FORESTRY STATISTICS

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PREFACE

Forestry provides habitats for a multitude of animal and plant life. It is the protector of soils and regulates water flows and carbon cycles. It is, therefore, one of the essential topics that are covered on the environment. Forestry is one of the chapters covered in the Environment Statistics Publication produced by the Central Statistics Office (CSO).

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FORESTRY

1 Introduction

Forests are bio-productive systems, which provide various benefits to society. Namely: wood and non-wood products, food and medical flora, environmental protection (conservational activities), habitats for plants and wildlife, shade and aesthetic beauty as well as opportunities for recreation, education, cultural and spiritual activities. Botswana vegetation types are closely related with climate. The hardwood forests of the north of the country represent a valuable resource. Over 60% of Botswana land area is covered by sparse savannah woodland and scrub formations. In the drier western areas the vegetation types are determined by the lower rainfall and are composed of succulent plants, course grasses and semi-arid tree species. The northern part of the country is characterised by open woodland of hardwoods such as *Baikiuea plurijuga* and *Pterocarpus angolensis* and the majority of these hard woods are located in Forest Reserves. Derivation of these products (*Baikiuea plurijuga* and *Pterocarpus angolensis*) from forest resources continues to be under great pressure due to human activities; particularly wood which has major contribution of fuel energy used in the country.

Some of the major human activities that contributes to this depletion are: land use for settlement and infrastructure development; arable and pastoral agriculture; cutting of live wood resources for building poles and fencing material for kraal and homes. These factors together with frequent adverse climatic conditions, bush fires as well as increasing populations of both domesticated and wild animals contribute significantly towards the denudation of forest resources in the world as illustrated in Table 1.

Table 1 Forest denudation: 1990-2000 (Adapted from FAO, 2000)

	Total forest cover (%)	Forest denudation (% per year)
World	52	-0.23
Africa	35	-0.78
Botswana	80	-0.10

Source: A, Department of Crop Production and Forestry Division of Planning and Statistics Assessment of community woodlots in Botswana

The current loss of woodland resources in Botswana is to all of the causes mentioned above on exclusion of commercial logging, which was suspended by the government of Botswana in the early 1990's.

2. Forests Reserves

These /forests are largely on tribal land. The six gazetted forest reserves make about 0.8% of the total land area of the country. The reserves were created primarily to safeguard valuable timber resources. The resources are therefore not open to any exploitation without prior permission from the Forestry Division. On the other hand, in the communal areas, the natural woodlands are a free access regime and can be harvested for use or trade within and between settlements. However, some parts of the communal areas are being 'privatised'. Some communal areas have private boreholes or private ownership of boreholes in the form of syndicates and such people tend to have a de facto control of the woodlands in the

surrounding areas. The woodlands in communal areas are mostly used for fuelwood, fencing and construction of huts.

Table 2 Areas of Woodlands on State Land (Forest Reserves)

Year of Declaration	Name of Forest Reserve	Area (square kilometres)
1968	Kasane Forest Reserve	131.86
1981	Kasane Extension Forest Reserve	475.00
1981	Chobe Forest Reserve	1,740.31
1981	Kazuma Forest Reserve	225.47
1981	Maikaelelo Forest Reserve	625.00
1981	Sibuyu Forest Reserve	1,175.00
Total Area of Forest Reserves		**4,372.64**

Source: Ministry of Agriculture (Pers. Comm.)

The forests and woodlands of Botswana represent an important resource in terms of providing the majority of rural populations with an energy source, materials for fencing, construction, building, crafts and maintaining environmental balance.

Chobe Forest Inventory and Management Plan, (Norwegian Forestry Society 1992) estimated 419,800 ha of forest reserves containing invaluable timber resources of forest of Mukusi (*Baikiaea plurijuga*), Mukwa (*Pterocarpus angolensis*) mophane (*colophospermum mophane*). These reserves also contain a range of ecosystems including miombo woodlands, grass and bush savannah, as well as river and flood plain habitats. Wildlife abounds in the area and many other NWFP. In the villages that are surrounded the forest by forests a varied set of cultural systems exist based upon the exploitation of these different ecosystem.

