FORESTRY RESEARCH RECORD No.65

A REPORT ON THE MULANJE CEDAR RESOURCES AND THE PRESENT CRISIS

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Introduction

Mulanje Cedar (Widdringtonia cupressoides) is Malawi's national tree and it grows naturally only on Mulanje Mountain in Malawi. The tree has great commercial value and has a high potential for contribution to the nation's economy. But regrettably the cedar forest does not seem to be managed well by the Forestry Department.

This report is a result of a survey on Mulanje Cedar resources on Mulanje Mountain. The purpose of the survey is to map the distribution of the cedar forest and to analyse its condition. The field survey was carried out during the dry seasons of 1987 and 1988 intermittently. All the cedar forest was visited, or at least observed from the nearest view-point, to determine its extent and condition. In addition the cedar management was observed throughout these years. Aerial photographs which were taken in 1986 were used to assist the mapping.

1. Distribution

The distribution of Mulanje Cedar on Mulanje Mountain (except Michesi) is shown on map 1. The published map "Mulanje Mountain 1/30,000" was used as a base. (But in this report a reduced copy is attached. The scale of the copy is about 1/42,500.) All the [illegible] stands in Mulanje Forest Reserve (except Michesi area) which have more than 35% [illegible] ut ⅓) of [illegible] density are shown as [illegible] on the m[illegible] [illegible] is sh[illegible] [illegible].

The Mulanje Cedar Forest bei[illegible] scattered [illegible]ny s[illegible] [illegible] hollows, valleys and [illegible] upper part of the outer slopes [illegible]ximate altitude between 1600m and [illegible]00m.

Each stand or each cluster of stands has been named respectively (see map 1), and its area is shown in table 1. The areas were measured on the map by overlaying 10/3mm X 10/3mm grids which correspond to 1ha in the field. The total area of the cedar forest is calculated at 1462ha. This 1462ha includes any type of cedar stand as well as dead stands (see below).

2. Ecology & condition

The following paragraph quoted from Edwards (1982-2) provides a brief ecology of Mulanje Cedar.

> "Mulanje Cedar does not regenerate under a closed canopy and it is assumed that conditions in the ground layer of middle-aged or mature stands are unsuitable for germination and seedling establishment. Mulanje Cedar seedlings are sometimes presents on the edge of the forest in open shrub communities, usually in association with pioneer species such as Philippia benguelensis and Hypericum revolutum. This suggests that in the natural forest Mulanje Cedar would have been among the first species to recolonize bared areas after fire or windthrow but whereas most of the other pioneers are relatively short-lived and would have been gradually supressed by shade-tolerant evergreen forest species, Mulanje Cedar would have persisted in the canopy or emergent layer. Thus fires at intervals of 100-200+ years were essential for the rejuvenation and ultimate survival of the cedar stands."

TABLE I Cedar Areas (except Michesi)

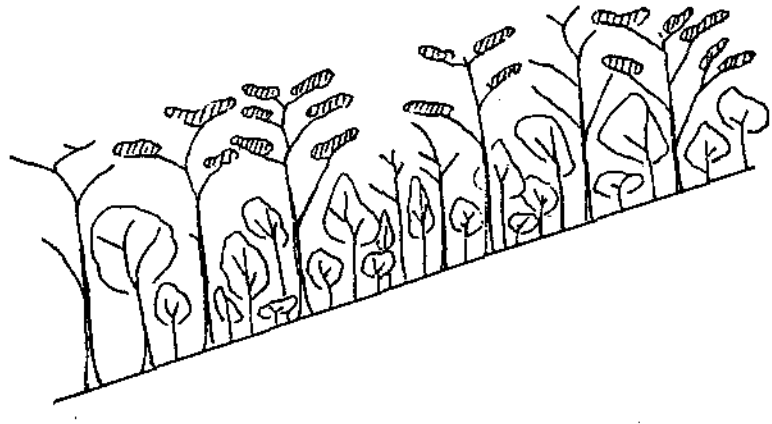
Chambe	*Likhubula	44 ha
	*Phalamata	74
	*Malembe	40
	*Changa	3
	*Namingazi	I4
	*Makhuthula	3o
		205
Lichenya	*Limbe	I90
	*C.C.A.P.	4
	*Chilemba	20
	*Tayamoyo	I4
	*Nang'ma	I
	*Muloza	I
	*Namunyemunye	22
		252
Thuchila	*Mikwasara	39
	*Chisepo	34
	*Nakwimbi	2
	*Mzimba	I9
	*Mvunje	I7
	*Thuchila	67
	*Co-op	68
	*Nambiti	5
	*Khomambiri	3
	*Nakhungubwe	I0
	*Zagaru	29
	*Likulezi	35
		328
Chinzama	*Chinzama	4 ha
	*Khuto	I
	*Minunu	55
	*Savani	7
	*Ruo	4
		7I
Sombani	*Chiphalombe	35
	*Phalombe	82
	*Nandiwo	I0
	*Nambiya	I0
	*Nathaka	24
	*Sombani	24
	*Matambale	I6
	*Namasile	I2
	*Chenjerani	I
	*Chinetefi	I
	*Reyareya	II2
	*Moriya	30
	*Naikoto	62
		4I9
Madzeka	*Mama	4
	*Madzeka	75
	*Nayawani	38
	*Phadzi	I5
	*Malilima	55
		I87

