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Review

The Critical Nexus and Implications of Smallholder Tobacco Production as a Livelihood Strategy to Forest Landscapes in Zimbabwe

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Abstract: The increase in tobacco production while ameliorating the condition of the participant households has caused challenges to stakeholders particularly those in the governance of forest resources upon which the sector is hinged. Massive deforestation has proceeded at an alarmingly high level, in a way that threatens the long term viability of the tobacco sector and sustainability of natural forest resources. The entrance of previously disadvantaged majority into the once minority-dominated tobacco sector (and economy) in a quest to improving their livelihoods, is driving forest landscape changes that pose inherent environmental challenges including climate change. This article adopts institutional and landscape approaches to explore and explain the drivers, nexus and implications of smallholder tobacco as a livelihood strategy to the forest landscape changes and the subsequent imperative for governance of the sustainable utilization of forest resources in Zimbabwe. Drawing on documentary evidence the paper concludes that this situation poses a dilemma to forest and livelihood policies, hence the need to examine new institutional and livelihood initiatives.

Keywords: tobacco; forest resources; deforestation; livelihoods; institutions; governance; landscape; land degradation; climate change

1. Introduction

This article reinforces the argument that tobacco production as a source of livelihood relates to deforestation and as such could be interpreted as an aspect that influences landscape changes and also pushes climate change or contributing to it. This is seen in the context of agriculture as a crucial sector in developing countries where particularly smallholder agriculture underpins the livelihoods of poor people while bearing the brunt of climate variability and change [1, 2]. In Zimbabwe, agriculture is a bedrock of the economy and therefore a critical sector in terms of its contribution to the Gross Domestic Product (GDP), employment and livelihood support for the majority rural population. For example, in 2016 tobacco (also called the 'golden leaf') generated an export income of US$933.7 million (33% of total exports), it contributes between 14-18.5% to the GDP, while the country is the sixth largest producer of the crop in the world [3]. The increase in tobacco production under smallholder farmers within the resettlement and communal areas has been hailed as a success by the Zimbabwean government of its fast track land reform programme that started in the 2000s under the mantra "the land is the economy and the economy is the land." However, the Tobacco Industry and Marketing Board (TIMB) of Zimbabwe even acknowledge that, "*the economic benefits*

derived from tobacco production should never be allowed to sacrifice the associated environmental concerns" [4]. My personal experiences can attest to these environmental concerns and there is an attempt to unpack them in this paper.

In early 2010 on a rare visit (since I was last there in a long period) back home to my village in the rural Mt Darwin District in northern Zimbabwe, I took care of the family herd of cattle. I drove the cattle into the nearby woodland where I used to do the same during my childhood. As it was during late summer one would have expected adequate pastures following a relatively good rain season. However, this was not the case as the vegetation needed to recover from the drought of the preceding 2008/9 season. However, there was one salient observation that struck me and that was my frequent encounter of huge tree stumps and felled tree trunks. This was consistent with the high stacks of logs of firewood that I had noticed earlier throughout my walk into the village earlier on. Makeshift tobacco barns (Figure 1) had also become fashionable as add on structures around some people's homesteads. Then in conversations with my kith and kin, I heard numerous stories of how people are making it in life through growing and selling tobacco and how they had abandoned cotton (dubbed 'white gold') growing as it was no longer lucrative. The landscapes around my village are characterized by uneven and sloppy areas of hills of mainly granitic rock outcrops under Miombo woodlands. Miombo is an informal term used to refer to indigenous forest resources mainly composed of *Brachystegia*, *Julbernardia* and *Isoberlinia* genara [5-8]. Miombo woodlands are dominant in southern, central and eastern Africa covering about 2.7 million square kilometers [7,9]. In Zimbabwe's 39 million land area, approximately 41% is under woodlands, with Miombo woodlands contributing 9% and *Colophospermum mopane* making up 21% [6]. The tree stumps that I encountered were mainly those of *Brachystegia boehmii* (Mupfuti) and *Brachystegia glaucescens* (Muunze) species (indigenous tree names in brackets). This was a sign of the selective cutting down of trees for a particular purpose – tobacco production – in addition to some other forms of deforestation that have pre-existed to meet human needs such as for firewood, thatching grass, fiber, poles and medicinal purposes. These activities have an effect of selectively compromising the species composition of indigenous forests [10].

Then, I remembered my view through the woodlands had completely changed from my childhood with the rocky outcrops looking barer than before as the vista was more enhanced for me to see far afield. From a vantage point next to our cattle pen I could spot the huts belonging to people from the next village, something which was practically impossible during my childhood because of the obstruction by the tall and dense vegetation cover that existed then. Even the mighty Donga River downhill that runs through my village was heavily silted such that by this time of the year it was no longer having flowing water except interspaced small and shallow pools. These are landscape changes borne out of the cumulative effects of environmental pressure over many decades which in my view are getting severe due to the further cutting down of huge trees for tobacco production. In my subsequent visits since then (2010) I have witnessed these changes. As far back as 1980 when the country got political independence, increasing levels of deforestation of indigenous woodlands, especially in the communal areas, were noticed and attributed to rising population pressure [5]. This concern has been raised since then [6] and recently this has escalated due to the increase in smallholder tobacco production and its inherent fresh push on forest resources [11].

