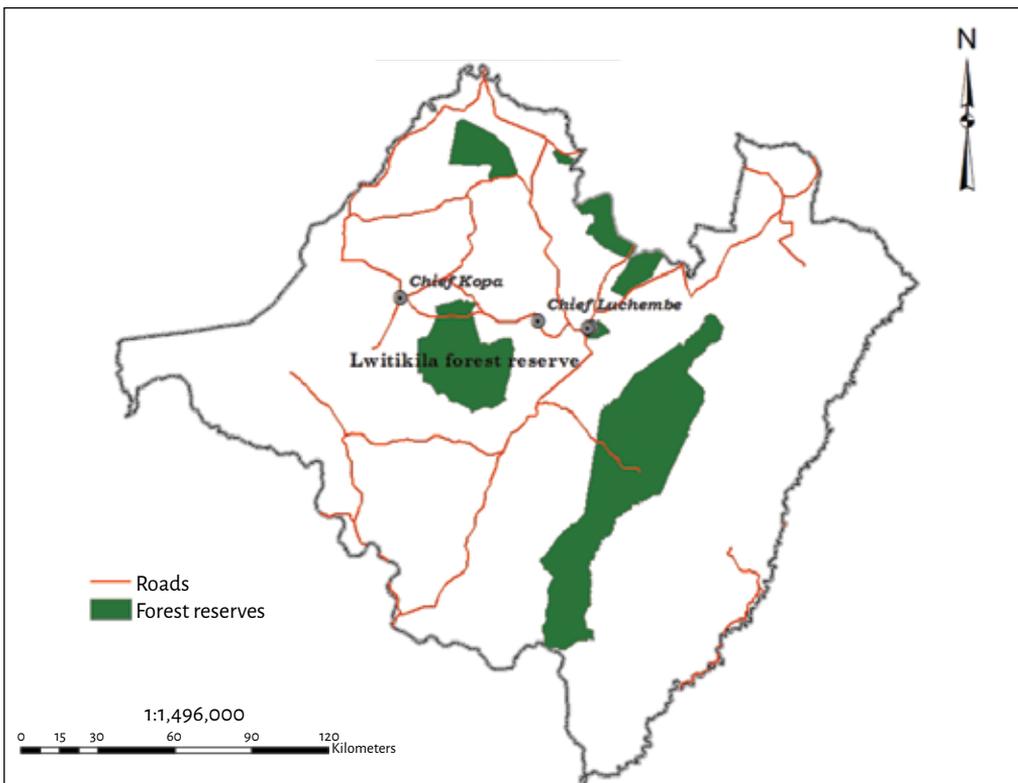


Figure 7.2 Mpika District showing Lwitikila National Forest No. 291.

leader (chief), made up of several villages of people of the same ethnic background. While chiefs can allocate land for agriculture to individual households, their greater power lies in being custodians of the chiefdom's natural resources management (Ranger 1983; Herbst 2000; Chikulo 2009). In this instance, both Chief Kopa and Luchembe, and their respective headmen or women, had been allocating land to their inhabitants against the wishes of central government in terms of agriculture. In support of central government, these chiefs have encouraged farmers to move away from shifting cultivation to more sedentary agriculture (Kakeya et al. 2006). With these issues in mind, the team examined how arable fields and forest cover varied with distance from the Lwitikila Forest Reserve in those areas abutting the sides of the chiefdoms.

Forest cover was noted as varying with distance from the forest reserve in both chiefdoms. Brief discussions with locals showed that the level of agricultural support and the levels of agro-input use, for example improved maize seed varieties and associated agrochemicals, were behind the changes. Implied in this was the issue of the history of agricultural expansion into forests, which has been highlighted as one of the drivers of deforestation in Zambia (GRZ 2010). This confirmed the existence of an agricultural intensification continuum where sparse tree vegetation was noted in the older and more settled villages, while those closer to the forest reserve still had some forests on them. Discussions with older members of the villages indicated that there was some knowledge of the three historical epochs, i.e. the colonial, post-independence and structural adjustment periods, and how the policies associated with them had influenced agriculture and related activities had been carried out over the years. This offered a partial explanation as to how agricultural activities had led to the conditions described above.

The observations made by the team meant that the land-use zone selection criteria stipulated by the experimental design of the Agrarian Change Project could be fulfilled through the use of an agricultural intensification continuum in Zambia.

Without losing the essence of the project's original land-use zone selection criteria, detailed criteria specific to Zambia were developed and further reviewed in Lusaka (see Appendix 7A). These criteria were applied during the technical visit to Nyimba District³ by the CIFOR Lusaka team and combined with existing field knowledge and data available on the two districts. A comparative analysis was carried out for Mpika and Nyimba Districts. Initial analysis showed that there was very little separating the two landscapes and after conducting a SWOT (strengths, weaknesses, opportunities and threats) analysis on both potential landscapes (Table 7.1), Nyimba District was chosen as the study landscape.

7.1.4 Geographical context

The Nyimba District, which was chosen as the landscape for study, is 10,509 km² in area and is located in Eastern Province of Zambia. It is the second largest district in this province (see Figure 7.3). The agrarian history of Nyimba cannot be separated from that of Zambia's Eastern Province and therefore some brief aspects pertaining to the Eastern

3 The Zambia team also benefitted from prior knowledge and data from a project the team had completed in 2014.

Table 7.1 Strengths, weaknesses, opportunities and threats (SWOT) analysis used to compare Mpika and Nyimba.

District	Strengths	Weaknesses	Opportunities	Threats
Mpika	<ul style="list-style-type: none"> Relationship established with the district agricultural coordinating officer (DACO) and district forestry officer CIFOR holds a database on shifting cultivation in three villages Creation of new sites, additional operational area, additional data and relationships 	<ul style="list-style-type: none"> Limited district level baseline data except for three villages No project structures in place Costly exercise to establish such structures (recruiting and training of research assistants) 	<ul style="list-style-type: none"> Creation of additional database for selected villages Enrichment of organization's profile - additional study sites Potential of conducting a new study on the social economic impact of the Zampalm oil palm plantation on local communities Creation of new partners (traditional leaders, NGOs, government officials) 	<ul style="list-style-type: none"> Study time is limited and not long enough to establish a presence; distance between Lusaka and Mpika is a constraint (long travel time – dead mileage) No existing relationship with communities 75–100 households targeted per zone for the household survey may not be found (population sparsely distributed)
Nyimba	<ul style="list-style-type: none"> Strong relationships with stakeholders in the district (e.g. with the District Commissioner, DACO, District Forestry Officer, Zambia Wildlife Authority, and chiefs and communities in 8 villages) Biophysical and social economic databases available Secondary data on agriculture available 	<ul style="list-style-type: none"> Access to some households would be a challenge Shift by CIFOR from a forest focus to agriculture research may be a challenge for some of the community to understand Familiarity with institutions could lead to working on assumptions 	<ul style="list-style-type: none"> Enriching existing CIFOR database on Nyimba Entrenching our work Demonstration of commitment to existing partners Strengthening relationships with stakeholders Linkages with miombo sentinel landscape work 	<ul style="list-style-type: none"> Over familiarization may affect probing and robust questioning Research becomes less rigorous Maintaining existing incentive systems (which must be increased) is a challenge

Province are covered here. The Eastern Province of Zambia sits on the country's Eastern Plateau, at an altitude of ≥ 900 masl with a small section of the province located in what is known as the Luangwa valley (part of the Rift Valley) at an altitude of ≤ 600 masl. The Eastern Province was one of the country's first areas to grow improved maize varieties and use chemical fertilizers. Used initially by the province's large-scale farmers in the early 1960s, such technologies would only come to smallholder farmers a decade later, until then they continued to grow traditional maize varieties (Harvey 1973; Kumar 1994; Rainer et al. 1999). The post-independence period witnessed a greater focus on improving the livelihoods of smallholder farmers through agriculture (Sitko and Jayne 2014). This meant that the maize production base was expanded in the Eastern Province

