TANZANIA

TOBACCO TAKES ITS TOLL IN THE MIOMBO WOODLANDS

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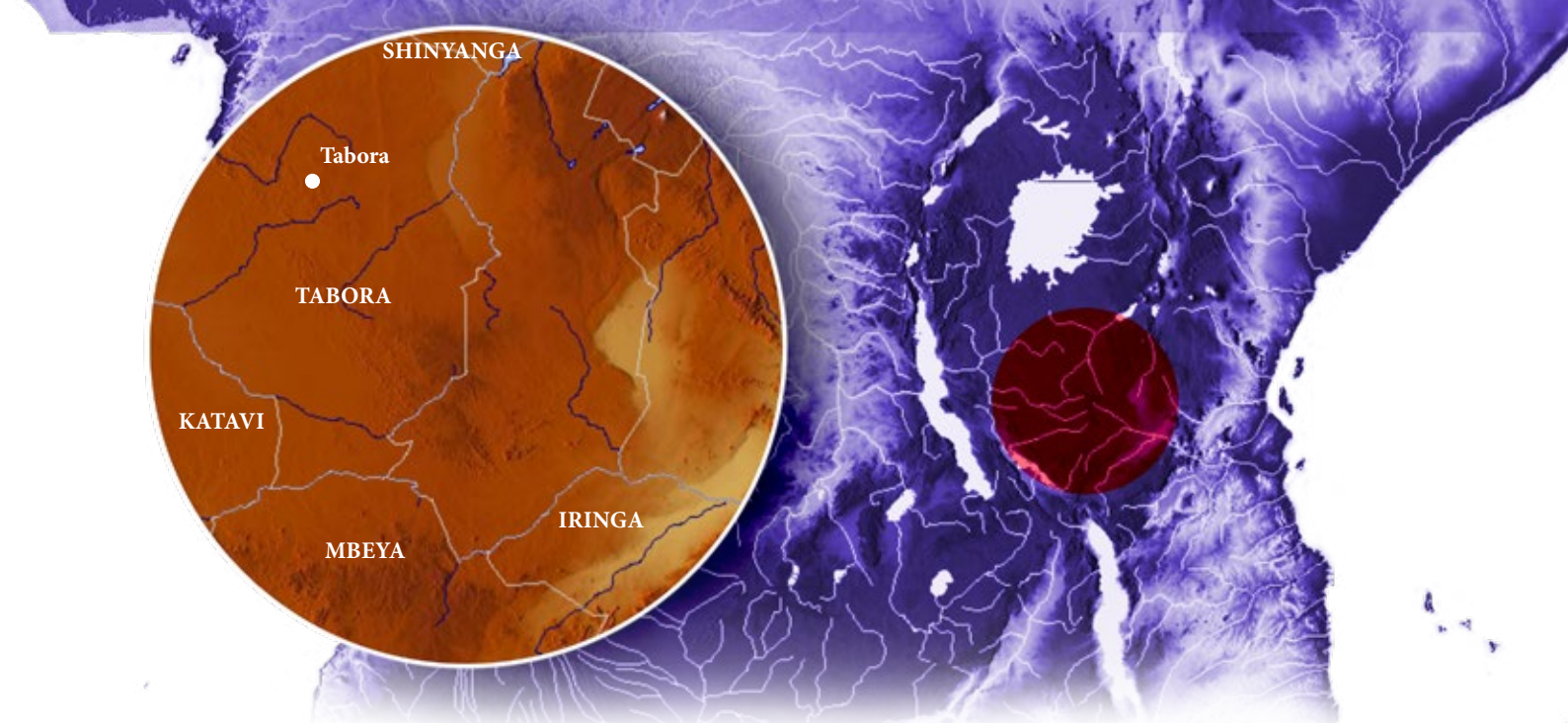
Tobacco is mainly grown in the miombo woodland regions of central western and southern highlands of Tanzania, where growers clear vast areas for farms and consume large quantites of natural wood for curing the crop (Mangora 2005, 2012; Ntibiyoboka 2014; Abdallah et al. 2007; Jew/Dougill/Sallu 2017; Ndomba 2018). It is the second export cash crop, after coffee. Tobacco export recorded a rise in revenue from US$ 127 mio in 2009 to US$ 288 mio in 2015, when it was accounting for more than a third of all the country's export earnings from traditional crops (Bank of Tanzania 2018). Other major export crops are cashew nuts, coffee and tea. In 2016, the area planted with tobacco was 148,462 hectares (FAOSTAT 2018).

