Bush Control and Biomass Utilisation Project

POLICY BRIEF

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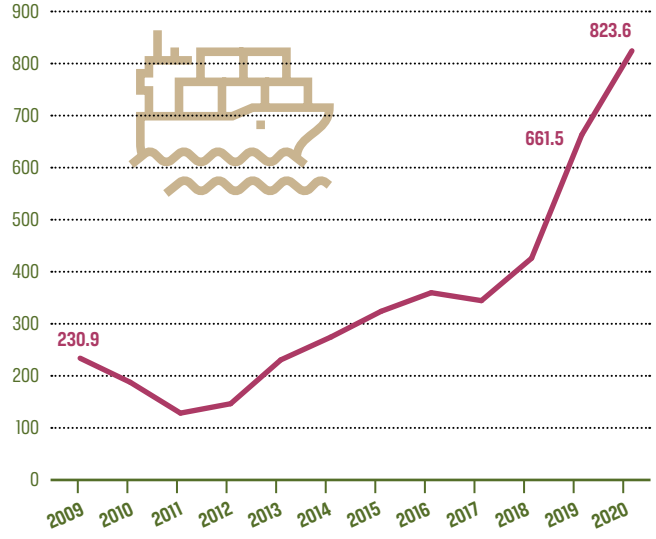
Namibia's economic opportunities

Biomass value addition: charcoal, animal feed and other uses

The Namibian economy is benefiting greatly from biomass utilisation. The production of charcoal in particular has increased significantly and resulted in much-needed direct and indirect job opportunities as well as foreign exchange earnings. This policy brief provides an update of the May 2020 version that focused on two complementary value chains: charcoal and bush-based animal feed production[1]. Charcoal producers use the thicker stems and branches of the bush, while bush feed producers use the thinner twigs, leaves and pods. However, the biomass sector provides further business opportunities beyond these two products and beyond the sector due to backward and forward linkages. Concerted efforts are required to expand these value chains and explore new ones.

Namibian Charcoal Exports (NAD million)



RECOMMENDATIONS FOR POLICY AND INDUSTRY

- Identify additional business opportunities beyond current biomass utilisation such as the establishment of feedlots supplemented by bush feed or the production of biochar and granules for water filters for instance.
- Support domestic producers of input materials such as machinery, fodder supplements, packaging material and protective wear.
- Approve bush-based animal feed as a commercial product through the Ministry of Agriculture, Water and Land Reform.
- Animal feed machinery has been exported to the region and as far as Somalia indicating that there is a demand for the Namibian products. The Namibian High Commissions and Embassies could play an important role in promoting this equipment and in connecting Namibian producers to potential customers of their host countries.
- Raise further awareness among farmers about biomass utilisation, its benefits and economic returns and the importance of sustainability certification, e.g. by the Forest Stewardship Council (FSC).
- Provide further training regarding sustainable bush thinning, the proper use of machinery in particular for bush feed production and the right mix of bush-based animal feed. Extend this in particular to communities in need for drought relief in order to increase their resilience and reduce the need of drought relief.
- The lack of official data prevents a more robust analysis of the economic benefits. The Namibia Statistics Agency could add activities related to biomass utilisation to their economic and social surveys, such as the National Accounts and Labour Force Surveys. Official statistics would allow for monitoring the development of these activities and for timely policy interventions. DAS could consider including additional indicators and stakeholders in their Monitoring and Evaluation framework in order to capture value chains comprehensively.
- There are opportunities for closer consultations and cooperation between the various industry associations, which can lead to the identification of further business opportunities regarding the domestic supply of goods and services for biomass utilisation activities.
- Invest in Research, Development and Innovation in order to reduce the environmental impact of biomass utilisation, increase the sustainability of the sector and develop new products and services.

1 The update is complemented by data compiled by Johannes Beck of D-One Consulting and published in: D-One Consulting & De-bushing Advisory Service. 2020. State and Trends of the Namibian Bush Biomass Sector 2019. Available online at http://www.dasnamibia.org/download.

For farmers, charcoal and bush-based animal feed production create opportunities for additional on-farm economic activities. This also provides additional income streams during times of droughts, reduces costs for the purchase of animal fodder and hence reduces vulnerability.

Both value chains also benefit further economic sectors such as manufacturing, transport and retail trade where they create income and jobs.

