

# THE NELSON MANDELA AFRICAN INSTITUTION OF SCIENCE AND TECHNOLOGY (NM-AIST)



## REPORT ON FIELD EXCURSION OF 15<sup>TH</sup> -16<sup>TH</sup> MARCH 2014, FOR BIODIVERSITY SCIENCE AND CONSERVATION PLANNING

Prepared by *Masters' students in Life Sciences and Engineering* <Specialization: *Biodiversity conservation and Ecosystem Management*>

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### INTRODUCTION and site description

An excursion at Ecoscience Centre was organized by the Nelson Mandela African Institution of Science and Technology (NM-AIST), headed by Prof. Thadeus Tarimo, Coordinator for Biodiversity Science and Ecosystem Management in the School of Life Sciences and Bio-Engineering and Dr. Linus Munishi, an elephant specialist, who is academic staff and course instructor within the School. The Ecoscience centre is situated on the North-Eastern border of Tarangire National Park, The 80 ha property borders an important migration route of elephants, zebra's and other animals. From Arusha: a one hour drive to the village of Makuyuni. Continue exactly 3 km on the Babati/Tarangire road. At the big telephone antenna (right hand side on main road), turn left on the dirt road and continue straight away for 20 km.

The excursions included first year Masters Students of Life science and engineering, specializing in biodiversity and ecosystem management. The Director of the Ecoscience Centre, Ben Beeckmans, was requested to give a Lecture on the Northern Tanzania's geology and geomorphology as part of the basic knowledge for the students and a complement in studying the area's biodiversity. During the field excursion the diversity, abundance and composition of the trees, and shrub species in a 80 hectre area of Ecoscience centre and adjacent area outside the centre was assessed.

## **METHODOLOGY**

### **Study site description**

The study was conducted in Ecoscience and its adjacent area . Ecoscience is situated on the North-Eastern border of Tarangire National Park, 20 km South of the village of Makuyuni (itself on the main tourist road to the Serengeti national park). The local village is called Mswakini Juu. The 80 ha property borders an important migration route of elephants, zebra's and other animals. From Arusha: a one hour drive to the village of Makuyuni. Continue exactly 3 km on the Babati/Tarangire road. At the big telephone antenna (right hand side on main road), turn left on the dirt road and continue straight away for 20 km.

To achieve our objective, three line transects were put 250 m apart and on every transect, three 10X10 m quadrants were located making a total of nine quadrants. Similar design was laid out in an area adjacent the Ecoscience as a way of comparing higher plants biodiversity between the two adjacent sites. Within each quadrant, all trees and shrubs were located and enumerated and the results are summarized in the Tables below. Then species composition for both area 'A' (Ecoscience) and area B (adjacent to ecoscience) was calculated by using Simpson's Index of Diversity (SDI) which is the common method to calculate species composition (Nuffield 2008).

Simpson's Index of Diversity (SID)= $1-D$

$$\text{But } D = \frac{\sum n(n-1)}{N(N-1)}$$

Whereby  $D$ = Simpson's Index.

$n$ = A total number of organisms of a particular species.

N = total number of organisms of all species

Therefore Simpson's Index of Diversity (SID) =  $1 - \frac{\sum n(n-1)}{N(N-1)}$

**RESULTS AND DISCUSSION**

**Describe how many tree and shrub species were in the area.....then explain those identified and unidentified ones before showing them in a summary table....**

*Table 1: Specie of Area "A"(Ecoscience)*

PLOT	SPECIES	NATURE	FREQUENCY
1	<i>Azanza garckaena</i>	tree	10
	<i>Solunm incunum</i>	shrub	15
	Unidentified species	shrubs	186??? In one plot??
2	<i>Azanza garckaena</i>	tree	28
	<i>Solunm incunum</i>	shrub	68
	<i>Acacia species</i>	tree	8
	<i>Dichrostachys</i>	shrub	9
	Unidentified species	shrub	230
	Unidentified species	tree	1
3	<i>Azanza garckaena</i>	tree	7
	<i>Dichrostachys</i>	shrub	17
	<i>Dalbergia species</i>	Tree	4
	Unidentified species	shrub	11

4	<i>Azanza garckaena</i>	tree	40
	<i>Dalbergia species</i>	tree	9
	<i>Solunm incunum</i>	shrub	55
	Unidentified species	shrub	10
5	<i>Azanza garckaena</i>	tree	17
	<i>Solunm incunum</i>	shrub	12
	<i>Unidentified species</i>	tree	3
	<i>Unidentified species</i>	shrub	36
6	<i>Acacia spp</i>	tree	1
	<i>Dichrostachys spp</i>	shrub	2
	Unidentified species	shrub	2
7	<i>Azanza garckaena</i>	tree	2
	<i>Solunm incunum</i>	shrub	13
	<i>Dichrostachys</i>	shrub	7
	Unidentified species	tree	1
	<i>Unidentified species</i>	shrub	27
8	<i>Azanza garckaena</i>	tree	10
	<i>Solunm incunum</i>	shrub	35
	Unidentified species	shrub	31
9	<i>Solunm incunum</i>	shrub	3
	<i>Dichrostachys spp</i>	shrub	5
	<i>Dalbergia spp</i>	tree	1

Then species composition in area 'A' (Ecoscience) were calculated by using Simpson's Index of

Diversity (SDI) which is the common method to calculate species composition (Nuffield 2008).