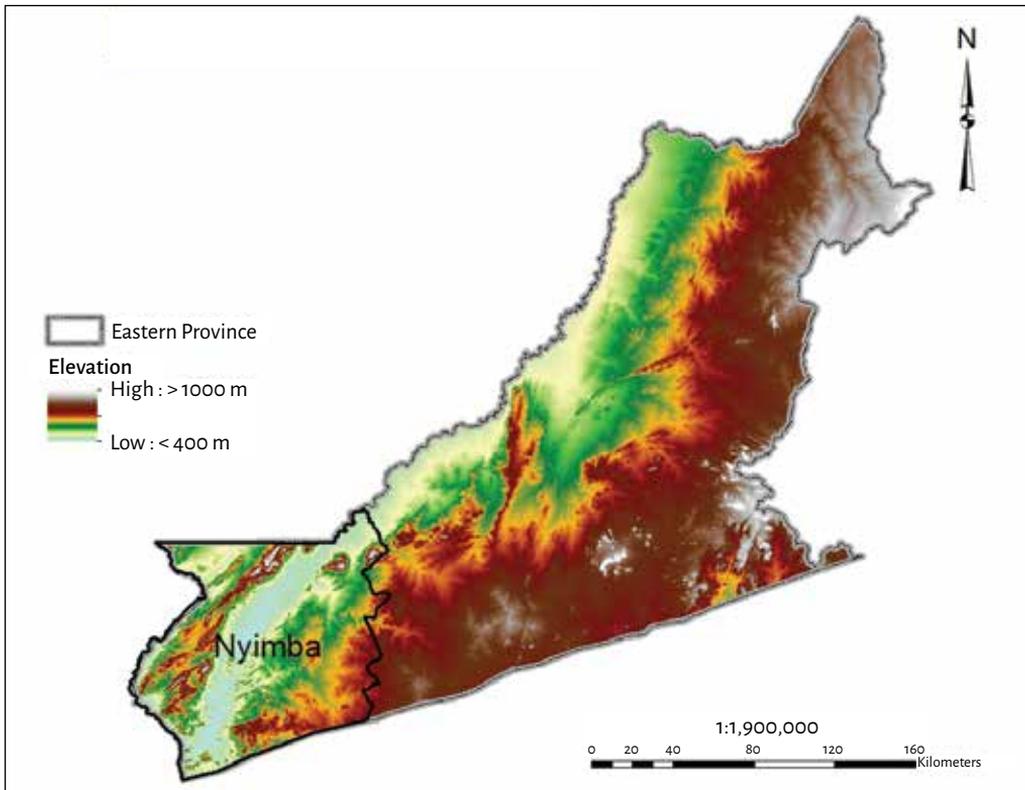


Figure 7.3 Eastern Province elevation.

so much that by the late 1980s and early 1990s, the province had earned the title of the nation's maize basket (Saasa 2003). This trend has continued and as late as the 2009/2010 cropping season, some 20% and 40% of smallholder farmers used hybrid seed and fertilizer, respectively, and produced 420 tons of maize in the same season (Tembo and Sitko 2013). Agrarian change across Zambia has largely been seen through the adoption of improved maize varieties, agrochemical use and increased utilization of draft power by smallholder farmers (Kumar 1994; World Bank 1995; Saasa 2003; GRZ 2004, 2013; Sitko and Jayne 2014).

7.1.5 Historical context of agrarian change in Eastern Province

The agricultural scene in the Eastern Province is dominated by productive smallholders who are also involved in livestock production. The province has higher population density (30.9 persons/km² compared to the national average of 17.4 persons/km²) and lower land availability than other provinces in the country (CSO 2010). The province is one of the most important agricultural regions in the country where smallholder farmers have excelled since independence in 1964.

Landscape change in the Eastern Province started with the arrival of the Chewa in the 15th century. They were later followed by the Nsenga, Ambo and Wiza ethnic groups (Zgambo 1983). The native farmers practiced a form of shifting cultivation known as the 'Eastern Plateau Agricultural System' (Tembo 2011). Under this system, crops were planted on mounds and in most cases finger millet and maize were the first crops planted in the first season. Groundnuts, beans and cowpeas were planted alongside maize later in the planting season. Planting in the subsequent seasons followed a similar pattern, with the exception of millet whose planting was not normally repeated on the same pieces of land (Zgambo 1983; Tembo 2011). Planting on each field site was repeated for 4 to 5 years, after which the site would be abandoned and left to fallow for a period of 25 to 30 years for fields on poor soils and 20 to 25 years for richer soils (Tembo 2011).

In 1898, colonial authorities set about dismantling the traditional shifting cultivation practiced by the native communities as it was considered wasteful and damaging environmentally. They sought to change this approach by limiting the amount of land available to smallholder farmers and introduce a native agricultural development program. Land available to smallholder farmers was limited through the declaration and creation of native reserves in 1906 (Zgambo 1983). By 1928, native reserves covered an area of over 8000 km². These reserves were located in areas with poor soils. Population increases in these reserves led to competition for land for shifting cultivation, and the long fallow periods required to restore soil fertility could no longer be accommodated (Zgambo 1983). The Eastern Plateau agricultural system was only suitable for populations of not more than 9 persons per km², while population densities in some reserves were as high as 31 persons per km², forcing smallholder farmers to cultivate the same fields year after year without fallowing, and therefore not allowing for the revitalization of soils. Continuous cultivation of native lands led to soil nutrient loss, removal of tree stumps and elimination of coppicing and regeneration of forest resources (Tembo 2011).

As noted under the general discussion of policies, additional policies were introduced banning the hunting of game, which in turn resulted in increased wildlife populations and tsetse fly re-infestation. This led to a significant decline in the number of livestock units owned by native communities (Tembo 2011). Prior to 1911, colonial authorities made efforts to develop native agriculture, with the aim of ensuring a cheap food source for the settlers and later mining towns. In addition, by improving the livelihoods of native Africans they too would be able to pay taxes. This was done through distribution of Irish potato and vegetable seed and the promotion of cotton farming among the native farmers (Tembo 2011). However, the failure of cotton trials and pursuit of land alienation policies meant that African agriculture remained largely abandoned and restricted to the growing of maize.

Following the tobacco boom of 1914, it was anticipated that a large number of white settler farmers would come to the Eastern Province of Zambia to engage in tobacco farming. This did not occur as prices in the tobacco markets fell in the 1920s (Tembo 2011). By 1931 only 1600 km² (15%) of the 9000 km² of the land reserved for white settlers had been occupied. The rest of the land was underutilized and had reverted to bush

only suitable for wildlife and tsetse fly. The presence of tsetse fly meant the unoccupied area could not be used for cattle rearing, thus providing a level of forest protection. The pre-independence period presents a scenario where, on one hand, native reserves were overcrowded and forest resources were degrading, while on the other, trust lands were largely unoccupied and had thus reverted to forest.

The great economic depression of the 1930s led to a sharp decline in demand for copper, resulting in decreased demand for agricultural produce in the mining towns. Settler farmers switched to maize production, but faced stiff competition from the native smallholders who also grew maize, albeit using traditional maize varieties. In order to eliminate this competition, the colonial government introduced the maize control act of 1931, which led to the creation of the Maize Control Board in 1936 (Robinson et al. 2007). Maize selling by smallholder native farmers was severely restricted and they could only sell to the State through the Maize Control Board but the price offered was well below that of export markets (Rothermund 1996; Robinson et al. 2007).

The advent of the Second World War triggered an increase in copper demand, resulting in a renewed and increased demand for food in the mines, which in turn triggered increased agricultural production. At the same time, colonial authorities introduced hut tax, which forced native farmers (men) to abandon farming to seek waged employment in the mines and commercial farms to earn money to pay taxes (Mwanza 1992). This resulted in less food being produced. Among smallholders, tasks that were normally done by men, like land clearing, were left to women, reducing the efficiency of agricultural production and contributing to food shortages in the 1950s in the Eastern Province (Mwanza 1992).

Following the attainment of independence in 1964, new agricultural and land policies were promulgated and were aimed at encouraging subsistence farmers to participate in agricultural markets. The policies were supported by the formation of the Agricultural Rural Marketing Board (ARMB) to service rural areas, while the Federal Marketing Board was renamed the Grain Marketing Board (GMB) and serviced commercial farmers along the line of rail. The newly formed ARMB established agricultural depots in areas that were considered less viable for agriculture outside the Central, Eastern and Southern Provinces. These depots were taken over by the National Agricultural Marketing Board (NAMBOARD), which was established in 1967 through the amalgamation of the GMB and ARMB (Jansen and Rukuvo 1992).

Fertilizer use among smallholder farmers in the Eastern Province was non-existent until the late 1960s and early 1970s (Harvey 1973). Despite the low adoption rates after the introduction of fertilizer, use increased with the introduction of improved maize seed varieties and grain marketing facilities, as this made fertilizer use more profitable. Agricultural research and extension services in the Eastern Province were targeted at agriculture on the Plateau leaving the Luangwa Valley largely neglected (Jha and Hojjati 1993).