Domestically produced bush-based animal feed can replace some of the animal fodder imports and hence can contribute to foreign exchange savings. The value of animal fodder imports dropped by 50% from NAD1.2 billion in 2019 to an estimated NAD0.6 billion in 2020 owing to good rainfall. **Charcoal exports have contributed some NAD4.1 billion (EUR 280 million) to Namibia's foreign exchange reserves between 2009 and 2020.**

CHARCOAL

Trade

Export of wood charcoal has increased substantially since 2011 from NAD125 million to NAD662 million in 2019, contributing 0.7 per cent to total exports. The export value rose by more than 25 per cent in 2020 to NAD824 million.

Charcoal exports accounted for 12.5 per cent of total agricultural exports on average over the ten-year period 2009 to 2018.

Charcoal exports increased substantially from 10.3 per cent in 2018 to 16.8 per cent in 2019. It emerged as the third largest contributor to total agricultural exports for most of the period from 2009 to 2019 with the exceptions of 2015, 2017 and 2018, when it was surpassed by the export of sheep and goats.

In 2019, live cattle exports ranked first with NAD1,605.7 million followed by grape exports with NAD818 million and charcoal with NAD662 million. Charcoal exports, however, exceeded grape exports in 2020 by NAD0.9 million and hence became the second most important agricultural export product after live cattle (NAD1.1 billion).

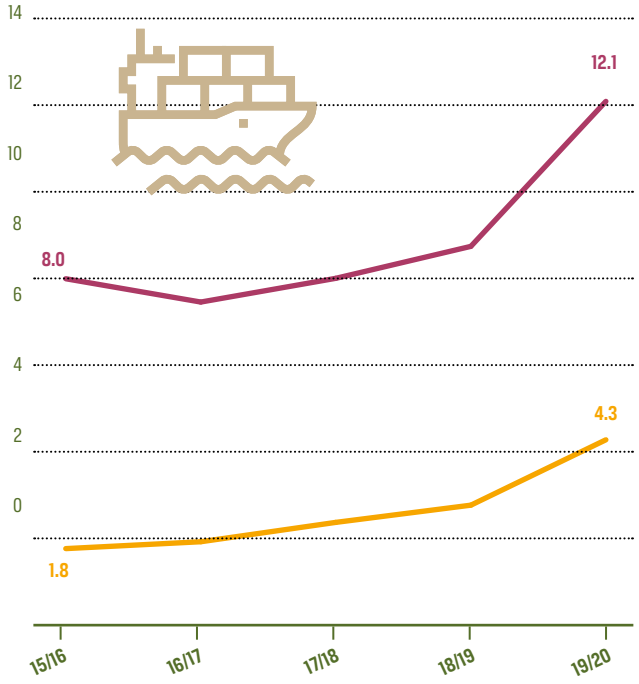
An increasing number of farmers have applied for the Forest Stewardship Council (FSC) certification, which not only contributes to the sustainable management of the biomass resource, but also ensures adherence to labour and environmental standards. The certified area increased from 100,000 hectares in 2010 to 270 farms with 1.6 million hectares by mid-2020 (D-One Consulting & DAS, 2020:35). It is estimated that two-thirds of charcoal exports are from FSC-certified areas. FSC certified charcoal holds economic benefits as well, since it fetches higher prices on the export markets.

Manufacturing sector

Kilns and mobile retorts are almost exclusively produced by Namibian manufacturing companies, while the components for the few stationary retorts are imported. Companies are investing into research and development to improve the efficiency of, in particular, the kilns. It takes a welder about a day to produce a traditional kiln and about two days for the more advanced kiln. One company built more than 180 kilns in 2019 amounting to employment for at least 180 work-

Charcoal export volumes as share of total exports

Charcoal export volumes as share of total exports (purple line) and share of total volume handled at Walvis Bay port (orange line) in per cent




Taimi Ndilimani, Winner of "Outstanding Employee" Award for the Women in Biomass Awards 2020

Charcoal processors employed about 1,350 workers, of which 46 per cent were female.

ing days, most likely more, which would translate into one-year full employment (accounting for weekends, public holidays and annual leave).

Namibia exported more than 210,000 tonnes of charcoal through the port of Walvis Bay in 2019/20. This production volume would require on average 3,500 new traditional kilns per annum based on an output of about 120kg charcoal per the four-day production cycle for a traditional kiln, a nine-month production period per annum, as well as an average life span of 7.5 years for the traditional kiln. The number of new kilns every year could create about 24 full-time jobs in the manufacturing sector. The construction of advanced retorts is more work intensive.

Furthermore, Namibian companies manufacture wheelbarrows for the transportation of wood to the kilns or retorts as well as wheelbarrows specifically for charcoal transportation with a built-in sieve to sieve the charcoal while transported from the kiln or retort. They also produce briquette presses as well as hand-pressed grass balers.