Despite this economic attraction, extensive clearance of woodands for tobacco cultivation claims more arable land that would otherwise be available to grow other crops for food, exposing families in tobacco growing areas to food insecurity. Furthermore, tobacco cultivation is labour intensive, such that farmers devote more time to tobacco farming at the expense of food crops. Labour requirements by tobacco growers compell families to rely on their children for work in the fields which often goes to the expense of their education (ILO 2016). Tobacco cultivation relies heavily on applications of pesticides and fertilizers, exposing farmers with little knowledge of the toxicity of such chemicals to health risks.

There are two main types of leaf tobacco grown in Tanzania, distinguished by curing methods. Virginia ‚flue-cured' (VFC) whereby harvested leaves are hung in curing barns, in which heated air is generated by burning wood to dry the leaves for up to a week. This variety is primarily grown for the international market, accounting for over 80% of the annual tobacco production in the country. VFC was first introduced in Urambo in the 1940s and subsequently spread to other areas of Tabora region, Kahama, Mpanda, Iringa and Chunya (Geist et al. 2009; Jew/Dougill/Sallu 2017; Ndomba 2018). Accounting for 15% of the country's tobacco production is dark fire cured tobacco (DFC), which is cured by smoke and was first introduced in Namtumbo, Ruvuma region, in the 1930s. Other areas growing this variety are Kagera and Mara (Ndomba 2018). A third variety, air-cured Burley tobacco, is of minor commercial importance, grown only in Ruvuma, Kagera and Morogoro (Sauer/Abdallah 2007; Ndomba 2018).



Tobacco cultivation in the country is characterized by smallholder growers, for whom the crop serves as a major source of household employment and income. Families cultivating tobacco get agricultural inputs (seeds, fertilizers, pesticides) on agreement to deliver the harvested and cured leaves to the tobacco buying and processing companies. According to the government body regulating the tobacco sector, the Tanzania Tobacco Board, on average 4,000 people enter into such agreements every year. In the processing factories, about 8,000 people are employed every year, 5,000 on a permanent basis and 3,000 as temporary casual labourers. With all the blames for the negative social and environmental consequences, tobacco cultivation in Tanzania is perceived as major source of income and a way to alleviate poverty (Mayuya 2013), albeit the production remains characteristically smallholder (Jew/Dougill/Sallu 2017; Ndomba 2018). In spite of the promotion of contract farming, the industry is still characterized by unstable crop prices, inadequate extension services and poor marketing systems, allowing exploitation of poor peasants by crop buyers through low prices offered, high-priced loans for farm inputs and unfair grading of the crop at the buying stations (Ndomba 2018).

ENVIRONMENTAL IMPACTS

Tobacco farming in Tanzania leads to deforestation and soil erosion. These in turn lead to ecological disruptions, as land is cleared, trees are cut down for tobacco farming and curing and agrochemicals such as pesticides and fertilizers are used extensively.

Tobacco takes more nitrogen, phosphorus and potassium than other major crops and depletes soil fertility (Novotny et al. 2015). To compensate for the lost or impoverished soils, farmers are compelled to use chemical fertilizers, which in turn disrupts the natural nutrient pools and further degrades the soil. In addition, farm productivity in tobacco heavily relies on the application of pesticides, for example Confidor (imidacloprid), Desis and Yamaotea. While imidacloprid has recently been banned in the European Union for outdoor use (EU 2018), it has been introduced in Tanzania for tobacco farming. After on-farm and on-station trials in Tabora region, the substance was recommended due to its apparent profitability over other commercial chemicals (Abdulaziz/Abeid/Peploe 2016).

