**Bush Encroachment - Turning a problem into an industry**

*By Dagmar Honsbein and Colin Lindeque*

Bush encroachment in Namibia is defined as the densification and rapid spread of native bush and shrub species, resulting in an imbalance of biodiversity. In addition to native species, invasion of exotic tree or shrub species such as *Prosopis* also pose a threat.

This bush encroachment phenomenon is said to be caused by a number of interlinked and potentially compounding factors, including overgrazing caused by historically high stocking rates; preference of grazing livestock over browsers (such as goats); increased atmospheric $CO_2$ levels, which favour growth of bush over grasses; suppression of regular high-intensity fires; prolonged drought periods followed by high rainfall years; fewer periods of frost; and perhaps other factors that have not yet been fully understood. However, one thing is certain: if we do not actively control bush encroachment in Namibia, it will soon become an insurmountable economic, social and environmental problem.

The latest estimates indicate that bush encroachment affects up to 45 million hectares of land in Namibia. To give some perspective, this encroached area is equivalent to the entire surface areas of Germany, Belgium and Switzerland combined. Furthermore, it has been estimated that bush encroachment in Namibia is increasing each year by approximately 3.2%, regardless of any ongoing efforts to extract the bush. This means that bush encroachment is growing faster than our national population. Simply stemming this spread of bush encroachment each year would require de-bushing and biomass harvesting activities across 1.4 million hectares per annum, while substantially reducing bush encroachment over Namibia's rangelands is a far greater challenge. Currently, our national concerted de-bushing and harvesting efforts are optimistically estimated at a mere 200,000 hectares per year (0.5% of the total national area potentially available for de-bushing).

However, with Vision 2030 fast approaching, it should be emphasized that the utilisation of the resultant biomass from bush encroachment will have significant benefits in line with a number of Sustainable Development Goals (SDG) pivotal to achieving Vision 2030. These SDGs include SDG 2 (*Zero hunger)*, SDG 7 (*Affordable and clean energy*), SDG 8 (*Decent work and economic growth*) SDG 9 (*Industry, Innovation and Infrastructure*) and SDG 15 (*Life on land*).

**Impact of Bush Encroachment**

Bush encroachment is a silent killer of our agricultural and associated sectors, substantially suppressing our economy. It is slowly suffocating our productive land, sucking our soils dry and driving out our ecological diversity. If business as usual continues, all of Namibia's most productive lands will be blanketed in bush, hindering our very important socio-economic contributors, like the beef and small stock production industries, our tourism industry and our game farming and hunting industries, to name but a few.

The current level of bush encroachment is causing substantial agricultural productivity losses through land degradation and the subsequent drastic reduction in stocking rates. This productivity loss alone is estimated to be costing the local economy approximately N$2

billion per year. These losses will undoubtedly continue to increase, in line with the spread and worsening of the bush encroachment problem. It is now commonplace for once productive land to be so densely bush-encroached that the movement of animals, livestock and wildlife alike, is impaired.

Ground water recharge is also significantly affected by bush encroachment. A single 2.5 metre tall *Senegalia mellifiera* (Black Thorn or Swarthaak) bush is estimated to draw up over 60 litres from the ground into the air each day through evapotranspiration. And given the fact that an average bush encroached hectare of land can host over 2 000 bushes of various height classes, loss of soil moisture into the atmosphere is significant. This, in turn, also reduces the available soil moisture for grass growth and for the replenishment of the groundwater systems. Over large areas of bush encroached land, billions of cubic metres of water are thus lost each year due to the bush encroachment problem. The recent drought begs the question: can Namibia spare such a loss of water?

Numerous other sectors are negatively affected by bush encroachment. Consumptive tourism, such as hunting, and non-consumptive tourism, such as wildlife viewing, are both impacted, as the density of wildlife in bush encroached areas is greatly reduced. This affects the level of tourist satisfaction, which may in turn have negative impacts on the future of our tourism industry, an industry intrinsically linked to Namibia's wildlife and scenic beauty. Game farming is equally affected by bush encroachment through reduced stocking rates, and thus reduced offtake capacity.