TOTAL I462 ha

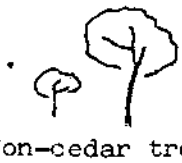
As the regeneration of Mulanje Cedar occures only under the limited conditions shown above, each cedar stand tends to consist of more or less even-aged trees. Thus the cedar forest can be classified into certain age classes. But other factors such as fire damage, exploitation etc. make the structure of the forest complicated. In this chapter some typical profiles of the cedar forest are described to explain the present condition of the forest.

A.Old and decrepit stand

This stand consists of old and decrepit trees which have often attained 30-40m in height and over 1m in diameter. They have a clear bole of about 20m and big limbs with relatively sparce foliage. The tree top is dead or bent horizontally so the top of the crown is flat. The growth rate is low now and they can no longer produce abundant seed. Some of them are already dead of old age. An evergreen understory has been developed well and a thick humus layer has been accumulated. On the other hand Mulanje Cedar saplings are almost completely absent on the forest floor.



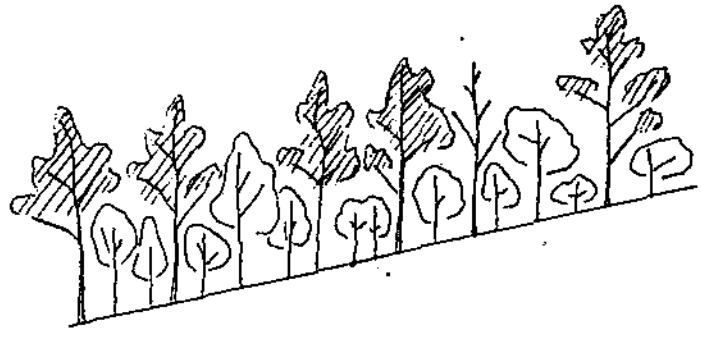
Cedar trees



Non-cedar trees

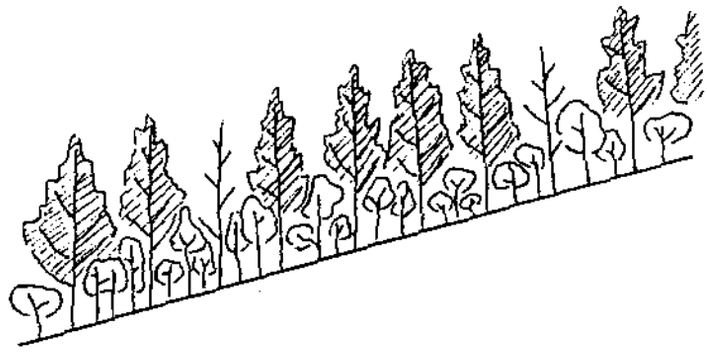
B.Middle-aged stand

These trees have attained a great dimention but are still growing well and putting on increment and height growth. An evergreen understory has been developed but Mulanje Cedar regeneration is absent under the forest canopy. This stand is an earlier stage of an old-decrepit stand. The transition age between the two stages is varied depending on individual vigour but is presumed to be well over 150 years.