Nonetheless, apart from affecting farmers' health, chemical fertilizers and pesticides pollute water courses due to run-offs and poison soil microorganisms as well as bees. It results in the disruption of pollination services and affects other sectors such as beekeeping, because tobacco is cultivated in areas with high potential of beekeeping (Kagya 2016; Lahr et al. 2016).

Although tobacco cultivation in Tanzania claims only about 1,5% of the agricultural land (Eriksen et al. 2015), its characteristic shifting cultivation farming system that involves vast clearance of new land so as to maximize farm productivity is substantially damaging to the environment (Mangora 2005). Smallholder farmers tend to engage in a farming practice whereby after harvesting one plot, they leave it to fallow, move on to the next plot, and thus advance on into clearing new forestland (Acre/Caballero 2015). This kind of farming practices exposes the natural miombo woodlands to degradation and loss, threatening environmental integrity, as the fallow periods become as short as four years. For poor farmers who often can not afford the heavy priced fertilizers and pesticides, at least a 20 years fallow would be required to restore the natural fertility (Mangora 2005, 2012). To complicate the situation, mixed cropping is not an option for smallholder tobacco farmers, because they do not have capacity to control possible unintended drifts of chemicals incompatible with food crops. Furthermore, tobacco is a „clean" crop on farm, weeds do not grow in the field, exposing soil to erosion and water loss. This has implications on household food security.

LIFE ON LAND

SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

The most serious impact on miombo woodlands in Tanzania's tobacco growing areas originates from the curing process. Smallholder farmers exclusively use wood as source of energy to flue-cure the green leaves of Virginia tobacco. Large quantities of wood are drawn from the natural forest every season not only for curing the crop (Mangora 2005), but also to construct curing barns (Geist et al. 2009). It is estimated that wood harvested from approximately one hectare of woodland is required to flue-cure one hectare of planted tobacco (Acre/Caballero 2015). In other words, an average crop harvest of 1,000 kg tobacco (cured) per hectare consumes 23 m3 of wood (Mangora 2012). Thus for every cleared hectare of natural forest planted with tobacco, another hectare that must be over 10 years of age is cleared to cure it, resulting in massive degradation and loss of the miombo woodlands. More than 70% of it is sourced from general lands and forest reserves and only 30% is sourced from private lands (Geist et al. 2009; Jew/Dougill/Sallu 2017).

Consequently, farmers have complained over the years about deforestation in tobacco growing areas (Temu 1979; Mgeni 1988; Waluye 1994; TTCF 2007). Researchers have attempted to quantify and report deforestation figures from different districts. For example, in Urambo district, annual deforestation caused by accessing new tobacco fields was estimated at 3.5%, while another 3% is due to curing (Mangora 2005). In Iringa region, tobacco production accounts for 3.0 to 3.3% of annual deforestation (Abdallah et al. 2007). And most recently, an estimated 4.2% of annual deforestation was reported from Chunya district (Jew/Dougill/Sallu 2017). Additionally, the extent of the effect of tobacco curing to the environment is also dependent on the type and efficiency of the curing barns used. The traditional barn structures equally use a large amount of wood (Mangora 2005, 2012).

Tobacco farming accelerated deforestation through slash and burn is further associated with the decline of biodiversity and loss of other forest ecosystem services, both wood and non-wood. Deforestation triggers carbon emissions, contributing to global warming, the impact of which is much felt at local level through increased temperature and erratic weather conditions. In the wider context, recurrent droughts and famines, and unpredictable rainfall patterns are expected to increase with desertification in the country (Ndomba 2018). Scarcity and the burden to fetch forest resources such as fuelwood for cooking and building materials will grow with the distances to be covered for reaching the forest (Jew/Dougill/Sallu 2017; Mwasimba/Noorbasha 2017). As population increases, tobacco's competition for land will increase and the need for more farmland for food crops to ensure food security will intensify.

HOW TO ADDRESS THE NEGATIVE IMPACTS

A substantial body of literature exists on the negative impacts of tobacco farming, but yet affirmative control measures remain far from reach due to the controversies raised from the environmental, health and household economics (income and food security) point of view (Novotny et al. 2015). This chapter focused on the environmental impacts, particularly the impact of tobacco growing and curing on the miombo forest.