3 Exploitation of Wood in the Communal Land

3.1 Trees Species in Communal Woodlands

The woodlands in communal lands are mainly used for the provision of fuelwood, building and fencing materials and raw materials for use in making furniture and carvings. The two most preferred species are *Colophospermum mophane* and *Combretum imberbe*, found in northern and southern parts of the country respectively. However deficits are beginning to occur in areas surrounding major population centres. The situation is not helped by persistent cycles of droughts wild fires, overgrazing etc. The results have been devastating, as large areas have been stripped of tree cover through indiscriminate cutting of live trees. The combined effects of deforestation, overgrazing and perennial forest fires have resulted in conversion of thousands of hectares of productive woodland to less productive grasslands and shrub formations, leading to serious soil erosion problems, flash flooding and localised fuel wood shortage (Ministry of Agriculture Report, 1984).

The District Conservation Committees were established under the Agricultural Resources Conservation Act of 1974, with the objective of directing Land Boards on conservation of natural resources, including afforestation programmes. However, in practice the application

of the Act has been related mainly to control of fires and issuance of permits for harvesting veldt products.

3.2 Tree Species Preferences

The indigenous trees that are commonly preferred for fuelwood, construction and provision of fruit/food according to a study on community woodlots in Botswana (Department of Crop Production and Forestry) are as depicted in Tables 4-6. These preferences as listed in Tables 4-6 are for the top five preferred species for each use.

Table 3 Tree species Preferences for fuelwood, construction and provision of fruit/food

Species used for fuelwood		Community members	
Common name	**Botanical name**	**Frequency**	**Percent**
Mongana	*Acacia mellifera*	95	29.7
Mogotlho	*Acacia erioloba*	71	22.2
Mokha	*Acacia karoo*	39	12.2
Mogono	*Terminalia sericea*	31	9.7
Mophane	*Colophospermum mopane*	16	5.0

Source: A Department of Crop Production and Forestry, Division of Planning and Statistics. Assessment of community woodlots in Botswana 2003

Table 4 Tree species Preferences for construction

Species used for construction		Community members	
Common name	**Botanical name**	**Frequency**	**Percent**
Mogonono	*Terminalia sericea*	112	35.0
Mokala	*Acacia galpinii*	60	18.8
Mongana	*Acacia mellifera*	41	12.8
Mophane	*Colophospermum mopane*	21	6.6
Moselesele	*Dichrostachys cinerea*	9	2.8
Mokgalo	*Ziziphus mucronata*	9	2.8

Source: A Department of Crop Production and Forestry, Division of Planning and Statistics. Assessment of community woodlots in Botswana 2003

Table 5 Tree species Preferences for provision of fruit/food

Inigeneous fruit plants commonly used		Community members	
Common name	**Botanical name**	**Frequency**	**Percent**
Moretlwa	*Grewia flava*	205	64.1
Mokolwane	*Hyphaene petersiana*	25	7.8
Motlopi	*Boscia albitrunca*	15	4.7
Moretologa	*Ximenia caffra*	10	3.1
Motsentsela	*Berchemia discolor*	8	2.5

Source: A Department of Crop Production and Forestry, Division of Planning and Statistics. Assessment of community woodlots in Botswana 2003

Table 3 of this table illustrates that the most preferred fuelwood species are *Acacia erioloba* and *A. mellifera* and this is true for both the Woodlot Committee representatives and members of the community. It must be pointed out that *A. mellifera* is the most preferred species in the Southern part of the country while *Colophospermum mopane* is preferred in the northern part of the country where it is predominant.

Table 4 shows that *A. galpinii* is the most preferred species for construction purposes and *Terminalia sericea* is also highly rated by the community members. The reasons advanced for the preference of the species are that the species are durable and highly tolerant to termite attack.

Table 5 shows that the most commonly used indigenous fruit/food plants are *Grewia flava (*64%) and *Hyphaene petersiana* (8%). The most important economic features of these species are the fruit/ berries that can be used for brewing beer.

4 Tree Nurseries and Plantations

In response to increasing deforestation and fuelwood scarcity, the government and Non-Government Organisations have participated in various afforestation projects all over the country. The projects were designed to ensure the development of tree nurseries, community woodlots and agro-forestry projects. Both indigenous and exotic trees are planted in the afforestation projects. It is hoped that these efforts will, *inter alia,* reduce pressure on natural woodlands, enhance environmental conservation, and increase food production through the planning of food-yielding multi-purpose tree. The production figures of seedlings in government nurseries during the 2000/2001 planning period are as shown in Table 6(a).

Table 6 (a) Number and Annual Production Capacity of Tree Nurseries by Region during the 2000/01 planning period.