Given the tobacco sector's long history as a major contributor to the country's economy, significance of the land question, coupled with lack of capacity to enforce key environmental

protection policies in Zimbabwe all pose governance challenges in the use of natural resources and promotion of alternative and environmental friendly livelihood strategies. Colonial policies and regulations in southern Africa made tobacco production exclusive to the minority white commercial farmers [12]. Colonial land policies also pushed the African majority population into marginal areas where agro-ecological conditions are not conducive for arable agriculture, thus making those ecosystems and landscapes fragile and more susceptible to damage due to human habitation. The entrance of previously disadvantaged majority into the once minority-dominated tobacco sector (and economy) [13,14] in a quest to improving their livelihoods (as a way of empowerment), is driving forest landscape changes that pose inherent environmental challenges including climate change. The farm level processing of tobacco leaves after harvesting involves drying which requires circulation of heat energy in a barn [11]. Wood is less efficient heat energy source than coal and therefore the curing process demands an excessive amount of firewood [9]. The majority of the smallholder tobacco farmers (about 90%) rely on firewood to cure their tobacco as other alternatives like coal are logistically and financially beyond the reach of the rural households [13]. Thus farmers selectively cut down for example, huge indigenous trees some of which would have taken 75-150 years to mature [11]. The rising need for land to cater for the economy in a way that allows conservation, ecosystem service functions and supporting the livelihoods of rural communities pose a daunting task in the governance of land resources [15]. Ongoing deforestation, deterioration of forest resources in conjunction with loss of biodiversity and habitat fragmentation in the tropics have been a worldwide concern [16-19]. This is because on a global scale, about 1.6 billion people's livelihoods are anchored on forest resources in the rural areas which have negative effects on the environment including climate change [20]. There is therefore one critical question that keeps lingering in relation to the reliance on forest resources for poor rural households around the world: *"are household-level forest incomes in developing countries sustainable*?" [21 (p. S113)]. In the Zimbabwean context, the heavy reliance on firewood for curing tobacco is posing a dilemma to forest policy and regulation, and livelihood strategies in relation to the sustainability of the forest resource utilisation.

The paper proceeds by laying out the conceptual and analytical framework of the institutional and landscape approaches used to look at the critical nexus and implications of smallholder tobacco production as a livelihood strategy to forest landscapes in Zimbabwe. This will be followed by a treatise of smallholder tobacco production as a livelihood strategy. Next is the connection of smallholder tobacco production to deforestation followed by exploration of Zimbabwe's forestry policy dynamics. The implications of smallholder tobacco production as a livelihood strategy to forest landscape are important, as further discussed in the section that incorporates some reflections of institutional processes that stir landscape governance which is followed by concluding remarks.

2. Conceptual and Analytical Framework

This article explores the dynamic relationship between the institutional and landscape approaches in the management and utilization of forest resources. Institutions are critical as they govern access to and use of resources (forests in this case) [22] which in turn have an effect on forest landscapes. The fast track land reform process in Zimbabwe for example, opened up access to land to the previously disadvantaged people (which was a noble initiative) who were resettled on formerly minority owned land and thus inherently opened access to the forest resources [13,23]. A situation is portrayed when the local community manages its forest resources whilst enmeshed in a market economy system that has a pervasive influence on the utilization of its resources [24,25]. The conservation imperative of the forest resources keep going down leading to an unpredictable trajectory [25]. Subsequently, the community is inclined to adopt what could be an economically option for the utilization of forest resources in the pursuit of local development [25-27]. Poverty is singled out as a major drive behind the unsustainable utilization of forest resources on the back of an economic impetus that turns those resources more for agricultural purposes [25,28]. Around 2011, about 75% of the Zimbabwean population, the majority of them in the rural areas, were estimated to be living below the country's poverty datum line [3]. For a long time, poverty has had an intricate relationship with deforestation [25]. For example, a win-lose link ensues when deforestation cost

borne by a society for its development as forest resources are turned in to satisfy agricultural requirements [25]. The increase in agricultural production has driven the change and deterioration of tropical forests [15,17,29]. An ideal win-win relationship is when forests are allowed to regenerate to ensure adequate ground cover to achieve an appropriate landscape without compromising ecosystem integrity [25]. Such win-win situations characterized by the interface of "*poverty alleviation and forest conservation*" still remain unknown as there have not been comprehensive studies that include "*detailed socio-economic and forest inventory data*" [21 (p. S113), 30]. However, fickle market economy conditions can result in a lose-lose relationship for both the community and its forests resources [25,27,31]. This arises when forest resources are turned in for agricultural purposes in a manner that is not viable, leading to people to survive from hand to mouth [25]. A sudden change in market forces can justify the business case for a move from one economic activity to another [27], but the environmental footprint (including landscape degradation) of the previous activity may be long lasting.