The effect of tobacco curing to the environment is dependent on the type and efficiency of the curing barns used. As such, proper curing and barn management is one of the measures advocated. Traditional barn structures with more than one furnace, use a large amount of wood, whereas other barn structures, the Brazilian barn and the Standard barn, use a medium amount of firewood. This warrants for exploration of energy efficient barn model. According to Tanzania Leaf Tobacco Company (TLTC), a subsidiary of the multinational tobacco leaf merchant Universal Corporation, the zigzag method for curing tobacco uses up to 30% less firewood compared to other traditional methods. Zigzag barns have a V-slot furnace allowing the use of small logs and twigs instead of big tree trunks, the zigzag brick channels to better distribute the heat and avoid fires in the drying room, as well as furnace doors to avoid heat loss. The governmental body Tanzania Tobacco Board, called on farmers with traditional barns to convert them to the zigzag model by the 2018 crop season. While the promises of such barns are high, they are not afforable

by most of the smallholder farmers, demanding for external support. Nonetheless, there are no independent studies yet to validate the claims on the effciency of the zigzag type of furnace made by the tobacco leaf merchant (Universal Corporation n.d.).

As an alternative fuel source coal has been discussed for some time. But it poses substantial environmental and health concerns. Discovery, mining and use of coal in southern highland regions of Tanzania is gaining pace for other sectors, such as industrial production, but emissions from exploration, mining and burning coal are critical. It is highly unlikely that substituting fuel wood with coal is a sustainable and environmentally friendly solution. Furthermore, elephant grass has been recently introduced and is suggested by the government as a viable alternative source of fuel (Ndomba 2018). Nevertheless, there is no impact assessment for its sustainability yet.

As a very important step to overcome soil erosion and deforestation, investment must be directed to agroforestry. First, alley farming with nitrogen fixing tree species such as Gliricidia, Sesbania and Tephrosia spp. in tobacco farms could improve soil fertility and should be strongly encouraged. Secondly, tree planting programmes to supply firewood for curing tobacco need to be enhanced. Thirdly, reforestation programmes are the crucial factor to restore the degraded natural forest areas . Although the government and tobacco companies have tried to address the issue by providing tree seedlings to farmers, the amount of reforestation is much less than mandated by the government or what is necessary to stem the rate of deforestation. Such schemes have had little positive impact, because the trees provided are often non-native and the fast-growing type such as eucalyptus and cypress to be used only in tobacco production. These tree species absorb a lot of water, adversely affecting the water supply for other food crops and for drinking water. After decades of reforestation trials, deforestation is still vivid in the tobacco growing areas in the country (Hu/Lee 2015). Major setbacks are the inadequate forest extension services as well as the perception of farmers that there is still plenty of forest and tree planting is for supply of curing needs only, rather than restoring forest ecosystems. To sustainably overcome deforestation, the government needs to develop a mechanism to finance reforestation schemes in tobacco growing areas, for example by establishing a forest fund that could attract fees from tobacco merchants and multinational tobacco companies. In addition, the participation of tobacco farmers in planting trees needs to be enhanced by awareness raising and proper forest extension services.

In the long run, alternative livelihoods have to be strongly considered, crops as well as non-agrarian livelihoods. The government should focus on research and support tobacco farmers in such a way that they have the choice, knowhow, and opportunity to shift to economically viable alternatives. There are already suggestions for other crops, e.g. cotton or sunflower (Geist et al. 2009), nevertheless traditional farmers are reported to be reluctant to switch and to feel that tobacco was still the best bet for household income security (Makoye 2012). The non-governmental organisation Tanzania Tobacco Control Forum (TTCF) counters this perception (TTCF 2007). Since 2006, TTCF has been working closely with tobacco farmers in southern Tanzania, where more than 70% of the farmers had attempted alternative crops. For example, between 2006 and 2014, TTCF recorded a massive increase in tonnage of both food and cash crops other than tobacco, while it recorded a huge decrease in tobacco production between 2010 and 2014 (Kagaruki 2018). Accordingly, TTCF envisages that with increased farmers‘ sensitisation coupled with sustainable and viable markets a total replacement of tobacco with alternative crops would be possible.

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