C.Young stand

A young tree is defined here as a tree which has germinated after cedar exploitation was started at the beginning of this century. The tree has sharply tapering crown and D.B.H. is usually less than 40cm.



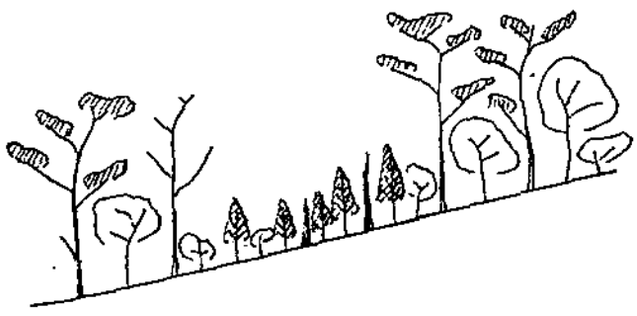
Although there are some natural stands in this age class, many of the young stands are planted. The achievement of cedar planting on Mulanje Mountain is recorded in "Colonial Report -Annual, Nyasaland Protectorate (British Central Africa Protectorate)","Nyasaland Protectorate Annual Report of The Forestry Department" and "Forestry in Nyasaland 1920". This information is listed on table 2. During this period, according to the records, some 170-190ha were planted with Mulanje Cedar.

At present part of Phalamata cedar forest on Chambe Plateau is thought to be a planted area. On Lichenya Plateau Namunyemunye is planted. The upper part of Limbe forest was planted with a mixture of Mulanje Cedar and Cypress. On Sombani Plateau, Nandiwo·Nambiya·Nathaka, and part of Matambale are presumed to be planted. But the total area of those plantations on Sombani does not reach that recorded as planted. It is supposed that the remaining has been destroyed most probably by fire. On the other hand the first planting on Thuchila Plateau is difficult to distinguish from natural regeneration.

It is estimated that the cedar forest in this age class today does not exceed 300ha including both planted and natural stands.

D.Sapling & seedling

Saplings and seedlings are usually found along a fringe of the cedar forest or in a glade within the forest where the vegetation was once destroyed by fire, or other causes, and which has been well protected against fire since then. The tree has a sharply tapering crown and juvenile foliage. It colonizes with other pioneer species. Today the trees in this age class are very scarce because of fire damage (see below). They occur in small clumps or as sporadic individuals.



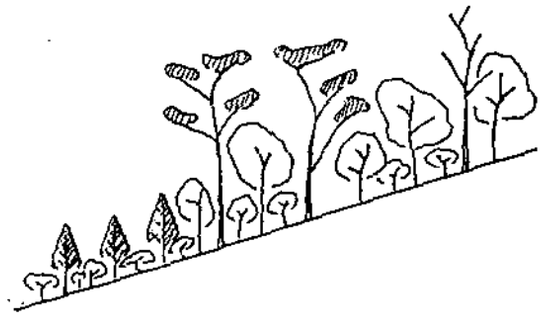


TABLE 2 Planting Record of Mulanje Cedar

1. from "Colonial Report - Annual, Nyasaland"

planting season	areas(acre)
1904-05	20 (Thuchila) (Up to this year total about 80 acres)
1905-06	6 (")
- - - - -	
1914-15	25 (Likabula plateau)
1915-16	15 ("), 15 (Lichenya)
- - - - -	
1919-20	13 (Mulanje plateau)

TOTAL about 150 acres

2. from "Forestry in Nyasaland"

Up to 1919 100 acres

3. from "Nyasaland Protectorate Annual Report of The Forestry Department"

planting season	areas(acre)
1925-26	4½ (Mulanje)
-27	a small area
-28	3 (Fort Lister), 7 (Lichenya)
-29	- - - - -
-30	12 (Fort Lister), 2 (Lichenya)
-31	23 (")
-32	11 (")
-33	15 ("), 9 (Lichenya)
-34	29 ("), 23 (")
-35	23 ("), 8 (")
-36	5¾ ("), 5⅛ (")
-37	10½ ("), 6 (")
-38	12 ("), 4½ (")
-39	7 ("), 13½ ("), 1 (Chambe), 4 (Sombani)
-40	14½ ("), 9 ("), 9½ (")
-41	8 ("), 11 ("), 13 (Sombani)
-42	24½ (Mulanje)