The poor households are barely able to meet their short-term needs at the expense of the long-term sustainable utilization of their forest resources [19,25]. Poor indigenous people become mainly concerned with day to day survival, though in overall people's needs and aspirations keep changing [32; 33], which calls for constant evaluation of previously held views regarding resource use [27]. This is important to differentiate people's practices which are deliberate from those which are inevitable resulting into a variety of landscapes depending on vegetation cover and fragmentation [32,34]. Studies on the governance of forest resources at a local level have shown that without institutional mechanisms that level the distribution of returns, well up members of the community can unreasonably benefit at the expense of the poorer members of the society thereby increasing the gap between them [28,29,35-38]. This can happen when local level custody of forest resources increases as a reaction to lackluster approach by state authorities in the conservation of those resources that guarantees upholding the ideals of concerned stakeholders [18,39]. In this way weak institutions in forest resource governance may result in unintended consequences [40]. For example, deforestation becomes connected to *"insecure property rights, which are broadly defined and are caused by political instability (the inability to enforce ownership) and the absence of government accountability (non-representation)"* as this has been revealed that *"enforcement of property rights (secure ownership) is lacking in countries experiencing rapid deforestation"* [39 (p. 118)]. Could this be the situation unfolding in Zimbabwe where tobacco production has been encouraged as a culmination of the controversial political and economic policies that relate to land and forest resources?

The successful management of a resource on a sustainable basis is difficult to achieve when there are stakeholders who have diverse knowledge, rights, interests, values and choices [41-43] which creates tension based on how to use the land and its resources [32,44]. Tension between community management and biodiversity management also arises because of a community's direct subsistence through selective utilization of forest resources resulting in the disturbance of the ecosystems [27,38]. The selective cutting down of indigenous trees for tobacco production is a case in point here. This is characterized by an alteration of the species composition, even leading to biodiversity loss which is seen as a pervasive global environmental threat [15,16,45]. This difficult situation also results from the inherent changes of the ecosystems and the shifting human relations driven by the prevailing socioeconomic fundamentals and systems of rules [42]. Now there is a realization that biodiversity around the world exists juxtaposed to human territories and hence the tension needs to be reduced by solutions implemented across the landscape and stakeholders [32,45]. So, interventions must be grounded on local contexts [45] as the local people derive some positive returns while simultaneously being motivated to increasing their conservation efforts [37,46]. Exclusive conservation policy interventions run the risk of putting the livelihoods of local people in danger [28,29]. A study involving a common pool resource demonstrated that the users will be drawn to manage their resource prudently when they are inevitably faced with an inherent

sudden change in the rate of regeneration of the resource [42,47]. Community management of forest resources has mixed results [32,45]. There is dearth of proof to assert that narratives on the international policy arena that community management of forests is more appropriate for biodiversity conservation than in public protected areas [32,45]. This is so because those resources may be mainly controlled by local elites who could be equally dishonest like their counterparts in higher levels of government [26,32,37]. Circumstances in a particular area are unique and there is need for a variety of ways to analyze how local management of forests resources takes place [32]. Communities may value biodiversity in a different way from the perspectives of global conservation organizations, like what is provided for in the Convention for the Conservation of Biological Diversity [10,32]. Imperatives for local management of resources may not be in sync with intangible biodiversity concerns linked to the public good as ephemeral immediate needs supersede the far-fetched global biodiversity standards [45]. When such contradictions arise, the landscape stakeholders look for means to resolve the tension by taking local measures that attempt to fit into the relevant policies in line with their own choices [48]. If it happens that the results conform to the well established policy arrangements then *"productive and institutional bricolage"* would have taken place [48: 64]. Production systems can be set in unclear institutional arrangements which need further 'bricolage' which involve "unconscious yet creative process of blending old, place-based institutions with modern institutions, thereby crafting new institutional arrangements that fit into the specific realities of landscapes" [48 (p. 64)].

This blending echoes the view that rather than sidelining (local) citizen participation [40,41,49], ideally, people who are directly affected by the adoption of conservation programs need to be involved in their initiation and implementation for such programs to be inclusive of the people's wisdom, value systems and interests since they depend on those same resources for their livelihood [32,40,45,50]. This is important for the governance arrangements to be context specific to the ever changing local conditions that underpin biodiversity conservation for example by allowing communities in formulating regulations and making decisions [32,47]. In this way *"…local involvement [is seen] as the input to decisions on the use, including conservation, of natural resources by the people who live in and utilize a particular forest or landscape for their livelihoods"*, [45 (p. 2)]. Landscapes keep on changing due to social, economic and political factors coupled with inherent environmental processes such as variability of climatic characteristics [34]. These factors that determine the state of the landscape at any juncture are related to the track record of its occupation, environmental limitations, governance arrangements as well as the effect of current users' activities and ethics [34].