Fertilizer subsidies to small-scale maize farmers were introduced in 1971, while uniform pricing of maize was introduced in the 1974/75 farming season. The Registration and Development Villages Act was also introduced in 1971 (Kwesiga et al. 2003; Chikulo 2009). Under this act, village productivity committees were established whose main task was

to plan for the growth and development of the village, effectuating the establishment of new villages and establishing cooperatives for the purpose of marketing village agricultural produce. This prompted the growth of small- and medium-scale farmers from 23% to 36% of the rural population (Jansen and Rukuvo 1992).

The earliest efforts at agricultural extension were made in 1977 with the introduction of the Lima program, targeted at smallholder farmers able to farm 1 Lima (0.25 ha) of cash crop per season. This was complemented by the establishment of an Adaptive Research Planning Teams in each province, which used participatory approaches to involve farmers in identifying constraints to increasing yield among smallholder farmers. This was extended by introducing the 'train and visit' program in 1982 that meant farmers had increased access to information on agricultural practices like fertilizer application ratios (Saasa 2003). Clearer land rights and availability of agricultural inputs (through subsidies and agricultural loans) led to a change from shifting cultivation to sedentary agriculture. Farmer's increased maize production as grain marketing boards made it possible to earn income from the sale of this crop (Sugiyama 2007). Adoption of sedentary agriculture meant that there was little need to open up more agricultural land as farmers could return to the same fields year after year. This served as a safeguard for forests as these were not cleared for agricultural purposes.

A change in government in 1991 ushered in SAP, underwritten by the IMF, which called for reduced central government spending in services. The objectives of SAP in the agricultural sector were to improve food production, promote non-traditional (agricultural) export by reducing government intervention in the markets allowing a greater hand for the private sector (Simatele 2009). Under these reforms, marketing boards and parastatals were abolished (e.g. NAMBOARD) or privatized (e.g. Zamseed) (Mason et al. 2009; Simatele 2009). In addition, agricultural markets were liberalized while direct input subsidies and credit controls were removed. The implication was that farmers would have to compete for access to credit with other potential borrowers, hence farmers with limited collateral had significantly reduced access to credit facilities (Simatele 2009). The government could not completely do away with subsidies, as it was one of the visible ways of demonstrating government support for the rural poor. From the late 1990s, several programs were introduced to provide some level of subsidized input to smallholder farmers (Mason et al. 2009).

The SAP froze agricultural expansion as people did not have access to agricultural inputs and extension services that they had enjoyed before, and reductions in crop production, especially maize, were noted (Simatele 2009). As an adaptation measure, rural farmers opted to open up new land in search of more fertile soils by clearing forests, as this was the only viable alternative to increase crop production in the absence of subsidies. The SAP, through the removal of services (e.g. extension and forest guards) that protected agriculture and forests, triggered an expansion into previously unused areas.

From the above discussion, it is evident that in each of the three epochs discussed (colonial, post-colonial and post-SAP), policy played a key role in influencing the development of smallholder agriculture. This has been seen through policies like centralization of smallholder communities and exclusive support for large-scale farmers

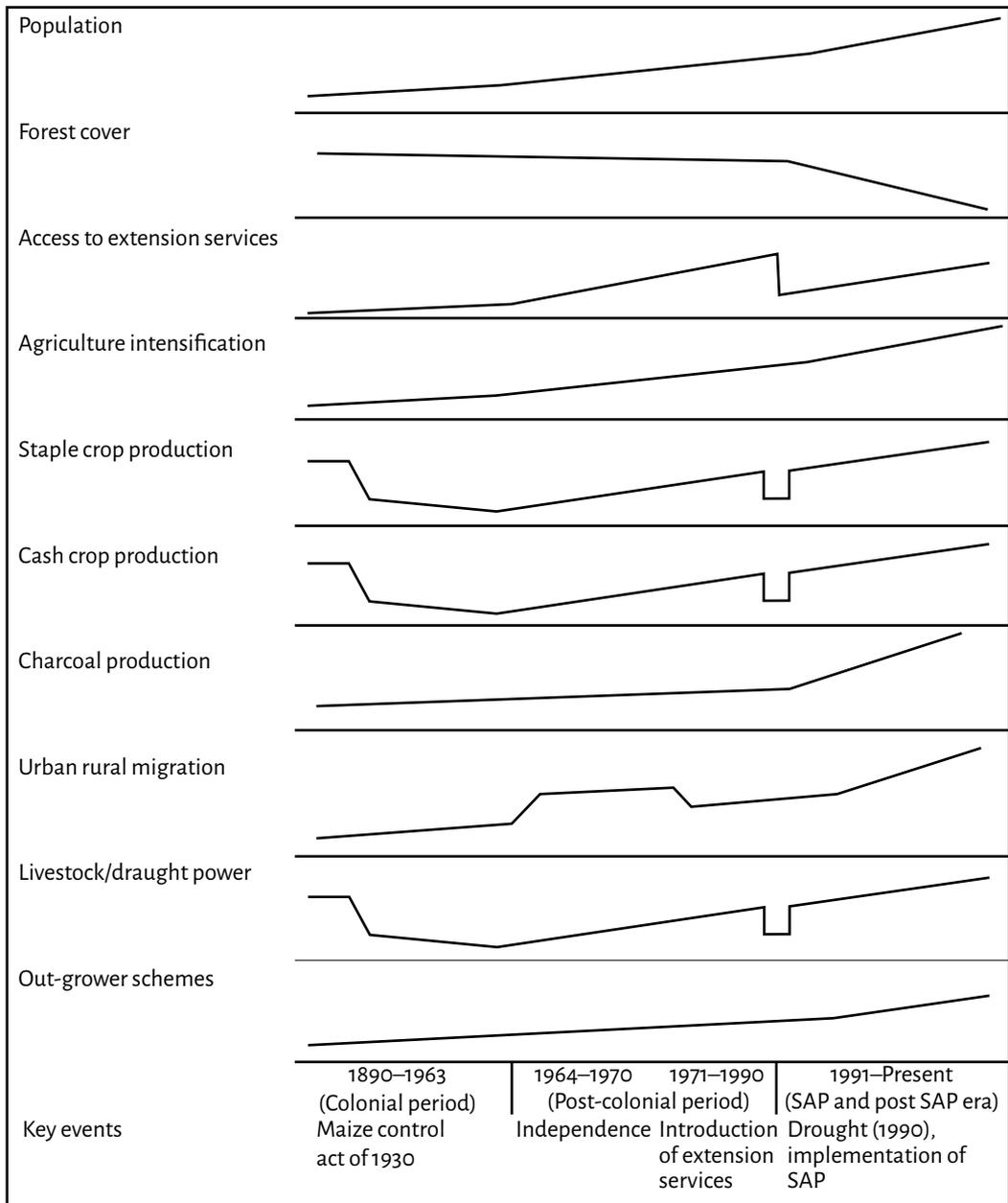


Figure 7.4 Historical trend lines and important events in the Eastern Province.

in the colonial era, increased government support for smallholders and direct market interventions in the post-colonial era, and liberalization of agriculture markets following the economic structure adjustment (Tembo 2011). The agrarian transition in the Eastern Province and Nyimba District, in particular, has as such been underwritten by policy, and major policy shifts throughout the three epochs have impacted land use and land-use change over time, thus shaping the Nyimba landscape. This interaction between land use/land-use change and policy across the three epochs is summarized in Figure 7.4.

7.1.6 District background to Nyimba District

Nyimba District has a population of 80,025, with population density of 8.1 persons per km², which is the lowest in the Eastern Province (Figure 7.5; CIFOR 2014). Nyimba District was previously part of Petauke District, thus most historical data available references Petauke. It shares an international boundary with Mozambique. Nyimba District has two key geographical features, the Luangwa Valley on the western side of the district and the Eastern Plateau to the east (Figure 7.5). Nyimba District's geography is unique in that part of the district lies on a plateau and the other in a valley, and as such land-use practices here mirror to a great extent those of the entire province (see Figure 7.6).