Agricultural Region	Number of nurseries	Total production	Percentage of national production	Average capacity
Southern	2	81,079	15.0	40,540
Central	4	79,902	14.8	19,976
Gaborone	7	87,616	16.2	12,517
Francistown	2	109,871	20.4	54,936
Western	4	76,840	14.2	19,210
Ngamiland	3	104,363	19.3	34,788
Total	**22**	**539,671**	**100.0**	**24,531**

Source: Compiled from the regional reports of the Division of Forestry, Beekeeping and Range Ecology, Ministry of Agriculture.

Table 6(b) Number and Annual Production Capacity of Tree Nurseries by Region during the 2001/02 planning period.

Agricultural Region	Number of nurseries	Total production	Percentage of national production	Average capacity
Southern	2	125,000	20.7	62,500
Central	4	80,200	13.3	20,050
Gaborone	7	80,980	13.4	11,569
Francistown	2	116,002	19.2	58,001
Western	4	74,214	12.3	18,554
Ngamiland	3	126,967	21.0	42,322
Total	**22**	**603,363**	**100.00**	**27,426**

Source: Compiled from the regional reports of the Division of Forestry, Beekeeping and Range Ecology, Ministry of Agriculture.

The Government, operating through the Ministry of Environment, Wildlife and Tourism (MEWT), is the main sponsor of the nurseries programme. The total national production of tree nurseries was about 539,671 trees per year in 2000/01 compared to 603,363 trees per year in 2001/02. This shows an increase in seedling production of 12%.

5 National Tree Planting Day (NTPD)

This is an annual event that is commemorated every last Saturday of November. The former President of the Republic of Botswana Sir Ketumile Masire inaugurated this event in 1985. A study by Peer Consultants (Pty) LTD (2001) revealed that the majority of Batswana know about the purpose of the NTPD and support continuation of the programme. However, most community members and the extension services in general feel and agree that there is need to improve the present NTPD programme.

The study also revealed that a measure of success of the NTPD could be acknowledged in so far as the raising of public awareness and appreciation of value of trees in our lives is concerned. But the programme is still a long way from fulfilling its ultimate objective. The study assets that the NTPD programme is silent on Non Wood Forest Products such as veldt products: (phane, silk, aloes, apiary products and its bye-products), eco-tourism and wildlife. The program is also silent on the importance and potential, in socio-economic terms of the vast forest reserves.

6 Harvesting, Natural Loss and Regrowth

Table 7 shows that there are 52 woodlots with a total area of about two hundred and twenty one (221) hectares and the most prevalent tree species in the woodlots are *Casuarina cunninghamiana* (Beefwood); *Eucalyptus camaldulensis* (River red gum*); E grandis* (Rose gum) and *E. tereticornis* (Forest red gum). However, in most cases the species were planted in unsuitable sites hence most of the woodlots having a basal area of less than $5m^2$/ha. The diameter at breast height (dbh) for woodlots range between 1cm and 35cms,

while the height range from 0.2m to 25m. The objective of woodlots was to addresses shortage of fuelwood and poles but this objective has not been adequately addressed.

Table 7 Woodlot Area (ha) Utilized

Region	Total No. of woodlots per Region	Total area (ha) of woodlots	Area (ha utilized at time of this study in 2000	Area (ha) not utilized by 2000	Max. Area (ha) utilized since establishment	Percentage of area utilized by 2000
Central	6	19.3	4.05	15.25	4.05	21
Gaborone	16	85.9	56.9	29	78.2	66
North West	5	16.25	1.12	14.95	7.05	7
Southern	9	46.1	11.55	34.55	12.05	25
Western	16	53.55	15.2	38.35	30.75	28
Francistown	0	0	0	0	0	0
Totals	**52**	**221.1**	**88.82**	**132.1**	**132.1**	**40**

Source: A Department of Crop Production and Forestry Division of Planning and Statistics. Assessment of community woodlots in Botswana 2003

7 Non-Timber Forestry Products (NTFP)

The Government of Botswana through the Ministry of Agriculture consider the Beekeeping Industry as one of the alternative enterprises that can diversify the economy of Botswana that is largely marshalled by the Mining and Livestock industries. The beekeeping venture has been considered because it can be started using little capital and simple technologies that require semi-skilled labour and other minimal factors of production. The government has been the main sponsor of Beekeeping programmes and projects for more than 20 years.

Table 8 indicates that there is a potential income generated growth and the quantity of honey harvested. The trend of development and performance as compared among the years differs due to year's weather changes (very low temperatures and long dry spell) were very cartographic to the bee manipulation.