3. Smallholder Tobacco Production as a Livelihood Strategy

Tobacco as a purely cash crop has critical implication for its role as a source of income. This is unlike for example, maize as a staple food crop whose production by rural households has to primarily satisfy their food requirements before they start selling the surplus produce to derive extra income for other needs. It is this critical nexus of tobacco production as a livelihood strategy which has far-reaching consequences in altering landscapes as it is intricately linked to selective deforestation of indigenous trees. Income from tobacco production became so lucrative in Zimbabwe for the smallholder farmers. For example, an unstable macroeconomic environment coupled with periodic droughts limit household incomes, pushing people to depend heavily on forest products for various needs of survival [6]. Deforestation continues unabated because a crop, such as tobacco in this instance, is fetching an attractive market price even if this may be short-lived as anticipation for improved prices is instigated [26]. The lucrative tobacco price was on the back rising demand from developing markets like the Chinese [23]. As of 2001 the distribution of land in

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the country was as follows: communal areas (42%), large-scale commercial area (28%), state land (17%), and resettlement areas (9%) small-scale commercial farming area (4%) [51]. The fast track land reform process in Zimbabwe altered these distributions of land in the country. By 2009 the state had taken over 10 million ha of arable land from the large-scale commercial farming sector which was subdivided into plots that were parceled out to over 168 000 households thereby bringing around 146 000 and 23 000 new entrants into smallholder farming sector and the large-scale farming sectors respectively [3]. Part of these 146 000 land reform beneficiaries constitutes the increase that has been witnessed in the smallholder tobacco farming segment (Table 1). About 75 per cent of the poverty stricken population in the developing world reside in the rural and they are overly dependent on natural resources (with forests contributing a significant portion, therefore critical) for their livelihoods in terms of subsistence and income generation [20,24,28,31,36]. In Zimbabwe the rural population constitutes about 70 percent of the total population. Given that rural livelihoods in the developing world are in a precarious position as they are vulnerable and insecure due to government policies amongst other causes [24], the Zimbabwean context was exacerbated by the political and macro-economic crisis following the fast track land reform programme that intensified since 2000. Forest resources are used as a cushion and they act as a hedge against the risks associated with predictable and uncertain crises that befall on rural communities [9,24,31].

Tobacco production has added onto the indirect commodification of forest products through emergence of middlemen as small scale wood suppliers, like in Malawi [12], who have traded firewood to tobacco growers who come from areas where there is scarcity of indigenous woodlands enough to sustain their local demand for treatment of flue-cured tobacco. Flue-cured (Virginia) tobacco production far exceeds the production of burley (air-cured) and oriental (sun-cured) tobacco in Zimbabwe [51] and this comparably heightens the demand for firewood for tobacco treatment. Provision of support in terms of financing through contract farming by private companies contributed to the increase in the participation of the smallholder sector in tobacco production than before [23] as farmers under the auction system have to directly bear production costs [3]. In the same vein, a study in Mazowe District, Zimbabwe found out that contract farmers did well than their non-contract counterparts, as they secured inputs, extension and financial services [23]. Contract farming contributed 82% to the sale of the country's tobacco output as compared to 18% sold through the auction system in 2016 [3]. However, there was need for government intervention in strengthening institutions that cushioned the farmers in the form of land tenure, contractual issues and the provision of long lasting infrastructure besides the operational finance provided by the private contracting firms [23]. In Nepal, studies have shown that community participation in forestry programs has yielded an increase in forest product output and better forest outlook, but there is dearth of studies on the financial returns of such participation at the household level [20,47]. On the other hand, the fickle nature of markets (as noted in the volatile tobacco prices in Table 1) leaves a mixed trail on the forest value chain.

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Table 1. Flue-Cured Tobacco Production in Zimbabwe (52,53)[1]

Year	Growers	Area (ha)	Mass Sold (kg)	Average Price (US$/kg	Average Yield (kg/ha)	Gross Value (US$)
2015	97 616	107 546	198 954 849	2.95	1 850	586 544 231
2014	106 372	107 371	216 196 683	3.17	2,014	685 244 013
2013	78 756	88 627	166 572 097	3.67	1,852	612 135 672
2012	60 047	76 359	144 565 253	3.65	1 893	527 805 943
2011	56 656	78 415	132 431 905	2.73	1 689	361 448 679
2010	51 685	67 054	123 503 681	2.88	1 842	355 572 326
2009	29 018	62 737	58 570 652	2.98	934	174 457 761
2008	35 094	61 622	48 775 178	3.21	792	156 663 816
2007	26 412	54 551	73 039 015	2.32	1 339	169 159 675
2006	20 565	58 808	55 466 689	2.00	943	-
2005	31 761	57 511	73 376 990	1.61	1 300	-
2004	21 882	44 025	68 901 129	2.00	1 565	-
2003	20 513	49 571	81 806 414	2.25	1 673	-
2002	14 353	74 295	165 835 001	2.27	2 213	-
2001	7 937	76 017	202 535 209	1.75	2 664	-
2000	8 537	84 857	236 946 295	1.69	2 792	-

[1] The blank spaces in the column of gross value for the years 200 to 2006 inclusive were during the Zimbabwean Dollar times and comparisons here are difficult due to the hyper-inflationary outlook of the official currency at that time

Some factors that influenced the growth of the smallholder tobacco sector have to do with the historical question of land imbalance, colonial policies that stifled African participation in the sector, and the political and economic policies adopted by the post-independence government especially after the tumultuous period since 2000. It is in this context that one has to analyze the reconfiguration of forestry policy juxtaposed to the unfolding political and economic circumstances that influenced the massive adoption of smallholder tobacco production. A study using the gross margin analysis in Hurungwe District, Zimbabwe showed that overall the smallholder farmers gained from tobacco farming with a mean of US$3 396.00 where 85% of their fuelwood source is the indigenous woodlands (mainly being *Brachystegia boehmi, Brachystegia spiciformis* and *Julbernadia globiflora*) as compared to 15% from the exotic Eucalyptus woodlots [51]. The same study revealed that on a benefit to cost ratio, the benefits exceeded their costs within a range of 1.74 to 1.76 [51]. Studies elsewhere have also confirmed the prospects of raising the income of smallholder farmers, thereby uplifting their livelihoods [13].