7.2 Scoping study results

7.2.1 Agro-ecological zone and vegetation type

The Luangwa Valley lies in agro-ecological Zone 1 (AEZ1), which covers the southern part of Zambia. AEZs are “geographical areas exhibiting similar climatic conditions that determine their ability to support rain fed agriculture” and may be used to determine

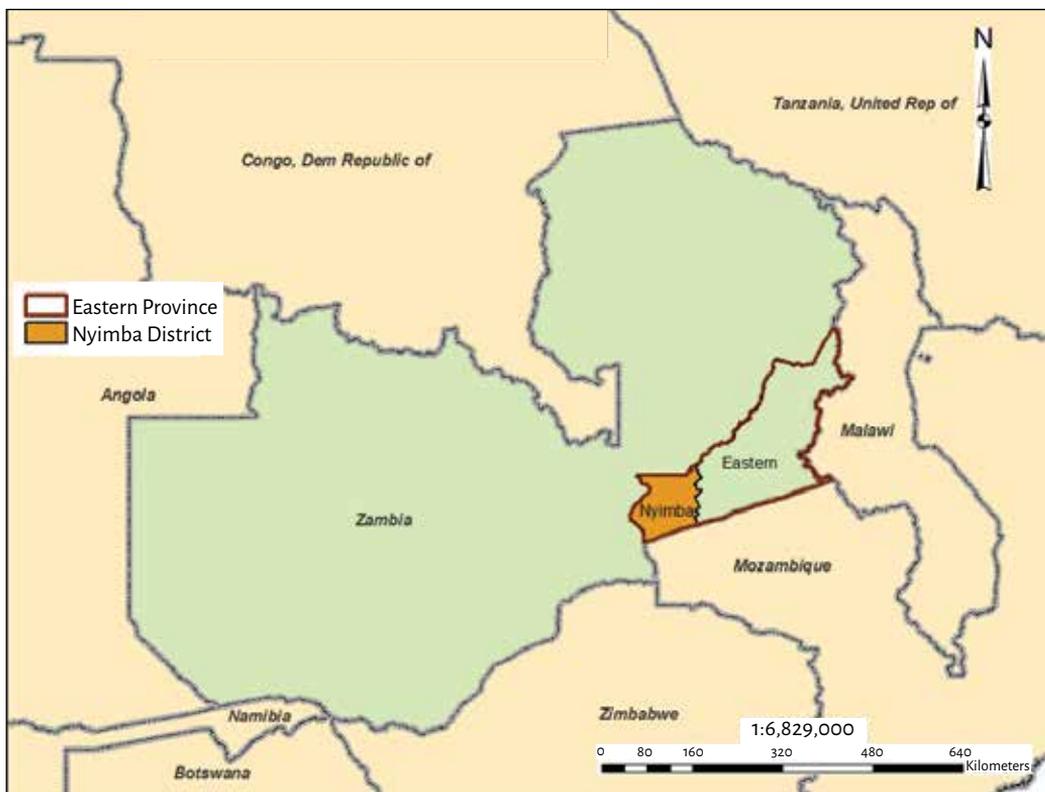


Figure 7.5 Location of Nyimba District in Eastern Province, Zambia.

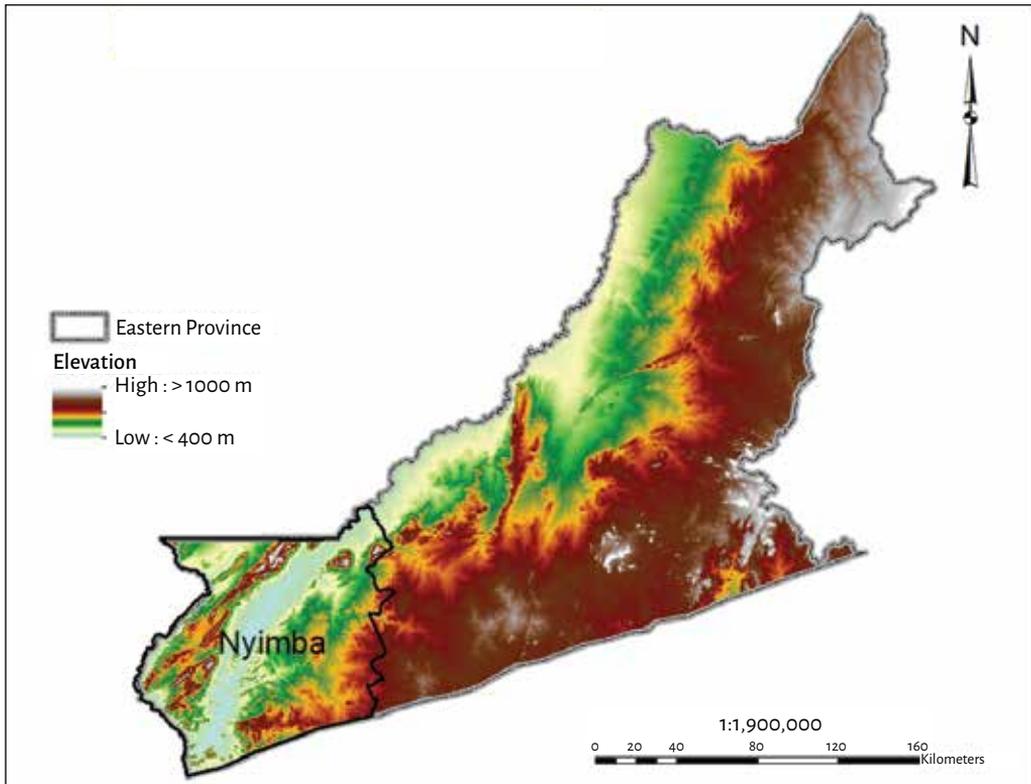


Figure 7.6 Eastern Province elevation.

crop types (Sebastian 2014). Agro-ecological Zone 1 sits on an altitude range of 300–900 masl. The Luangwa Valley receives an annual rainfall of 600 mm to 800 mm, much of which is erratic and unreliable. The valley also experiences a short crop growing season of between 80 and 120 days (JAICAF 2008). The most suitable crops are drought resistant crops such as sorghum, millet, and cotton. Soils in the valley are typically shallow and sandy, which are not suitable conditions for agriculture (Mukosha and Siampale 2008). In Nyimba, the Luangwa Valley hosts part of the West Petauke game management area (GMA) and a number of game ranches and, as such, farming households in the valley co-exist with wildlife. Presence of wildlife in the valley has led to tsetse fly infestation and human–wildlife conflict limiting the livestock production potential of the area (Siegel 2008).

The Eastern Plateau of Nyimba District is in agro-ecological Zone 2 (AEZ2). The plateau is characterized by an altitude of 900–1200 masl and receives moderately good rainfall of 800–1000 mm per annum. The growing season often lasts between 100 to 140 days. The soils found here are moderately leached sandy loam soils, which are good for agriculture. Absence of tsetse flies makes livestock rearing possible and the most common livestock include cattle, pigs and goats (Siegel 2008).

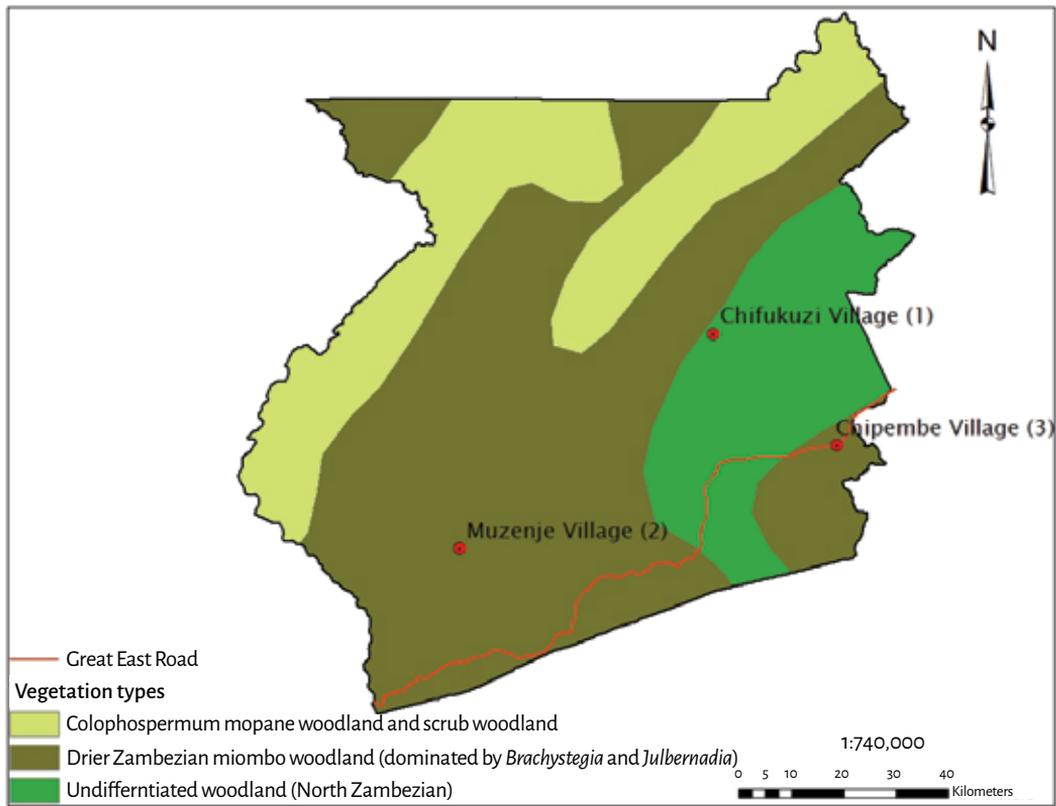


Figure 7.7 Vegetation of Nyimba District.