Taylor (1998), reported on changes in the utilisation and management of renewable resources (veldt products) in the Kalahari and gave the estimated value of NTFP at about P65 million annually. Ringrose and Chanda (2000) estimate the annual value of forest products to be US $ 15 million, while NTFP's could contribute between US$ 10 million and US$26 million.

Table 8 Beekeeping Development & Performance Since 1993 to 2002

Current Year	1993/94	1994/95	1995/95	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02
No. of people involved	189	754	840	1,334	1,503	2,052	1,950	1,214	1,283
No. of bee colonies	121	205	216	365	603	372	340	785	906
Kg of Honey Harvested	231	351	531	980	1,523	838	602	3,949	4,266
Income Generated (9Pula)	2,724	4,344	8,545	10,496	18,021	7,451	14,202.	53,809	78,176

Source: Compiled from the regional reports of the Division of Forestry, Beekeeping and Range Ecology, Ministry of Agriculture.

8 Deforestation

Deforestation is a worldwide problem particularly in Africa. There are many causes of deforestation and they vary from place to place. These include population growth, massive increase in livestock, increase demand in timber; agricultural land, human settlement; fuel wood production and mining areas.

8.1 Fuel Wood

Although the supply of wood is becoming increasingly scarce in certain areas, this is not a nation wide problem since the total supply of wood greatly exceeds total demand. The Rural Energy Supply (RES) study 2000 estimated that the total annual increment at over 7 million tonnes where as the total demand for fuelwood is estimated at about 1 million tonnes at the turn of the century. Demand exceeds supply in major villages and towns in the Kalahari, Southern, Central, and North East district of the country.

In the year 2000, wood was the main source of energy used in ED and contributed 38.23% of total energy energy consumption

1994/95 financial year-major source of energy was fuelwood and 58.5% was locally produced. Fuelwood was 69.4% of total net energy. Studies show that wood fuel harvesting is unsustainable especially near big villages, towns and other settlements.

8.2 Estimated Demand and Supply Balances

Annual growing stock is approximately 140 million tons and annual increment is approximately 1.8 million tonnes per year. Regeneration capacity is estimated to be about 0.3 to 2.1 tonnes per hactre per year and Estimated Standing stock Density is approximately 3.6 to 48.0 tonnes per hactre, this implies that regeneration is rather low.

National Wood demand (1993 energy balance estimates) was 1.6 million tonnes. Supply can only be sustainable if proper policies regarding harvesting of wood and which give due regard to sustainability of environment are put in force (EAD, 1981-1993)

8.3 Threatened Species

One of the endangered species is *Hyphaene petersianna* (Mokola palm) that is the material used in weaving baskets. A variety of research and extensive activities have been implemented to prevent the depletion of the mokola palm. These include propagation trials, collection of data on germination and growth rate, sustainable management of natural trees and encouraging communities to grow their own palm.

Grapple plant, a medicinal plant, is the most commercially harvested plant in Botswana. The species has already been proposed for listing under CITIES- Convention on International Trade in Endangered Species of wild fauna and flora. It is feared that the species is threatened by international Trade (*CITES Proceedings, Conference of the Parties II, Gigiri, Kenya, 2000)*

One of the threatened species that also appeared in a number of news reports in recent years is Hoodia. Traders harvested the wrong species in places such as Molepolole, Kanye and Serowe, mistaking it for the true hoodia. Botanists at the National Museum and Gallery Botanic Garden identified the species being harvested as an American cactus, *Trichocereus spachianus*. This is an invasive plant, which has been declared a noxious weed in Southern Africa. It is a member of the cactus family, which is entirely American.

The true Hoodia is a member of the oleander family (*Apocynaceae*) and is unrelated to the cactus family. It also differs chemically in having a stimulant whereas many cacti (including the one harvested in Molepolole) contain Mescaline, which is a hallucinogen. It is thus dangerous to confuse the two as has been done.

The fact that an invasive weed has been mistakenly harvested should serve to make us take a closer look at the need for a complete inventory of Botswana plants including those that are exploited for international export. Botswana should review and harmonise natural resources and environmental laws to insure that there is adequate protection to safe guard the diverse natural resources found in this country.