4. Smallholder Tobacco Production and Deforestation Nexus

The tobacco treatment process is the critical connection between the cutting down of trees (besides for other needs) to procure firewood as an input to emit heat in (in this case inefficient makeshift) tobacco barns (Figure 1) to produce the final output that is delivered to the market. Large scale commercial farmers used coal to treat their tobacco, before more most of them lost their land through compulsory acquisition during the fast track land reform program [13]. The International Tobacco Growers Association uses the concept of the Specific Fuel Consumption (SFC) which refers to *"kilograms of wood used per one kilogram of cured tobacco, in cubic metres per of tobacco produced, and cubic metres per farm"* [54] as a measure of the efficiency of tobacco barns. This SFC can range from 5 kg to 130 kg for example; a smallholder farmer can have a tobacco output of 1400kg per hectare and would require approximately a minimum of 7 tons of firewood [54]. The efficiency of the tobacco

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treatment process determines the consumption of firewood in a barn, which in turn is reliant on design of the barn and the wood species (which drives the selective cutting down of Miombo trees) with the barns used by the smallholder farmers having been declared to be inefficient [13]. There has been a notable trend of increasing tobacco growers, increasing tobacco production (Table 1) and the increasing use of woodfuel consumption across all provinces in Zimbabwe [13] but the major tobacco producing provinces are Mashonaland West, Mashonaland Central, Mashonaland East and Manicaland [3]. Technological improvements to bring efficiency through for example, a rocket barn which uses approximately half the amount of firewood consumed in a conventional barn [14] are a good step forward, but in the interim the new technologies are expensive to farmers [13].

Figure 1. A Makeshift Tobacco Barn and a Stack of Firewood (Photo by author)

In Malawi the heavy demand for wood to use to cure tobacco is estimated to be as much as 102 000 tons per annum [12,55]. Forestry based livelihoods have to be contextualized in the contribution of forest-based income to the overall household income, in addition to the importance of Miombo woodlands in supplying "*fuel wood, building materials, medicine, food and ecosystem services*" as this has been shown to be significant in Tanzania, Malawi, Zambia and Zimbabwe [9; 12]. When it comes to tobacco production, the role of Miombo woodlands become complicated as to whether income from tobacco should be assumed to be wholly as farm income or woodland-based [9]. If such income is seen as wholly farm income, it will sideline the contribution of fuel wood, while it will also be a distortion to see the income as woodland-based [9]. Such a situation shows the critical link between tobacco production as a livelihood strategy, which in turn has repercussions on the landscapes and subsequently connect with climate change. However, there is need for further research to determine the role of woodland resources in the production of tobacco to ascertain its contribution to income which is important to sustain livelihoods of the rural households.

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5. Zimbabwe Forestry Policy Dynamics

A major concern in relation to *"forest policy analysis is how the governance of forests promote or affect community livelihoods, whether certain elements reduce or exacerbate inequality*" [38 (p. 3)] and such information is hardly available for communities to be able to extricate themselves from an intractable position [43]. Zimbabwe's forestry policy has been mainly based on external expertise from the global level with little regard to local and traditional knowledge, thereby causing a unidirectional setup in knowledge transmission from the specialists to the smallholder farmers [7,56]. On this basis, Zimbabwe has adopted efforts at the international front, where issues relating to climate change and biodiversity have been attended to through a plethora of global environmental treaties. A turning point was the 1992 Rio Conference which ushered the United Nations Framework Convention on Climate Change (UNFCC), Convention in the International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Desertification and the Convention on Biological Diversity (CBD) [10,16,57-60]. These milestone agreements are a manifestation of a long drawn process of international negotiations which have become so instrumental in pushing multi-lateral and multi-scale policy development in recent decades [59] in an "*attempt to reduce the rate of tropical deforestation and forest degradation and the associated biodiversity losses*"[16 (p. 2)]. In relation to climate change, a host of high level interventions have been instituted mainly through the formulation, acceptance and implementation of the Kyoto Protocol (driven by the UNFCC), though with its challenges that led to adoption of the Paris Agreement in 2016 [58,59]. These governance arrangements encompass numerous stakeholders at state and non-governmental with a focus on mitigation and adaptation to climate change at different levels and scales [61]. With respect to biodiversity, international efforts have focused on policies and suggestions to step up conservation anchored on sustainable use since 1992 with notable progress though biological loss is higher than natural rate of extinction [59].