The predominant vegetation in Nyimba District is miombo (see Figure 7.7). Miombo woodlands are the most wide-ranging deciduous woodlands in Africa (2.7 million km²), and are dominated by the *Brachystegia*, *Julbernadia* and *Isoberlinia* genera (Campbell 1996; Backeus et al. 2006). The miombo woodlands are often located on the upper slopes and sit on soils that are inherently low in soil fertility (Deweese et al. 2011), with the lower slopes hosting mopane/acacia woodlands where the soils tend to be more fertile. Thus, the plateau is largely covered by miombo and the valley is covered by mopane with mixes of acacia species in places.

7.2.2 Agriculture

Over 90% of the population in Nyimba District is rural, with 91.7% of the smallholder households living below the poverty line (Tembo and Sitko 2013). Agriculture is the main stay of the district, with 87.7% of the total household income coming from farm activities (both sale and domestic consumption of farm produce and livestock) while only 12.3% of the total household income is realized from off-farm activities. Maize is the major crop cultivated; other crops include rice, sunflower, groundnuts, soya beans and cotton. As of 2012, 24,027 ha of land were under cultivation, with 71.1% of this area under maize cultivation (see Table 7.2; Tembo and Sitko 2013). The total maize harvest in 2012 was 34,375 tons, and the average harvest per household was 2.49 tons in the same

Table 7.2 Crop productivity figures for Nyimba District for 2012.

Attribute	Maize	Sunflower	Groundnuts	Soya beans	Cotton	Sweet potatoes
Crop yield (tons/ha)	2.3	0.57	0.48	0.39	1.22	3.97
Total harvest (tons/ha)	34,375.8	664.94	1457	0.7	1,802.8	981.1
Average harvest per household (tons/ha)	2.49	0.21	0.17	0.05	0.50	0.52

Source: Adapted from Tembo and Sitko (2013)

year (see Table 7.2). Fertilizer usage is restricted to maize with the average smallholder household using 510 kg of fertilizer, while maize yields are 2.3 tons per ha (Tembo and Sitko 2013). Fertilizer use in the valley is almost non-existent and as such low yields are generally experienced, thus limiting arable cropping as a source of income.

In Table 7.2, emphasis is placed on maize and fertilizer and less so on cash crops such as cotton and tobacco that are also grown in the district. Whereas maize is produced for household consumption and partly for the market through the Food Reserve Agency and private buyers, the production and marketing of most cash crops is done through out-grower schemes underwritten by private companies. In Nyimba, the most active are NWK (formerly Dunavant) (cotton) and Alliance One (tobacco) supported by the Cotton Board of Zambia and Tobacco Board of Zambia, respectively. Companies involved in out-grower schemes not only supply agro-inputs but also expertise (extension) and always guarantee a market for the product. What has been observed is that the pre-planting price offered by the company often determines the amount of land under the crop. Whereas the demand for additional land under tobacco maybe limited, the forest is impacted through the harvesting of wood for flue curing. Estimates indicate that approximately 7.8 kg of wood is needed to produce 1 kg of tobacco (Geist et al. 2009). These estimates have not been verified for Nyimba, but the contribution to woodland change cannot be questioned.

7.2.3 Market access

The district market located at the district center is the main source of household goods, farming inputs and implements, and can be accessed via the Great East Road. The presence of the Food Reserve Agency (FRA) depot and private companies, like Export Trading, make it a major market for farm produce (GRZ 2004). Within the villages, the FRA is the main market for the staple crop, maize, through its satellite depots. Private companies like NWK and Cargill provide a market for other cash crops, such as cotton and soya beans.

Inter-household trade is common, and a portion of farm produce is usually traded this way, for cash, other goods or labor.

7.2.4 Land tenure

In Zambia, land has been governed by several laws including the Land Deeds Registry of 1914, Land Acquisition Act of 1970, Lands (Conversion of Titles) Act of 1975 and the current Lands Act of 1995 (Adams 2003). Under current law, all land is vested in the president of the republic. Two tenure systems are present, customary and statutory (Malambo 2013). Under customary land tenure, vacant land is allocated to families or individuals by traditional authorities (chiefs) usually through subordinate leaders like village headmen (Ranger 1983; Berry 1993). Under statutory tenure, government allocates land through relevant organs and individual landowners have title deeds, hence can sell, rent or transfer the land. The lands tribunal established by the Lands Act of 1995 is tasked with sorting out land related disputes and its focus thus far has been on state land (Adams 2003). Statutory land covers only 6% of the total land area while the remaining 94% is customary land (Adams 2003).

Efforts have been made to secure land rights for women. An example of this is the requirement of the Ministry of Lands that 30% of all plots should be allocated to women and that the remaining 70% should be competed for by both men and women (GRZ 2006). By law, both men and women are allowed to request land. Under customary systems, however, women's land rights are generally considered to be insecure, as they have access to land (usually through a male relative, e.g. husband or father) but have no control over it (Chapoto et al. 2009). This assertion is affirmed by Kajoba (2002), who found that women in Chibombo, a similar district to Nyimba but located in the Central Province, lost their land after the death of a spouse, and were, in some instances, evicted from the villages and asked to return to their villages of origin (Kajoba 2002). Matrimonial societies with matri-local marriages are perceived to have more secure rights for women (Chapoto et al. 2009).

All land in the Nyimba landscape is under customary control, and locals access land either through inheritance or through their respective village headmen. Existing land can be increased by requesting additional land from the chief or headman. Households can also increase the amount of land under cultivation by borrowing land from neighbors to use in the farming season. In the study area, land disputes within the village are uncommon but where they arise, they are resolved by the headman.

7.2.5 Nutrition and health

Using a 24-hour food recall method, the 2007 demographic and health survey showed that at the time of the survey, 89.7% of children (aged 6 to 35 months) in the Eastern Province consumed foods rich in vitamin A and 45.5% consumed iron rich foods (CSO et al. 2009). The study further found that 61.4% and 64.0% of children under the age of 5 took vitamin A supplements and deworming medicine, respectively, within 6 months of the study. According to the 2013/14 demographic and health survey, 17.4% of children under the age of six in the Eastern Province were stunted and 43.3% severely stunted (national averages 17.2% and 40.1% respectively) (CSO et al. 2014). Close to 5.0% of children were wasted and 6.0% severely wasted, while 2.2% were underweight and 12.8% severely underweight (CSO et al. 2014).

Based on body mass index (weight to height ratio), the 2007 study found that 6.6% of all women in the province were underweight, 14.4% were obese and 79% were considered normal. Of all mothers, 98.3% breastfed their children and the average period of breastfeeding was 21 months (CSO et al. 2009). Health facilities are available in all three study sites.

7.2.6 Land use and cover change

In Nyimba, land uses have been changing, resulting in land-use mosaics across the district dominated by arable fields and forests. Under CIFOR's Nyimba Forest Project, land-use and land cover analysis, including change detection, were carried out for the period 1990 to 2013 (see Gumbo 2015). The dominance of agricultural activities as a driver of forest change was noted (0.4%/annum between 1990 and 2013) in line with provincial and national rates. Between these 2 years, agriculture has continued to expand at the expense of forests (Figure 7.8) leading to a decrease in woody biomass by 2013. It is noted that the same forests have also been changing through activities such as charcoal production, cutting of construction timber, tobacco curing in some places and fire. Thus, forests are dominated by trees with stem diameters of ≤ 13 cm calling for stringent management regimes (Gumbo 2015).