...continued

3. (continued)

-50	I28	(Principal species - Mulanje Cedar, P.patula, P.longifolia, P.caribaea, Cu.Lusitanica)
-5I	257	(" - Mulanje Cedar, P.patula, E.saligna)
-52	269	(" - P.patula, Mulanje Cedar)
-53	- - - - -	
-54	253	(Principal species - P.patula, Mulanje Cedar)
-55	20	(Mulanje Cedar on Chambe)
-56	7	(")

-I920	I00-I50 acres (Mulanje)	⟶ 40-60 ha
I925-42	329 acres (Mulanje)	⟶ I3I.6 ha
	I65¾ acres (Fort Lister)	
	I7 " (Sombani)	
	95⅓ " (Lichenya)	
	2I½ " (Chambe)	
	29 " (non-identified)	

E.Burnt stand

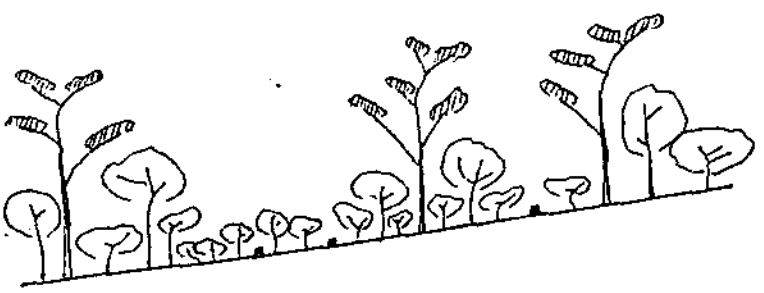
Although periodic fire is essential for survival of Mulanje Cedar, current frequency of fire, on the contrary, threatens its survival. Such frequent fires have created 'burnt stands' in all age classes. The burnt stand consists of dead trees and burnt stumps with a scorched shrub undergrowth. Live trees may occasionally survived among them. Repeated fire prevents the establishment of cedar regeneration. Almost every cedar forest patch has such a burnt stand on its edge. The stand often stretches toward the middle of the forest patch. Small and narrow forest patches usually consist of dead trees only.

Today it is estimated that about one fifth of the cedar forest on the mountain belongs to this category.

F.Exploited stand

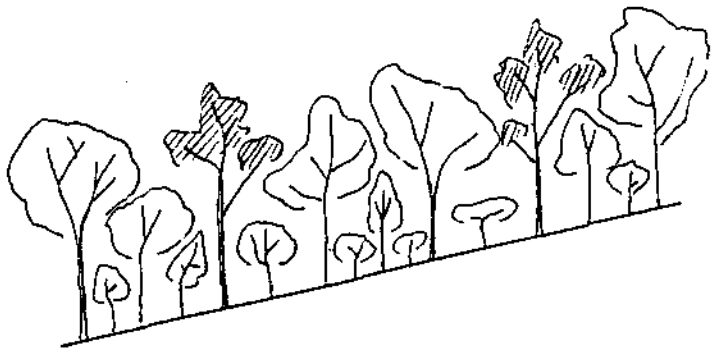
The Forestry Department began cutting cedar on Mulanje Mountain from 1901. Today there is no substantial cedar patch on the mountain (except on Michesi) which has not been exploited in the past. In this sense the whole cedar forest is 'the exploited stand', but here the term is used in a different sense.

Some cedar stands were heavily exploited without any effort to restock after the cutting was over. A huge cedar tree damages the undergrowth when it is felled. And the sawyers do not try to conserve the undergrowth during the operation. Thus the exploited stand consists of a bush layer with sporadic cedar trees which usually have less commercial value. Natural regeneration of Mulanje Cedar could be developed here. Examples of such a stand can be seen in any old-decrepit stand and mature stand.



G.Cedar co-dominant stand

In this stand Mulanje Cedar is a co-dominant species with other evergreen species. This stand is found in a transitional zone between a cedar dominant forest and an evergreen broadleaved forest.



At present 1462ha of Mulanje Cedar forest on the mountain are composed of those elements which are shown above. It is very clear that the present condition of the cedar forest is far from healthy.