Protective clothing and packaging material is mainly imported. The demand for these products could provide business opportunities for Namibian companies, in particular, those that are already involved in the clothing and packaging industry.

Transport sector

Charcoal production has resulted in increased efficiency of transportation services in the country.

Several trucks per day transport charcoal to the port of Walvis Bay. Trucks often transport cargo from the ports to the final inland destinations without return load to the ports. Charcoal transportation reduces the number of these 'empty legs'. This results in lower transportation costs and hence enhances overall efficiency and competitiveness.

Similarly, railway transport services have experienced an increased demand for the transportation of charcoal to Walvis Bay. About 90 containers are transported per month, which has contributed to rail services operating at full capacity from the North to Walvis Bay.

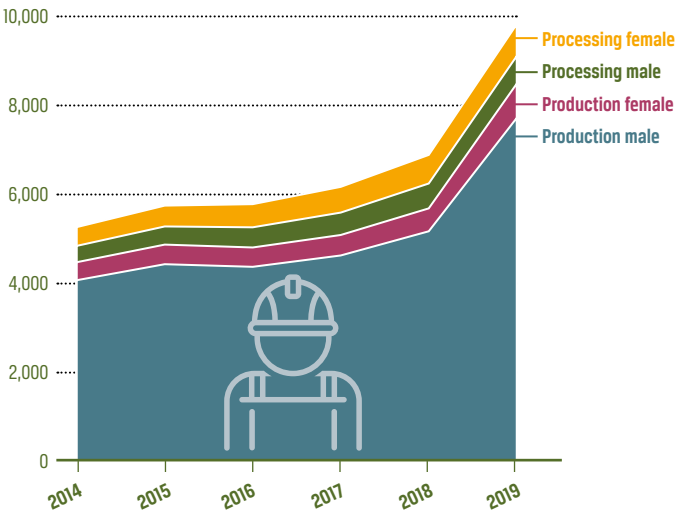
Smaller road transport companies which are often involved in the transportation of livestock in rural areas have additional business opportunities and hence income from the transportation of charcoal.

Charcoal exports through the port of Walvis Bay have increased 4.5 times between the financial year 2013/14 and 2019/20 to 212,960 tonnes, while total exports through the port rose by 1.5 times only. Charcoal exports grew from 4.0 per cent of total export volumes through the port to 12.1 per cent in 2019/20 or from 0.9 per cent of total cargo volume handled at the port to 4.3 per cent respectively. Charcoal exports have therefore somehow mitigated the negative impact of subdued global demand for commodities from the region.

Employment effect

Employment in charcoal production and processing has increased substantially over the years amounting to 10,000 workers in 2019 compared to some 6,000 in 2016/17. This represents 88 per cent of the 11,300 jobs in the biomass industry. In addition, jobs are created in the charcoal packaging industry where the charcoal is sieved and packaged before exported overseas or to South Africa. There are about 26 charcoal processors operating mainly in the area of Outjo, while other companies operate around Grootfontein, Otjiwarongo and elsewhere. Charcoal processors employed about 1,350 workers, of which 46 per cent were female (D-One Consulting & DAS, 2020:43). Due to the harsh conditions in charcoal production only about 14 per cent of the workforce were women.

Employment in charcoal production and processing



BUSH-BASED ANIMAL FEED

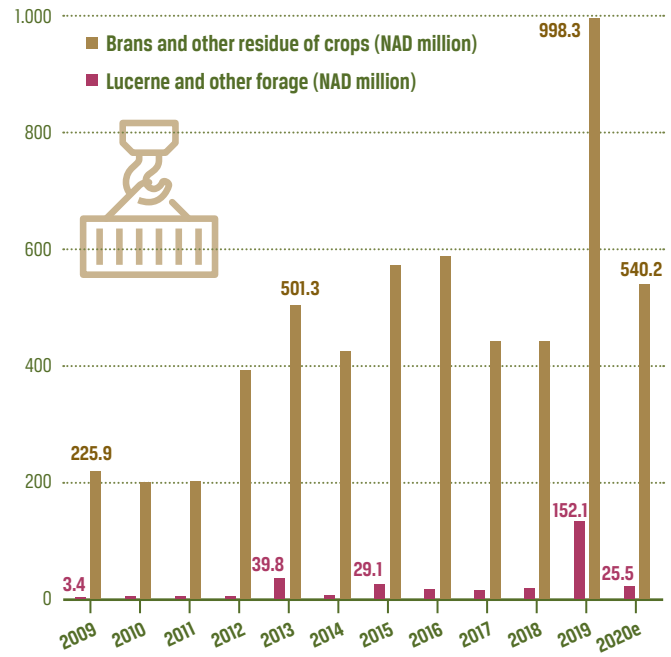
Trade

Namibia imported bran of maize and other animal fodder supplements to the value of NAD998 million in 2019. This amounts to an increase by NAD554 million or 124 per cent compared to the import value in 2018 (NAD445 million). However, good rainfall beginning of 2020 and hence better rangeland conditions led to a substantial decrease in imports to an estimated NAD540 million.