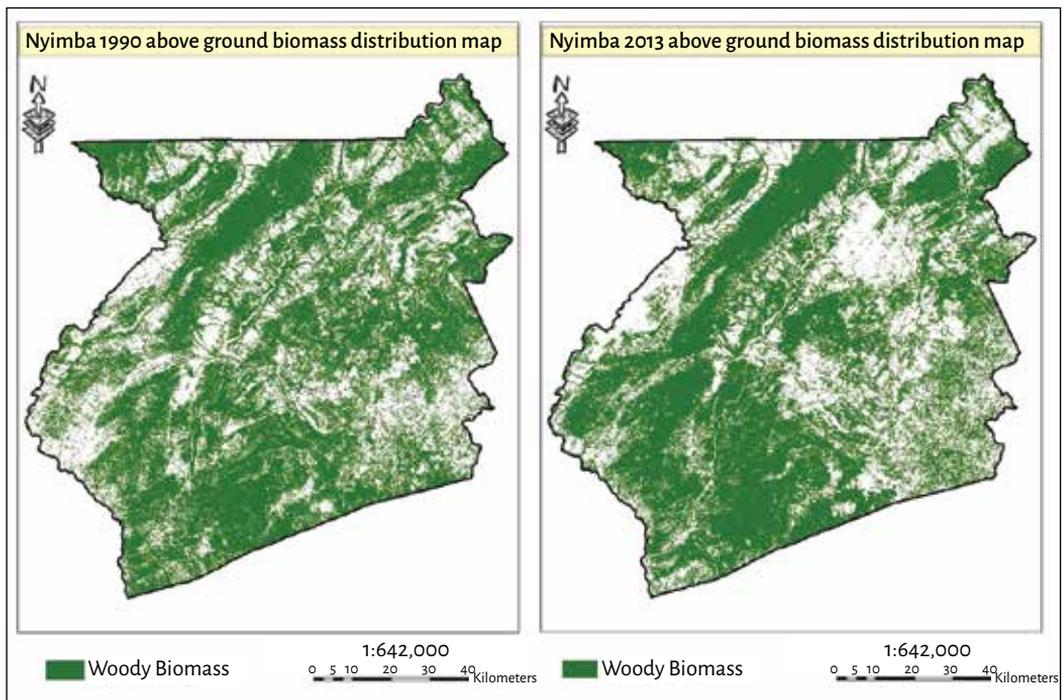


Figure 7.8 Wood biomass change in Nyimba District from 1990 to 2013.

7.3 Description of selected villages

As with the rest of the province, early development work in Nyimba was pegged to agriculture, albeit with a greater focus on the plateau. As such, landscapes in villages like Chipembe have been undergoing modification since the 1930s and present contemporary mosaics of cultivated, fallow, and homestead field and gardens, with scattered trees and patches of remnant forests. It was observed that the continuum lay between protected areas (forest reserves and GMAs) in the Luangwa Valley (390–450 masl) and old settlements (villages) on the plateau (>900 masl).⁴

There are a number of villages on this continuum, some 74 km in length, and the major differences among them can be explained by how widely cultivated they are as well as the intensive use of agrochemicals over time. An examination of the status of forest cover in the villages led to the selection of three villages for study: Muzenje (30.4° east, 14.7° south; 450 masl), Chifukuzi (30.8° east, 14.3° south; 786 masl), and Chipembe (31.0° east, 14.5° south; 909 masl) (Figure 7.9). The human populations in the villages

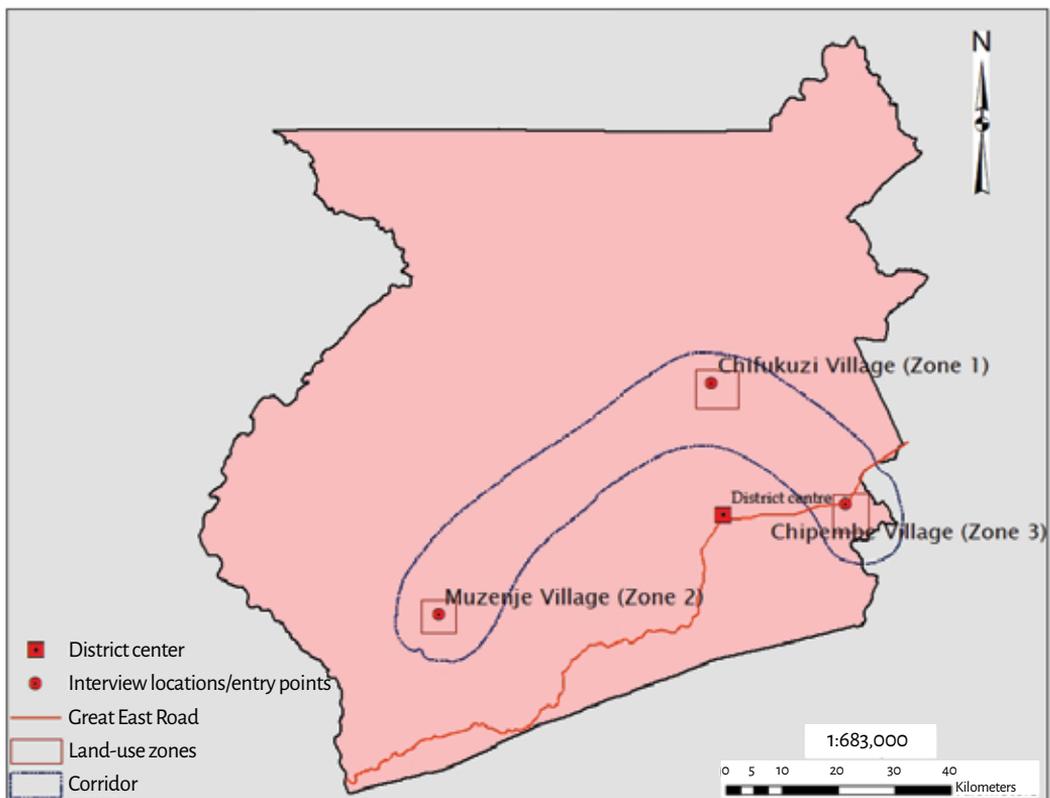


Figure 7.9 Nyimba District map showing the selected landscape and location of the settlements.

⁴ The plateau was settled first due to the absence of tsetse flies, which still occur in some sections of the valley (Mwanza 1992).

were 585, 3072 and 9000, respectively. Muzenje village sits in the valley and shares a boundary with Damiano Game Ranch, which is part of the 4140 km² West Petauke GMA. Whereas Muzenje is sparsely populated (9.4 persons/km²), Chipembe on the plateau is densely populated (230 persons/km²) immediately raising issues on the status of forest cover (Table 7.3).

The continuum presented three zones of varying agricultural intensification, with subsistence agriculture with high forest cover in Zone 1 and market-oriented high intensification agriculture and low forest cover in Zone 3. Zone 2 sits between the two extremes, in an area transitioning from Zone 1 to Zone 3.

On this continuum, the three selected settlements (Muzenje, Chifukuzi and Chipembe) represent land-use zones 1, 2 and 3, respectively (Figure 7.9). Muzenje (Zone 1) is a frontier village located in the Luangwa Valley (altitude 450 masl) and shares a boundary of West Petauke GMA and is also close to the Damiano Game Ranch. Muzenje is an area of high forest cover and has several seasonal and annual streams. Due to presence of

Table 7.3 Key aspects of the revised land-use zone selection criteria.

Criteria	Muzenje (Zone 1)	Chifukuzi (Zone 2)	Chipembe (Zone 3)
Land-use zone	1	2	3
Zone defined	Low agricultural intensification	Intermediate agricultural intensification	High agricultural intensification
Chiefdom	Nyalugwe	Mwape	Ndake
Population	585	3072	9000
Area of village	61.6 km ²	54.8 km ²	39.2 km ²
Forest cover	High	Medium	Low
Agricultural activity	Subsistence	Mixed (subsistence and cash cropping)	Mixed (subsistence and cash cropping)
Use of draft power	Low	Medium	High
Presence of extension services	No	Yes	Yes
Levels of agricultural inputs use	Low	Medium	High
Market-oriented crop production	None	Cotton, soya beans, sunflower	Maize, cotton, soya beans, sunflower
Out-grower schemes	No	Yes	Yes
Distance to district center	100 km	30 km	21 km
Land tenure	Customary	Customary	Customary
Proximity to protected area	Near	Far	Distant
Level of in migration	High–medium	Medium–low	Low



Intensification gradient from Zone 1, a settlement on the boundary of west Petauke GMA (left), to Zone 2, a high tree density zone that is currently being opened up for agriculture (center), and Zone 3, a low tree density zone (right). (Moka Kaliwile/CIFOR)

tsetse flies, limited access to extension and markets and human-wildlife conflict, agriculture in Muzenje is highly underdeveloped and oriented toward subsistence production. As such, the landscape has more trees and few agriculture fields.