Finally, it is imperative that financial resources, adequate research and marketing facilities are put in place to utilise the natural resources of Botswana without endangering them. We need to involve those who have knowledge and skill and insure that they profit from such knowledge. Only then can we be sure they will be safe from unscrupulous exploitation
(Source: *Bruce J. Hargreaves, Principal Curator, Natural History, Nonofo Mosesane, Curator of the Botanic Garden, National Museum of Botswana*)

Table 9(a) shows some of the endangered species found in Botswana. The Botanic Garden of the National Museum and Art Gallery are traversing this country to identify some rare plants that are believed to be found in this country but have not yet been identified. Some endangered species are listed in the Table 9(a). A list of endangered species found in Botswana are: *Adenium boehmianum Schinz, Adenium Oleifolium Stpf, Hoodia hugardi, Huernia levyi Oberm, Orbea tapscottii, Orbeopsis knobelii,Euphorbiacea venteri,Nesaeaminima Immlman,Ansellia africana Lindl,Eulophia angolensis Summerh,Eulophia latilabris Summerh, Anacampseros rhodesica, Erythrophysa and transvaalensis I. Verd.* These species are listed in the Southern African Red Data List.

Table 9(a) Endangered Plants

Name of species	Endangered	Ecosystem type	Plant form	Area covered
Adenium boehmianum (Apocynaceae)	Endangered	Rocky	Succulent shrub	Tsau Hills/Sonop koppies
Orbea tapscottii (Apocynaceae)	Endangered	Bushveld with sandy/gravelly/calcareous soil	Succulent	South eastern Botswana
Euphorbia venteri (Euphorbiaceae)	Endangered (potential endemic)	Whitish gypsum ground open mopane veld	Succulent	Northeast

Source: Botanic Garden of the National Museum and Art Gallery

Table 9(b) Rare/ Endangered Plants

Name of species	Rare/Endangered	Ecosystem type	Plant form	Area covered
Blepharis bainesii (Acanthaceae)	Least concern	Grass and bush lands clay	Sub-shrub	Northern Botswana
Pycreus okavangonsis (Cyperaceae)	Least concern	Wet soil by rivers	Sedge	Okavango & Northeast Botswana
Panicum gilvum (Poaceae)	Least concern	Seasonal rainwater pans	Annual grass	North & Central Botswna
Panicum pilgerianum (Poaceae)	Least concern	Seasonally flooded area (growing in water)	Annual grass	Northern Botswana
Sporobolus bechuanicus (Poaceae)	Least concern	Saline pans	Annual grass	Botswana
Nananthus aloides (Aizoaceae)	Data deficient	Unknown	Succulent	Southeast corner of Botswana
Nananthus margaritiferus (Aizoaceae)	Data deficient	Crevices of hard limestone ledges	Succulent	Nossob river (Kgalagadi)
Arctotis rogersii (Asteraceae)	Data deficient (potentia endemic)	Unknown	Annual	Mochudi
Arctotis serpens	Data deficient	Unknown	Annual	Unknown
Rennera laxa (Asteraceae)	Data deficient (potential endemic)	Unknown	Unknown	Gemsbok

Table 9(b) Rare/ Endangered Plants (Continued)

Name of species	Rare/Endangered	Ecosystem type	Plant form	Area covered
Eleocharis cubangensis (Cyperaceae)	Data deficient	Edge of pond	Sedge	Chobe river
Eriospermum linearifolium (Eriospermaceae)	Data deficient	Unknown	Tuber	Unknown
Eriospermum seineri	Data deficient (potential endemic)	Bushveld deep red sand	Tuber	Kuke
Acacia hebeclada subsp. *tristis* (Fabaceae)	Data deficient	Open bush on sandy soils	Shrub	Fossil river valleys Northwest
Barleria matopensis (Acanthaceae)	Data deficient	Streamside communities with on well drained substrate.	Sub-shrub	Unknown
Grielum cuneifolium (Rosaceae)	Data deficient	Sandy soil	Sub-shrub	Manoatse pan (Cetral Kgalagadi)
Thesium dissitum (Santalaceae)	Data deficient	Woodland on deep fine sand	Annual	Mamunwe (sic)
Jamesbrttenia integerrima (Scrophulariaceae)	Data deficient	Rocky hill and mountain slopes	Sub-shrub	Unknown

Source: Botanic Garden of the National Museum and Art Gallery

Table 9(c) Vulnerable Rare/ Endangered Plants

Name of species	Ecosystem type	Plant form	Area covered
Habenaria pasmithii (Orchidaceae)	Water meadows	Tuberous ground orchid	Okavango River
Zeuxine africana (Orchidaceae)	Moist sand in grassland & in mud, under shade	Tuberous ground orchid	Moremi wildlife reserve
Aristida wildii (Poaceae)	Combretum apiculatum-Terminalia prunioides savanna on shallow sands overlying limestone	Annual grass	Aha and Kgwebe Hills
Panicum coloratum var. *makarikariense* (Poaceae)	Bushland and grassland	Annual grass	Makgadikgadi pan