Forestry policy in Zimbabwe has to be analyzed in the context of broad environmental policy making. There is an observation that environmental policy making took a trajectory of continuing some colonial "*top-down, command-and-control"* tendencies, for example, of attributing land degradation in the so called 'native reserves' (now communal areas) to 'primitive' African agricultural production systems as if there was no land degradation within areas of European settler occupation [56 (p. 14), 62]. Such an approach was in line with the adoption of a narrow technocratic stance in steering environmental policy making to the exclusion of other views and focusing on environmental problems that needed attention in natural resource management [56]. The processes of the development of colonial forestry policy excluded local people to the extent of limiting their involvement in decision making in the use of forest resources by treating them as being destructive [7,62]. The same notion persisted in post-colonial Zimbabwe simply through deracialization of forest regulations by doing away with racial tags for example, Native Area Forest Produce Act of 1929 and the Forest Act of 1949 which were changed to Communal Lands Forest Produce Act of 1987 and the Forest Act of 1996 respectively [7]. It is under the Forest Act that the Forestry Commission was established in 1954 to oversee government's forestry plan that centralized state control in communal areas [7]. These processes happened excluding the much needed meaningful democratization to seek to address issues of tenure and access to forest resources by the rural households in the communal areas [7].

Efforts of decentralization in the management of natural resources can be viewed in tandem with restructuring of local government. The restructuring involved attempts to deracialize the local governance system steeped on the colonial system by for example, replacing the African Councils with District Councils in 1980, followed by their consolidation with Rural Councils into Rural District Councils in conjunction with Urban District Councils in 1988 [63]. Formidable steps towards decentralisation of local government were put in effect around 1984 through the formulation of Ward Development Committees (WARDCO) and Village Development Committees (VIDCO) [56,63]. The Forestry Commission worked hand in hand with the Rural District Councils in

taking care of forest resources in rural areas under co-management arrangements [64]. The Ward Development Committees and Village Development Committees as formal institutions also blended and interacted with traditional authorities in the management of common property resources [22]. However, there is contention that establishment of these committees "*invested with responsibility to organise 'community-based' environmental management schemes can be seen as ways of extending the reach and authority of the state and establishing its legitimacy as the ultimate source of authority within rural areas*" [56 (p. 14)]. The Agricultural Technical and Extension Services (Agritex) now transformed into Agriculture and Rural Extension (AREX) has been instrumental in offering extension services to the smallholder farmers to enhance their agricultural practices. Such a set up brought together a range of institutions (including non-governmental organisations) at the local level and this has had its fair share of challenges in the management of resources due to conflicting interests, power relations and mandates [22,38]. This accentuates the idea that less attention has been given to the effect of law on the tension of climate change and biodiversity conservation interventions at lower levels of the multi-tiered governance setup [59]. Forestry policy reconfiguration in Zimbabwe needs to move in sync with the adoption of smallholder tobacco production as a livelihood strategy by rural households.

The Constitution of Zimbabwe which was adopted in 2013 sets the broad base to deal with environmental issues (Section 73) including the sustainable utilisation of forest resources, together with the introduction of government structures and state institutions, such that some of the laws still have to be aligned to be compliant with the supreme law. For example, in Section 73(1)(b) the Constitution upholds the right of every person "*to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that – (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting economic and social development*" [65 (p. 37)]. Section 73(2) further declares that "*the state must take reasonable legislative and other measures, within the limits of the resources available to it, to achieve the progressive realisation of the rights set out in this section*" [65 (p. 37)]. However, in relation to environmental issues, prior to the adoption of the Constitution, government had already introduced a new statutory body, the Environmental Management Agency to replace the Natural Resources Board through promulgation of the Environmental Management Act (Chapter 20:27) in 2002 [66]. Through the Environmental Management Act (Chapter 20:27), the Environmental Management Agency has an overarching mandate broader than any other state agency connected to environmental matters by declaring in Section 3(2) that "*if any other law is in conflict or inconsistent with this Act, this Act shall prevail*" [67]. This development has its challenges in connection with the role of the long existing Forestry Commission as a government agency which has high institutional capacity to implement programmes on forest resource utilization and conservation. However due to scarce financial resources both government agencies are stretched to be able to monitor what is going on in each village and resettlement area to enforce regulations that govern the sustainable utilization of forest resources.

6. Implications to Forest Landscapes - Climate Change

The most anticipated effects of climate change on a global scale include the rise in the extent and rate of occurrence of acute weather incidents like storms and high temperatures which result in floods, increase in sea level and ecological changes that all have a bearing on livelihoods [10,57]. Deforestation contributes as much as a fifth of the human-induced greenhouse gas (GHG) emissions [33,39] mainly made of carbon dioxide [10]. Smallholder farmers are susceptible to the negative effects of climate change and variability because they depend on naturally occurring rainfall for their agricultural activities [68]. Land-use changes especially paving way for agriculture, settlement,

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unplanned bush fires; livestock grazing and the deliberate cutting down of trees, though seen to be happening at a local level, are prevalent in southern Africa and play a role in global warming [6,38,68]. This is in addition to the cutting down of trees as part of the demand for energy by the majority of the rural population in developing countries [33,39].