Furthermore, Namibia imported ***Lucerne*** and other forage products at NAD152 million during 2019. This almost equals the total value of the past ten years (NAD154.4 million over the period 2009 to 2018 with peaks of NAD40 million in 2013 and NAD29 million in 2015). The value of lucerne imports dropped, however, by an estimated 83 per cent to NAD26 million in 2020.

The importation of ***Lucerne***, brans etc. accounted for one per cent of total imports in 2019 compared to 0.40 per cent in 2018 and an estimated 0.52 per cent in 2020. The import of fodder supplements such as molasses and urea added another NAD23 million in 2019 to the import bill, but increased to an estimated NAD42.9 million in 2020. Based on the 2019 survey it is estimated that 102,914 tonnes of animal fodder was produced in Namibia. This domestic production substitutes some of the imports and hence contributes to saving scarce foreign exchange reserves. Furthermore, domestic, on-farm fodder production can result in a larger livestock herd, which has further positive impacts on downstream industries such as abattoirs and meat processing.

Lucerne & Bran imports (NAD million)



The import value of machinery for the preparation of bush-based animal feed such as milling machines has increased by 25 per cent between 2018 and end of September 2019 (from NAD40 million to NAD50 million). As with the domestic production of animal fodder, some of the equipment can be produced in Namibia and hence contribute to further foreign exchange savings.

The import of animal fodder and equipment soared in 2019. Some of the imports can be replaced by domestic production and an extension of local value chains.

Manufacturing Sector

Namibian companies manufacture the whole range of machinery used for bush-based animal feed production, from chipper, hammer mills and feed mixer to combined equipment. Namibian manufacturers offer after-sales and maintenance services, which provides them with a competitive edge.

The demand for domestically produced machinery has increased substantially during 2019. According to a Namibian producer, they produced five units in 2017, ten in 2018 and 108 in 2019. However, Namibian manufacturers produce on a rather small scale and hence customers face waiting lists of sometimes up to several weeks. This has resulted in the demand shifting to imported machinery that is more readily available. The preference for imported, less expensive equipment coupled with good rainfalls resulted in a drop in demand for Namibian-made equipment to just two during 2020.

In addition, the Namibian feed industry produces fodder supplements that are mixed with bush-based fodder.

Wholesale and retail trade sector

The wholesale and retail trade sector has benefited in various ways from both increased charcoal production and bush-based animal feed production. While retail outlets specialising in the agricultural sector previously ordered machinery such as hammer mills on demand, these items are now listed. Overall, more retail outlets that were previously not selling agricultural equipment at all offer this equipment. A retailer specialising in agricultural equipment indicat-



Complimentary industries: Charcoal uses thicker stems and branches, bush feed thinner twigs, leaves and pods.

ed that the demand for hammer mills increased from ten in 2018 to almost 400 in 2019. The demand declined in 2020 to less than 300.

This growing demand mitigated the drop of demand for other agricultural inputs due to the persistent drought and hence cushioned the wholesale and retail sector somewhat in 2019.

Employment effect

Based on survey results for 2019, an estimated 450 predominantly commercial farmers, were involved in bush feed production and employed on average two additional workers for that purpose. This amounts to an estimated additional employment of about 900 workers in rural areas, where economic and employment opportunities are often limited. In addition, six registered bush feed producers employed about 36 workers (D-One Consulting & DAS, 2020:44). It is important to keep in mind that 2019 was an exceptional year due to the prolonged drought. Owing to good rainfalls beginning of 2020 and because bush feed production is labour intensive, it can be assumed that fewer farmers are currently involved in this activity, which will have a negative impact on employment. Approval by the Ministry of Agriculture, Water and Land Reform for bush-based animal feed as a commercial product that can be sold on the market, could turn the tide around and provide farmers with incentives to consider it as an additional commercial activity, in particular since bush feed and charcoal production are complementary. In the longer term, in-depth research is required to establish whether bush feed combined with fodder production using hydroponics or aquaponics could provide the basis for a viable feedlot industry in Namibia.