Table 9(c) Vulnerable Rare/ Endangered Plants (Continued)

Name of species	Ecosystem type	Plant form	Area covered
A. oleifolium (Apocynaceae)	Loose white or red sandy bushland	Tuberous succulent	South East of Botswana
Orbea knobelii (Apocynaceae)	Deep fine soils (Pan soils)	Succulent	Southern Botswana
Hoodia currorii Subsp. *Lugardii* (Apocynaceae)	Calcareous grounds among tree	Succulent	600 km East West belt central region
Huernia levyi (Apocynaceae)	Stony/rocky soil	Succulent	Pandamatenga to Chobe National Park
Nesaea minima (Lythraceae)	Heavy white sand in moist grassveld of floodplain	Tiny annual	Chobe National Park
Ansellia africana (Orchidaceae)	Hot dry mixed deciduous woodlands and in riverine vegetation	Succulent epiphyte	North of Botswana
Eulophia angolensis (Orchidaceae)	Perennially swampy grasslands	Tuberous ground orchid	Northwest Botswana
Anacampseros rhodesica (Portulacaeae)	Bare rocky outcrops (grows in crevices)	Tuberous succulent	F/town & Tantabane (Northeast)
Erythrophysa transvaalensis (Sapindaceae)	Steep & rocky slopes	Shrub	Shoshong hills
Jatropha botswanica (Euphorbiaceae)	Bare black soils in depressions	Tuber	Northeast
Erlangea remifolia (Asteraceae)	Hill sides & in Baikiaea woodland	Sub-shrub	Tsodilo Hills
Habenaria pasmithii (Orchidaceae)	Water meadows	Tuberous ground orchid	Okavango River
Zeuxine africana (Orchidaceae)	Moist sand in grassland & in mud, under shade	Tuberous ground orchid	Moremi wildlife reserve
Jamesbrittenia concinna (Scrophulariaceae)	Damp ground around marshes, pans and along river banks	Annual	Deception pan (Central Kgalagadi Game reserve)

Source: Botanic Garden of the National Museum and Art Gallery

8.4 Invasive/Alien Species

Invasive species sometimes invade indigenous ecosystems. And overtime they dominate the native landscape and become invasive species. When invasive species spread and colonise new territory, they contribute to reduction in the native biodiversity affecting indigenous flora and fauna. Problems associated with the introduction of invasive species vary from country to country and the main environmental problems are:

- Negative impacts/ changes to the environment
- High levels of water uptake-affecting water tables.
- Changes in ecosystems as invasive species replace grasslands and indigenous trees.

This damage is often difficult or impossible to reverse. The cost of controlling invasive species must be seen not only in the cost of prevention and control, but also in indirect costs due to their impact on ecosystem. In Botswana, nurseries produce more exotic tree species than indigenous species. The exotic species se are used to address environmental problems that Botswana experience such as fuelwood shortages, desertification and deforestation, some of the exotic species are promoted for Beekeeping and folder in animal production. Table below gives list of exotic species demonstrating invasive tendencies by naturally regenerating in Botswana as submitted by (Binggeli 1998), Buss, 2002) Although Botswana is fortunate in that the introduced exotic species has not had a detrimental effect on its ecosystems, but if the practice continues without caution and foresight, the results on various ecosystems may be catastrophic.

Table 10 Species and their Invasive Category

Species	Invasive Category
Agave sisalana	NC
Atriplex nummularia	NC
Caesalpinia pulcherrima	2
Eucalyptus spp	2
Lantana camara	NC
Leucaena leucocephala	3
Melia azedarach	3
Nerium oleander	NC
Optunia spp	NC
Populus spp	NC
Prosopis spp	NC
Ricinus communis	2
Salix babylonica	NC
Salix fragilis	NC

Source: Adapted from C.M. Buss (2002), The potential Threat of Invasive Tree Species in Botswana, Division of Forestry and Range Ecology, Gaborone, Botswana.

Key:

NC: ***Not Classified***

1: High Invasive
2: Moderate Invasive
3: Possibly / Potentially Invasive

The species in Table 10 have regenerated along watercourses and other suitable areas. There is already concern from environmentalist that invasive species growing along watercourses, especially in Ngamiland, may have catastrophic effects on the ecosystem of the Okavango Delta, a Ramsar site. The distribution and scale of species above has yet to be established but all are visible in various ecosystems throughout the country. Some of these species have a high water uptake that may threaten the scare water resources in Botswana.

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