Chifukuzi (Zone 2) and Chipembe (Zone 3) villages are on the plateau. Chifukuzi was settled around 2000. However, due to easy access, presence of livestock (cattle) and migration, more land has been opened up for agriculture and is slowly transitioning from pristine forest to agriculture based landscape. Chipembe (Zone 3) village has been cultivated over a long period of time and is now sparsely forested. Chipembe thus presents a matrix of settlements and agricultural fields dotted with mango trees on old and abandoned home fields (Table 7.3).

7.3.1 Muzenje village

Muzenje (Zone 1) is made up of a cluster of six villages, namely Muzenje, Kautukilo, Musonda, Nyamulika, Chausi and Lameck (all located within a radius of 3 km) that were established in 1975 in Chief Nyalugwe's area.⁵ Inhabitants of this cluster of villages are mainly Nsenga speaking and migrated to this area from different parts of the chiefdom. It is unclear why they moved to this area, but they seem to have been attracted by the perceived benefits they would gain from the forest, and hunting and fishing along the Luangwa River and the GMA. Land is not a constraint in the area for it is still readily available. The villages in this cluster was established in the post-colonial era when agricultural policies favored agro-expansion. This zone has approximately 120 households with a population of 585 people (CIFOR 2014). The main sources of income for Muzenje village are agriculture, fishing and hunting. The head woman explained that extension services are not available due to the remote location of the village (100 km from Nyimba District center). Where elephants are dominant, they destroy crops every year and are a threat to lives resulting in human-wildlife conflict. The village is less than 10 km from Damiano Game Ranch and on the boundary of West Petauke GMA.

⁵ Clustered for the purpose of the study to meet the minimum 75 households per zone required.

Much of the cultivation in the village is carried out on permanent crop lands with some farmers using crop rotation as a strategy for soil fertility management. Presence of tsetse fly has hindered livestock rearing and hence curtailed the use of draft power. As a result, agricultural expansion is low because cultivation is hand-hoe based. In addition, there is limited access to extension services (both public and private), agricultural cooperatives and markets. The head woman explained that due to the low incomes and low crop production by households, families are not food secure throughout the year. Households in Muzenje have limited access to markets and have to take their produce (farm and off farm) to the district market, which is 100 km away. As such, farm production is oriented toward domestic consumption.

The Muzenje village community is highly dependent on forest resources for household energy in the form of firewood and wild fruits, which can be easily accessed. Game meat is an important source of protein, while trees with large diameter stems are used for construction and making dugout canoes. Households have exotic fruit trees, such as mangoes, in their homesteads and agriculture fields. Off-farm activities include formal employment in the game ranches, fishing and selling of reed mats and baskets from materials harvested from local streams and the Luangwa River.

The village has access to a clinic and a school, which are both 5 km from the settlement. The village can be accessed via a gravel road, which is maintained by the district council and game ranch owners in the area.

7.3.2 Chifukuzi village

The settlement selected in Zone 2 is Chifukuzi village, and is located in Mwape chiefdom. This village was established in 2000 by households that relocated to the area from Chinsimbwe village some 60 km away, but within the same chiefdom. The migration to Chifukuzi village was triggered by human–wildlife conflicts in Chinsimbwe village, which shares a boundary with the West Petauke GMA. Chifukuzi was established after SAP, when most rural farmers in Zambia were seeking new agricultural land and livelihood opportunities. The village grew as more families from different chiefdoms came to settle in the area. Included in these migrants are government retirees from within and outside Nyimba. This has resulted in mixed agricultural expertise and farming practices in the village. Agricultural land in the village is being opened up by new settlers as some of these have resources (pensions, remittances etc.) that enable them to hire labor to expand their agricultural fields.

Chifukuzi village has approximately 668 households with a population of 3072 people (Gumbo 2015). The main source of income for Chifukuzi village is agriculture. Extension services are available through an agricultural camp extension officer who visits the village before land preparation and during of the distribution agriculture inputs. Access to farming inputs under FISP is facilitated by two cooperatives while NWK and Olam cotton companies have out-grower schemes in the village. Farmers in Chifukuzi have permanent crop lands where, besides the use of fertilizers, they also practice crop rotation as part of fertility management and pest control. Use of animal draft power has contributed to the expansion of cultivated land in the village, while markets for cash crops are provided within the village by private companies through out-grower schemes. Private individuals also buy maize from locals, while some is exchanged for services especially during the planting season.

Remittances, pensions and cash earned from the sale of farm produce have contributed to the increased use of farming inputs (usually fertilizer, seed and at times herbicides). The main market for maize is the FRA though the depot is located 22 km from the village. The headman explained that as a result of the income generated from agriculture produce, remittances and retirement benefits most households are food secure all year round. Inhabitants of Chifukuzi village are dependent on the forests for fuelwood, wild fruits and game meat. Exotic fruit trees like mangos, guavas and pawpaws are available in homesteads and agricultural fields.

Off farm activities for households include charcoal production, beer brewing and trading, which are possible sources of income for farming inputs. The village has access to a clinic and a school, which are both within the village. Water for household use and domestic animals is sourced from four bore holes within the village as there are no surface water bodies. The village can be accessed through a gravel road, which is maintained by the district council and game ranch owners in the area.

7.3.3 Chipembe village

Chipembe village, located in Ndake Chiefdom was selected as the Zone 3 study site. This village was established in the 1930s by Chewas, Nsengas and Ngonis who migrated from Mozambique. The village sits at the junction of Great East Road (GER) from Lusaka to Malawi, and the Mozambique road to the border between the two countries. The accessibility of the village has led to an influx of people from different parts of Zambia, resulting in a cultural mix and an introduction of different agricultural techniques.

Chipembe village was established during the colonial era and has gone through all three phases of agrarian change. Inhabitants of the village benefited from the agriculture policies of the post-colonial era and as such agriculture is well developed. According to the agricultural Camp Extension Officer, the village has approximately 1800 households and has a population of 9000 people (Gumbo 2015). The main sources of income in Chipembe village are agriculture, formal employment in business enterprises, such as grocery and agriculture input retail and wholesale shops, schools, clinics, shops, depots, etc. The village has 21 agricultural cooperatives, which facilitate access to FISP, 13 savings and multipurpose clubs and a cotton out-grower scheme supported by NWK and Cargill cotton companies. There is an active agricultural camp office that has four members of staff who support farmers by providing extension services and coordinating the distribution of inputs supplied by government through FISP. Private companies provide market for cash crops (cotton), while the FRA provides the main market for maize within the village.

Chipembe village has limited land available for new settlers, as most of the land has been apportioned. The farmers have sufficient land to allow fallowing and practice crop rotation on an annual basis. Households in Chipembe village use animal draft power and this has contributed to current crop productivity. The headman explained that the income generated from the sale of agricultural produce and other off-farm activities has contributed to the households in the area being food secure. Chipembe has a FRA depot within the village but villagers complain the depot often delays making payments. Chipembe village community has a low dependence on the forest resources because of

the small diameter stems, which are less suitable for construction and energy (in the form of firewood). There are few wild fruits and game meat is generally unavailable. The zone is approximately 2 km from the homestead to the nearest open forest where these products can be harvested. Households have exotic fruit trees at both their homesteads and agricultural fields.

The village has one clinic and two primary schools, which are all within the village. Along the GER and the Mozambique road, there are multiple shops constructed from burnt bricks and metallic roofing sheets. The main sources of household water are bore holes and streams and rivers that run through the area.