From the viewpoint of age structure it inclines toward an over mature class. Today 'old-decrepit' and 'mature' are the dominant age class. In contrast, a young stand is comparatively small and saplings and seedlings are desperately few. There is no hope for increase in cedar regeneration as long as the present circumstances continue. On the other hand old-decrepit and mature stands are severely damaged by fire and exploitation. Fine and well stocked live forest of those age classes is almost absent on the mountain.

3.Cedar management at present

At present management of Mulanje Cedar is almost restricted to exploitation. As the Forestry Department places its reliance on natural regeneration for its restocking, planting of cedar trees is not carried out. Nor is any effort made to encourage natural regeneration. In brief the Forestry Dept. lacks a policy of restocking.

Neither does the Forestry Dept. take any efficient measure towards the conservation of the existing cedar forest. The cedar resources are lost by fire and illegal exploitation because of lack of close supervision.

Considering the present condition and management of cedar resources, drastic measures are required to conserve and restock these resources.

4.Proposed measure

Although much must be done, the first priority for the management of Mulanje Cedar is the protection of the cedar forest against fire and plant invaders. Without those two, any other efforts for conserving or restocking Mulanje Cedar will be in vain.

ten of those species are recognized on Mulanje Plateaux. Fortunately majority have spread only to a limited extent. But two of them have completely naturalized and invaded the indigenous vegetation. These are Pinus patula and Himalayan raspberry (Rubus ellipticus). A background of the introduction of the two species, their ecology and actual threat are well described by Edwards (1982-1). Those two species inhibit the natural regeneration of Mulanje Cedar as they are strong competitors of Mulanje Cedar in the early stage of its growth. These plant invaders must be controlled in such areas of the mountain.

(C) On the basis of those two measures, a keen effort is required to increase a young generation of Mulanje Cedar. Of course natural regeneration must be established with care, but some artificial restocking is necessary because natural regeneration alone is not sufficient for a drastic increase.

Although planting is the most effective means of restocking, other labour saving methods should also be considered. For example, scattering seeds on ground which is prepared by manual scarification, or light early burning, may be sufficient to produce an abundance of seedlings (Edwards 1982-2). In any case the plots must be protected by adequate firebreaks.

(D) On the other hand the existing cedar forest must be utilized properly. Last year illegal exploitation of live cedar was exposed. It should have been prevented by close supervision.

In addition every felled tree must be used completely. The customers usually buy the best portion of the tree only, and the remaining which also has commercial value and be given special protection.

(F) The establishment of a seed orchard is recommended to ensure a constant supply of Mulanje Cedar seed of high quality because old and mature trees which have excellent character are already all too few. Seed for the orchard can be collected from élite trees on the mountain (→E).

(G) In every age class many cedars are dying for no known cause. This is a relatively recent phenomenon. An aphid imported with cypress is one possible reason. Further investigation of these deaths is required.

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As will be obvious from this report, no complicated technique is necessary to conserve Mulanje Cedar, only steady and determined effort.

Reference

1. anon : Colonial Report - Annual, British Central Africa Protectorate Report for 1904-05

3 " : " Report for 1906-07

4. " : Colonial Report - Annual, Nyasaland Protectorate Report for 1907-08

22. " : " Report for 1925

23. " : Nyasaland Protectorate Annual Report of The Forestry Dept. 1926

53. " : " 1956

54. " : 1920, Forestry in Nyasaland Statement British Empire Forestry Conference

55. Chapman,J.D.: 1961, Notes on Widdringtonia; KIRKIA Vol.1 1960-61

56. " : 1962, The Vegetation of The Mlanje Mountain Nyasaland

57. " & White,F.: 1970, The Evergreen Forests of Malawi

58. Edwards,I.:1982-1, Plant Invaders on Mulanje Mountain; Nyala 8(2) P89-94

59. " :1982-2, A Report on Mulanje Cedar Resources on Mulanje Mountain; FRIM report No.82035

60. " :----- , Conservation of Plants on Mulanje Mountain malawi; Oryx Vol 19 No.2

61. anon :1951, Preliminary Yield Table for Mulanje Cedar on Evergreen Sites on Zomba Mountain

62. " :1981, The Natural Regeneration of Pinus Patula on Mulanje Mountain