Human activities such as deforestation and reforestation/afforestation have the effect of depleting species and introducing new species respectively which cumulatively result in 'novel ecosystems' that do not have a precedence thereby posing new and unforeseen challenges like invasive species and persistent pests [10,69]. Deforestation causes the scarcity of wood-based outputs such as woodfuel and cause land degradation which in turn reduces productivity [5]. The impact of deforestation and/or forest degradation in primarily altering ecosystems and compromising their ability to provide various ecosystem goods and services, in turn extend beyond their direct effect on the tobacco sector. A study in Urambo District, Tanzania showed that fresh woodlands that have not experienced excessive human influence have become rare due to liberal economic policies that encouraged the increase in the land being converted and trees cut for tobacco production [70]. There was a record of substantial reduction in biomass and alteration of the vegetation structure which could undermine ecological integrity [70]. Though such practices do not effectively alter stem density, there is need for long fallow periods (depending on carrying capacity) for the Miombo woodlands to regenerate, which is difficult due to abandonment of shifting cultivation [70]. Miombo woodlands are in this case critical in that they are a huge storage for carbon with implications for climate change from a global point of view [8]. In terms of biodiversity Miombo woodlands are also important in that in the regions where they are found they do so inherently with about 8500 species of plants, with more than 50% of them being endemic [8]. Conservation of Miombo woodlands is important for local people to benefit from them in a way that goes beyond energy needs for tobacco curing.

A study on climate change and variability in relation to smallholder farming in Zimbabwe showed that more than 95% of the respondents were aware of the changes in weather conditions, such that about 67% (Wedza District) and 75% (Makoni District) of them had pointed at the irregularity of rainfall as an observable trend they had witnessed in their lives [68]. The respondents described the rainfall season to have longer dry periods, high occurrences of flash floods, extended mid-summer droughts, a late start of the summer rains and a sudden end of the summer season [68]. These observations have been found to be congruent with scientific evidence which points towards the southern African region's trend of getting more arid posing challenges to agricultural production and viability [68]. Farmers are conscious of the shifting weather conditions, their causes and effects in their immediate surroundings and point at climate change [68]. These changes in weather conditions can be read as part of climate variability in the short term, but in the long term they can be a manifestation of climate change when they occur at a rate that has not been precedented in each particular area.

4. Discussion: Institutional Bricolage towards Effective Landscape Governance

In the face of an escalation in deforestation and subsequent land degradation the global village is called to craft solutions that are in line with "*both rural livelihoods and biodiversity conservation*" [14 (p. 2)]. There is concerted effort at the international level to elicit the support of local people who remain marginalized [46] in meeting global conservation targets in nurturing biodiversity [32]. However, due to lack of local connectedness, there is inadequate evidence to support the idea that solutions that involve conservation efforts at international level can be implemented through community management of forest resources and simultaneously bring local and wider environmental dividends [32,38,45]. There is also less substantial evidence pointing towards the effectiveness of community management of forests due to a lack of comprehensive studies in that respect [16]. Nevertheless, there is an argument that local management of forests should be viewed as a constituent of landscapes whose governance mechanisms are inclined towards optimizing "*a balance between the local livelihood values and the global public goods values of forests*" [45 (p. 1)]. The

Zimbabwean situation with regard to the utilization of forest resources driven by smallholder tobacco production need to be seen in this context.

Setting aside an area to protect nature is a strategic move towards conservation of biodiversity and its inherent ecosystem services [71] for sustainable development in line with the sustainable development goals (SDGs). People have a great responsibility not to damage the environment, keep it in a good condition to be fit for human habitation and leave it in a good state for subsequent generations [72]. However, the area that is put under conservation is limited in reducing the loss of biodiversity and satisfying human needs as the area is always restricted due to population pressure [27,45,73]. One of the major reasons of the fast track land reform program in Zimbabwe was to decongest the communal areas; hence there was noticeable movement into the resettlement areas (formerly large-scale commercial farming area), but this has not resolved the question of pressure on land. Innovative solutions are required at different scales so that communities that rely on forest resources can develop the capacity to meet the challenges of environmental changes [10]. These solutions need to be rooted in the understanding of what happens at the people-forest interface [19,43]. Forest resources have remained at the core or part of efforts to mitigate against climate change through various initiatives and platforms such as greening of the economy, zero deforestation – a brainchild of the New York Declaration on Forests, Tropical Alliance 2020, the Bonn Challenge, REDD+, Payment of Ecosystem Services (PES), Integrated Conservation and Development Projects (ICDPs) [10,28,30,35,55,58]. A study in Malawi showed that there is scope and potential with positive spinoffs for agroforestry and carbon sequestration in the smallholder sector [74]. Such a program which is part "*of the REDD+ mechanism [that] goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in reducing emissions*" [74 (p. 173)], need to be explored in the Zimbabwean context.