7.4 Conclusion

Nyimba District presents itself as an excellent site for a study on agrarian change. Lying in the Eastern Province of Zambia and one of the earliest provinces to receive support for smallholder farmers and most productive agricultural areas, Nyimba is a landscape where policy changes driven by pre- and post-colonial objectives in the area of agriculture, environment and natural resources had high impacts at the landscape level. Policy focus on smallholder farmers has not changed since independence and, even in the current post-SAP period, the focus has not been lost. Although other issues such as charcoal production are also coming to the fore vis-à-vis land-use change at district level. Further, the interplay between agriculture and other related policies (e.g. forestry, land and environment) can still be seen influencing change at landscape level.

The three selected villages in Nyimba, two on the plateau and one in the valley, lie on a continuum of agriculture driven land-use modification and represent areas where policy impact can be discerned. The landscapes surrounding these villages are the result of decisions and actions made at household level, but that are not only based on the provisions of various policies but also the land and other attributes, such as rainfall. The continuum of land-use modification identified across the three zones shows changes in land use from low to high agricultural intensification defined by levels of use of improved maize varieties, fertilizers and other agrochemicals. Equally important are issues related to access to extension services, draft power, out-grower schemes (mainly cash crops), density of cooperatives and markets; these vary across the three zones.

The changes at village/zone level are made more apparent through the analysis of remotely sensed data, which reveals that there are differences in forest cover and agricultural land cover among the three villages. Chipembe shows more land covered by cultivated areas than forests, while Muzenje shows the opposite with more forest cover. A comparison of woody biomass change in the two extremities shows an increase in Muzenje between 1990 and 2013 as opposed to Chipembe, which shows a decrease in woody biomass in the same time period. As already indicated, Muzenje village lies close to a GMA and a game ranch where other aspects like human-wildlife conflict and occasional re-infestations by tsetse fly have curtailed agricultural activities. Further, the presence of game and game meat, fish and forest foods, which do not require

modification of the environment, make a contribution to the food security in this village. Chipembe on the other hand is an agricultural village, with all the support needed to make agriculture viable and as a consequence it is devoid of trees.

The Nyimba landscape thus sets the scene for understanding how policies together with other factors have defined the agrarian change trajectory. It presents a continuum of varied policy penetration, giving rise to three zones of varied land-use configuration. Further, it presents an opportunity to understand how households have responded to policies, and how this has translated into change at landscape level.

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Appendices

Appendix 7A Criteria and characteristics of the selected villages

Table 7A.1 Criteria and characteristics of the selected villages.

Criteria	Low agriculture intensification	Moderate agriculture intensification	High agriculture intensification
Area visited	Clustered villages: (Muzenje, Kautukilo, Muzonda, Nyamulika, Chushi and Lameck)	Chifukuzi village	Chipembe village
Village settlement	Nyalugwe Chiefdom: MIGRATED to current settlement from a different part of the chiefdom in 1975 (post-colonial era)	Mwape Chiefdom: resettled to current location from a different part of the chiefdom in 2000 (post-SAP) because of human-wildlife conflict, others settlers coming from other chiefdoms including government retirees	Ndake Chiefdom: Migrated to the village in 1930s (Colonial era) from Mozambique, and village sits at the junction of GER from Lusaka to Malawi and Mozambique road to the border of Zambia and Mozambique. Accessibility of the village has led to an influx of people from different parts of Zambia
Geographical features	450 masl; valley; no use of animal draught power because of the presence of tsetse flies; 600–800 mm annual rainfall	786 masl, plateau; use animal draught power because there are no tsetse flies; between 800–1000 mm annual rainfall	909 masl; plateau; use animal draught power because there are no tsetse flies; between 800–1000 mm annual rainfall
Population data	120 households; population approximately 585 people	668 households; population approximately 3072 people	1800 households; population approximately 9000 people
Land tenure	Customary land; land is not a constraint; it is all communal land		Customary land; limited land available for new settlers
Dependence on forest resources	High dependence on forest; stems with diameters above 20 cm are available and are widely used for construction and fuelwood; wild fruits and animals available for consumption	High dependence on forest; stems with diameters above 20cm are available and are widely used for construction and fuelwood; wild fruits and animals available 7–10 km from area	Low dependence on forest; small stems available are less suitable for construction and energy (firewood); very few wild fruits and animals for consumption
Proximity to protected areas (forest reserves, GMAs)	Less than 10 km to game ranch; human-wildlife conflict present, has an impact on agriculture expansion	Less than 20 km to game ranch; no human-wildlife conflicts	More than 10 km to nearest forest where forest products are harvested; no human-wildlife conflicts

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Table 7A1. (continued)

Criteria	Low agriculture intensification	Moderate agriculture intensification	High agriculture intensification
Area visited	Clustered villages:(Muzenje, Kautukilo, Muzonda, Nyamulika, Chushi and Lameck)	Chifukuzi village	Chipembe village
Migration	Mainly Nsengas	Mixed culture: Nsenga, Bemba, Lozi, Tonga, etc.	Mixed culture: Nsenga, Bemba, Lozi, Tonga etc.
Existence of shifting cultivation	No shifting cultivation	Famers use permanent crop land for cultivation while practicing crop rotation	Famers have sufficient land to allow fallow and practice crop rotation on an annual basis
Access to inputs and market	No access to FISP; no out-grower schemes; no FRA depot in the village; village is 100 km from Nyimba District center	Out-grower schemes packages provided by Chipata cotton, NWK-Dunavant and Olam cotton; access to fertilizer through FISP; retiree pension, invested in inputs; no FRA maize purchasing depot present in the area, nearest is between 16–22 km away; maize and cotton prices known before crop planted	Out-grower schemes packages provided by NWK- Dunavant and Cargill cotton; access to FISP; FRA maize purchasing depot present in village but failing to meet demand for the commodity, need more market for the agricultural products; maize and cotton prices known before crop planted
Access to extension services and presence of agricultural cooperatives	No camp officers; no agriculture zones; no active cooperatives and clubs	No camp officer based in the area but visited by a camp officer from Nyimba; two cooperatives; 30 km to Nyimba District center	Presence of camp officers; 21 cooperatives; 13 clubs (savings, multipurpose, etc.)
Conservation agriculture	Practice conservation farming (limited)	Practice conservation farming; new settlers are coming in with different agriculture techniques including the use of rippers, pot holing; knowledge transfer from camp officer	Practice conservation farming; new settlers are coming in with different agriculture techniques, including the use of rippers, pot holing; knowledge transfer from camp officer.
Agriculture expansion	Minimal expansion because of human–wildlife conflict and the lack of extension services; no use of animal draught power to cultivate; the terrain is mountainous, difficult to expand	Expanding agriculture land; area has a number of land conflicts; use animal draught power to cultivate leading to expansion	Limited forest land available for expansion; use animal draught power to cultivate

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Table 7A1. (continued)

Criteria	Low agriculture intensification	Moderate agriculture intensification	High agriculture intensification
Area visited	Clustered villages:(Muzenje, Kautukilo, Muzonda, Nyamulika, Chushi and Lameck)	Chifukuzi village	Chipembe village
Presence of fruit trees	Indigenous fruits: Present in forest around homesteads (120 m away) Exotic fruits: Mangoes present at homesteads and abandoned field, started planting when they settled	Indigenous fruits: Present at homesteads and forests around the settlement Exotic fruits: Mainly mangoes, mature mango trees only found at homesteads of those who settled early, current settlers have young trees	Indigenous fruits: Very few indigenous fruits in the area, community members have to go to the nearby open forest, which is approximately 2 km away Exotic fruits: Mangoes present at homesteads, started planting when they settled in the area
Off-farm activities	Sell products made from reeds such as baskets; fishing; formal employment in game ranches; no charcoal production Income realized is usually spent on agriculture and household food	Remittance from family members; pension, grocery shops; very little charcoal production, village is far from market; Income realized is usually spent on agriculture and household food	Selling labor to farmers; formal employment (shop attendants, clinics, schools etc.); business enterprises (agro-inputs, grocery shops, restaurants, etc.); charcoal produced using small stems available Income realized is usually spent on agriculture and household food
Source of cooking energy	Firewood	Firewood	Charcoal used by civil servants, firewood/ charcoal
Food security and self-sufficiency	Approximately 50% of total households not food secure and self-sufficient	75% of total households are food secure and self-sufficient	75% of total households are food secure and self-sufficient
Presence of woodlots	Absent	Absent	Absent
Infrastructure development	Nearest clinic in the area is 5 km away; access road	1 health post; primary school is a shed constructed by the community from pole and dagg	1 clinic; 2 primary schools; multiple shops constructed from burnt bricks; market place, roads graded; some houses constructed with burnt bricks and iron sheets; water mono pumps