**The big bush opportunity**

Arboricides (chemical substances that kill woody plants) have been widely used in Namibia for decades to combat bush encroachment, indicating that the problem has been largely acknowledged. Nevertheless, the idea of utilising the woody biomass is a relatively new concept and bears tremendous socio-economic and ecological opportunity. The charcoal industry is the most developed biomass sector in the country, but it has not always focussed on the use of encroacher bush as its primary feedstock. However, more recently, charcoal production is being used as a means of bush control and it has been successful in that it provides cost recovery for the de-bushing efforts, which the use of arboricides simply cannot. Nonetheless, not all of Namibia's biomass can be converted into charcoal, and therefore new ways of commercialising our biomass resource should be pursued. The enormous potential value that could be unleashed from Namibia's encroacher bush biomass is a game changer, including but not limited to the potential for additional taxation revenues of an estimated N$750 million annually. This commercialisation of the biomass resource will assist in the reversal of land degradation, as well as halting biodiversity losses within Namibia's rangelands, in line with SDG 15. Additional benefits of biomass commercialisation would be to enhance Namibia's food security through the improvement of stocking rates and to promote more sustainable agriculture, in mitigating the further spread of bush encroachment, as per SDG 2.

The lowest hanging fruit is in energy, be it thermal or power. Encroacher bush as a feedstock for thermal energy generation is already gaining traction in Namibia. The Ohorongo Cement plant near Otavi has proven that its thermal energy requirements can be covered almost

entirely on encroacher bush wood chips, opening up a market of approximately 80,000 tonnes of wood chips per annum. However, while this market is worth an approximate N$65 million per year in wood chips, it is still going largely unmet. Namibia Breweries have also recently switched over to a biomass-fuelled boiler, which converts roughly 7,500 tonnes of encroacher bush wood chips per annum into thermal energy for operations at the Windhoek plant. Both of the above markets are substituting fossil fuels for wood chips, shifting from imported, unsustainable fuels to locally sourced, renewable ones, and addressing the encroachment problem in the process. Other benefits from fossil fuel substitution include fewer harmful emissions, foreign exchange savings and additional job creation. However, the above capacities show only a small fraction of the potential that Namibia's encroacher bush biomass holds.

Conversion of our biomass resource into electrical power is the next step and is one that is currently being investigated, both publicly and privately. It has already been determined that, in principle, the establishment of a biomass fuelled power plant of up to 20 Megawatt (MW) scale would be both technically feasible and economically viable. Not only would such a power plant be able to generate renewable energy, but it would also be able to provide base-load power, something that wind and solar Photo Voltaic cannot. A single 20 MW biomass power plant would require approximately 180,000 tonnes of wood chips per year, equitable to roughly 18,000 hectares' worth of bush encroached land. And while considered a fairly large undertaking in itself, Namibia would require another 70 of these power plants just in order to meet and mitigate the annual increase in bush encroachment. Theoretically, Namibia's total current encroacher bush biomass resource would be able to provide us with 1,400 MW for the next 30 years. This ignores the fact that the encroacher bush would typically regrow at an average rate of about 1.8 % per year after initial harvesting. It is in this light that Namibia's biomass resource can help ensure access to affordable, reliable, sustainable and modern energy for all, as per SDG 7.

The potential biomass industry would not only help to secure the existing 200,000 jobs within the agricultural sector through the restoration of Namibia's rangelands, but it would also directly act to create its own sector-specific jobs. These jobs would be most similar to the mining sector, whereby the majority of jobs would be decentralised, skills would be paramount and would, on average, offer far better income than jobs in the agricultural sector. Furthermore, primary harvesting and production of biomass would lead to new value chains being developed, such as thermal and chemical processing, biofuels, construction materials, services and research and development, yielding even more socio-economic benefits. And while it is difficult to project exactly how many new jobs would be created if the biomass industry were to receive its due attention and investment, utilising our vast wood-based biomass resource essentially equates it to an extractive industry. Thus, it would be safe to say that the biomass industry could align itself to other primary extractive, or resource-based industries, such as fishing or mining in the next 10-20 years. This potential for large-scale job creation and industrial development will also contribute towards SDG 8 and SDG 9. The sooner we harness this opportunity lying at our doorsteps, the better we can achieve our national goals, such as the Harambee Prosperity Plan and Vision 2030.

**Call to arms**

In light of the above challenges and opportunities, the Namibia Biomass Industry Group (N-BiG) was formed through cooperation between the private sector founding members and the MAWF - GIZ Support to De-bushing Project, running from 2013 to 2017. N-BiG is positioning itself in becoming the leading biomass information hub and industry association, build on public-private and academic sector cooperation in Namibia. It aims to support and facilitate growth within this young biomass industry to facilitate the restoration of Namibia's rangelands, recover the costs of de-bushing, and commercialise and exploit the largely untapped encroacher bush biomass resource.

N-BiG membership provides access to relevant information and services, and is open to all.

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