Institutions go through bricolage [75] whereby "*people consciously and unconsciously protect, conserve, use, contest, alter, exploit, destroy, change, and rehabilitate ecosystems, for their own or somebody else's benefit, with implications for ecosystem functions and services.*" [43 (p. 80)]. In this regard there is a suggestion for adaptive governance which embraces the challenges and caters for strategic learning, establishment of networks and accommodative mechanisms [76]. There is need to leverage on the spirit of bringing people together and emphasizing awareness on the degradation of landscapes due to deforestation in order for the stakeholders to craft local solutions. This calls for an institutional setup that is inclusive of the strengths of each intervention driven by public endorsement to achieve rehabilitation of ecosystems and strategic financial support [76]. Environmental policy integration on the back of substantial political will should be a priority in modifying institutions in the implementation of the sustainable development goals [28,77] as argued in this paper for the need for appropriate institutions for landscape governance that support sustainable utilization of forest resources. Zimbabwe has gone a long way of environmental policy integration through the emergence of the Environmental management Agency, but in reality this statutory body needs to be equipped with the necessary resources and political will for it to execute its mandate successfully.

Suggestions of interventions to mitigate the deleterious environmental impacts of tobacco production from the TIMB include, sustainable afforestation, introduction of efficient curing infrastructure, use of alternative energy sources such as coal and farmer awareness and training [4]. Viable options to tobacco production do exist for households to diversify but there is lack of support for poor and vulnerable households to adopt them. Increasing levels of poverty limit the ability of households to adopt new technologies and adaptation strategies when confronted climate change induced survival challenges [2]. The road to diversify into these viable options in Zimbabwe is a long drawn process of (re)orientation of suitable institutional arrangements to negotiate for equitable and environmental friendly ways for access to and utilization of indigenous forest resources. The crafting of forest policy happens in an environment in which the care for forests is riddled with challenges connected to rural advancement and nature conservation [78]. In Vietnam smallholder farmers have embarked on commercial tree growing, by capitalizing on the increasing demand for wood, to improve their livelihoods though well off households benefit more than their poorer counterparts [35]. The long-term survival of community managed forest resources is

determined by closing the gap between rich and poor members of the community especially by empowering the less privileged to improve their livelihood [2,37]. Contemporary trends on the climate change discourse stress the need for governments to shift their economies from use of fossil fuels, which comes with a heavy burden of transformation to a new state, which challenges current consumption trends that involve emission of greenhouse gases [79] and this would go a long way in the Zimbabwean situation in the face of the anti-tobacco lobby. For example, even the World Health Organisation's Framework Convention on Tobacco Control (FCTC) Articles 17 and 18 point out that need for emergence of strategically viable options besides tobacco production [80]. This poses a critical question of the responsibility of the state, the effect of the free market economics under neo-liberal policies [29,81] in directing the utilization of resources and the contemporary heavy consumption trends [29,39,79].

With the anti-tobacco lobby [80], given the hazardous effects of tobacco to health [82], pressure will keep on being mounted on the sector and this will undermine long-term sustainability of tobacco production by squeezing off the vulnerable and resource-poor smallholder players. Questions about health concerns, child labor (given that tobacco production is a labor intensive process) and human rights abuses on tobacco farms [3] all cast aspersions about the quality of life resulting from sustaining livelihoods from tobacco income and the continual reliance on the crop. Farmers need to embark on some reforestation programs in order to keep benefiting from tobacco growing as a livelihood strategy; otherwise the enterprise will become less viable due to shortage of fuelwood due to depleting sources [54].

In line with the successful decentralization by ceding power to local authorities in Nepal, based on scientific principles and indigenous knowledge, which allow autonomous management of their forests as provided for in the law [83,84], the Zimbabwe central government can make it mandatory for local communities to draw tangible plans. These local forest management plans need to be implemented in a way that allows central government not to take back the power that has been ceded to the local level [84-86]. The indigenous knowledge incorporates traditional ecological knowledge (TEK) which is becoming influential in the crafting of environmental policy and subsequent environmental decision-making at the local level for instance, in the fight against climate change [10,75,87,88]. This will allow for the integration of biodiversity conservation with the support of local people's livelihoods since they are the core users of the forests [83]. There is need to consider the socio-ecological production landscapes (SEPLs) as an alternative approach which is premised on the integration of social and ecological systems as they are mutually exclusive [40,43,73,75] and as part of 'forest transition' that exceeds focus on tree cover [68,89].

5. Conclusions

The nexus of smallholder tobacco production as a livelihood strategy to forest landscapes in Zimbabwe is posing a dilemma to forest and livelihood policies. Smallholder farmers seized an opportunity on the back of tacit government support coupled with market conditions under macro-economic instability to participate in the tobacco sector as a way to earn a livelihood. However imperatives for local management of forest resources have been seen not to be in sync with intangible biodiversity concerns linked to the public good as ephemeral immediate needs have superseded the far-fetched global biodiversity standards upon which Zimbabwe's forest policy is based. As such contradictions have arisen, the landscape stakeholders (mainly the smallholder farmers) looked for means to resolve the tension by taking local measures that attempt to fit into the relevant policies (under government support) in line with their own choices. Nevertheless, this paper argued that tobacco production as a source of livelihood relates to deforestation and as such could be interpreted as an aspect that influences landscape changes and also pushes or contribute to climate change, hence the need to examine new institutional and livelihood initiatives.

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