Financial sector

Depending on the herd size, the value of the machinery necessary for the production of bush-based animal feed for own use can amount to several hundred thousand Namibia dollar. The purchase is often financed through bank loans and hence provides additional business for financial institutions. Furthermore, the diversification of on-farm income streams can de-risk agricultural activities and hence reduce the risk of loan defaults. However, according to the D-One Consulting & DAS survey only two financial service providers offered products tailored specifically to bush control operations. Although farmers among the survey respondents were generally aware of financial products, only a small fraction applied for a product (7 per cent of those aware) and made use thereof (4 per cent of those aware) (Ibid. 2020:45/46). Extrapolating these figures to national levels for commercial farmers could suggest that some 90 commercial farmers have applied and between 50 and 60 made use of financial products in line with their bush control operations in 2019 (Ibid.).

Made in Namibia

The manufacturing sector appears to be one of the main beneficiaries of both charcoal production and bush-based animal feed. Namibian bush grows slow and hence the wood is harder. This makes Namibian wood ideal for charcoal production. Most machinery built elsewhere and imported is suitable only for softer wood and does not work effectively or does not last long under Namibian conditions. Domestic manufacturing companies have invested in research and development to produce innovative machinery and equipment that is well adapted to the specifics of the Namibian situation.

Key Facts and Figures

More than
45 million hectares
of previously open grassland and savannas are affected by indigenous bush encroachment.

The area under voluntary sustainability certification has increased from 100,000 hectares in 2010 to
1.6 million hectares
in 2020.

Employment in the biomass sector has increased from 6,000 in 2016/17 to over
11,000 workers
in 2019.

Export of wood charcoal has
increased by 558%
since 2011 from NAD125 million to NAD823 million in 2020.

ADDITIONAL BIOMASS UTILISATION

Besides charcoal and bush-based animal feed, biomass has been used for other purposes and holds the potential for a wide range of additional products that slowly emerge. These products not only diversify the sector and reduce the risks of dependency on certain products and markets, but offer further backward and forward linkages and opportunities to create jobs and income.

Some companies have started using wood chips and pellets to replace imported heavy-fuel oil in their production process, such as the cement and brewing industries. This sector will receive a substantial boost if NamPower goes ahead with plans to build a 40MW biomass powerplant in the Tsumeb area. Depending on the degree of mechanisation of bush harvesting, the project can result in additional employment of between 156 and 622 workers, while the plant itself is expected to have a staff complement of 62 (Cirrus Capital, 2018:32[2]).

Assessments are being conducted to explore the exportation of bush pellets overseas to replace coal with biomass. If proven environmentally sustainable this could offer new business opportunities. In the long term, biomass in combination with other renewable energy resources could be considered for the production of green hydrogen in Namibia to replace conventional fuel.

It is estimated that some 50,000 tonnes of firewood were sold in Namibia in 2019, which theoretically equates to about 380 full-time jobs in harvesting and production. Likewise, droppers and poles mainly for the erection and maintenance of fences on farms are produced from bush, but sold primarily on the informal market.

Namibia's biomass offers further opportunities for product diversification and value addition. This includes the production of biochar for soil enrichment and or as animal fodder supplement, granules for water filters, building material, etc. Research is currently being undertaken to explore these and other opportunities. Whatever additional final products will be commercially viable, it is important to not only focus on these final products, but also on the extension of value chains to capture more of the potential value addition through backward and forward linkages and in particular to create jobs and income in related economic sectors.

Annual loss of NAD 3.4 billion

Bush encroachment in Namibia reduces the carrying capacity of rangeland. As a result, the value of farmland as well as the value derived from it in terms of beef production, etc. are declining. A study in 2015 estimated that the area affected by bush encroachment is more than 45 million hectare, with a resultant loss of NAD2.7 billion annually (SAIEA, 2015:5[4]). Adjusted for inflation, the loss would amount to NAD3.4 billion annually in 2020 prices.

2 Cirrus Capital. 2018. An assessment of the micro- and macroeconomic benefits of an Encroacher Bush Biomass Power Plant near Tsumeb in Namibia. Prepared for NamPower and the MEFT/GIZ Bush Control and Biomass Utilisation Project, with the support of Namibia Biomass Industry Group (N-BiG). Available online at http://www.dasnamibia.org/download.

3 SAIEA. 2015. Strategic Environmental Assessment of Large-Scale Bush Thinning and Value Addition Activities in Namibia. Prepared for MEFT/GIZ Bush Control and Biomass Utilisation Project. Available online at http://www.dasnamibia.org/download.

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The brief is available online at www.dasnamibia.org/download.

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