Simpson's Index of Diversity (SID)=1-D

$$\text{But } D = \frac{\sum n(n-1)}{N(N-1)}$$

Whereby D= Simpson's Index.

n= A total number of organisms of a particular species.

N = total number of organisms of all species

$$\text{Therefore Simpson's Index of Diversity (SID)= } 1 - \frac{\sum n(n-1)}{N(N-1)}$$

Table 2: Identified species of tree and shrubs in Area 'A'

Species name	n	n - 1	n(n-1)
<i>Acacia species</i>	9	8	72
<i>Azanza garcaena</i>	114	113	12882
<i>Dalbergia species</i>	13	12	156
<i>solanum incunum</i>	201	200	40200
<i>Dichrostachys species</i>	40	39	1560
	N=377		$\sum n(n-1) = 54870$

just report the value obtained using the formula instead of showing the computational steps...and make interpretation in the context of plant forms classes that were studied (i.e. tree species separately from shrub species) = 0.62

The higher the SID, the more diverse the area is. Therefore area "A"(Ecoscience) have relatively high diversity since it have high Simpson's Index of Diversity (0.62)

### Discussion on Area "A" (Ecoscience)

discuss the results for each section (A and B) and how they compare one another. Some (which ones? How many? of the shrubs and trees were unable to be identified due to lack of expertise and time constraint. Based on the table above, the area composed by three tree species namely *Azanza garcaena*(83.8%),*Acacia species*(6.7%) and *Dalbergia species*(9.5%).Out of three tree

species *Azanza garckaena* which covers of about 83.8%. I??in term of shrubs two species were able to be identified include *Dichrostachys species*(16.5%) and *Solanum incunum*(83.5%) which means *solanum incunum* is dominant shrub in area A-so what does this mean in terms of indicators of rangeland state? Degraded?. Grasses-we can't discuss this because time was not enough to locate and estimate all the grasses for each plot and that is why we decided to choose higher plants (i.e. trees and shrubs only) were observed all over the area including *Setaria species*, *Antropogony econumus*, *Eragrostis species*, *Hyparrhenia hirta* whereby *Eragrostis species* were dominant compare to other grasses. The Diversity score for this area (SID=0.62) indicate a high level of biodiversity although the *presence of Solanum incunum* indicate that area previously was disturbed. Also presence of eragrostis grasses which are unpalatable is another indicator that shows this area was previously disturbed by overgrazing.

We were also able to see animal spoor for Zebra, Elephant and impala-so what???

Use the comments above to make similar changes and corrections for area B i.e. explain the number of tree and shrub species, and their respective abundance before getting to describing species diversity and then put the summary table and discuss the results along that direction.

Table 3:Area “B” (adjacent to ECOSCIENCE)

PLOT	SPECIES	NATURE	FREQUENCY
1	<i>Homocapus species</i>	tree	3
	<i>Solunm incunum</i>	shrub	39
	Un identified species	shrubs	4
	Unidentified species	tree	2
2	<i>Solunm incunum</i>	shrub	7
	<i>Dichrostachys</i>	shrub	7
	<i>Un identified species</i>	tree	1
3	<i>Azanza garckaena</i>	tree	3
	<i>Acacia species</i>	tree	4

4	<i>Ozoroa reticulata</i>	tree	2
	<i>Acacia species</i>	tree	1
	<i>Dichrostachys</i>	shrub	4
	<i>Solanum incunum</i>	shrub	40
	<i>Grewia monticola</i>	shrub	2
5	<i>Acacia species</i>	tree	1
	<i>Solanum incunum</i>	shrub	11
6	<i>Dichrostachys</i>	shrub	6
	<i>Azanza garckaena</i>	tree	6
	<i>Solanum incunum</i>	shrub	7
7	<i>Azanza garckaena</i>	tree	15
	<i>Solanum incunum</i>	shrub	30
8	<i>Azanza garckaena</i>	Tree	7
	<i>Solanum incunum</i>	shrub	50
	<i>Acacia spp</i>	tree	2
9	<i>Solanum incunum</i>	shrub	11
	<i>Dalbergia species</i>	tree	1
	Unidentified species	shrub	6
	Unidentified species	tree	1

Table 4: Identified species in area B

Species name	n	n - 1	n(n-1)
<i>Acacia species</i>	8	7	56
<i>Azanza garckaena</i>	31	30	930
<i>Dalbergia species</i>	1	0	0
<i>solanum incunum</i>	195	194	37830
<i>Dichrostachys species</i>	17	16	272
<i>Ozoroa species</i>	2	1	2
<i>Homocapus species</i>	3	2	6
<i>Grewia monticola</i>	2	1	2

	N=259		$\sum n(n-1) = 39098$
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(This table deducted from table 3 .In our calculation we exclude unidentified species)

By using  $D = \frac{\sum n(n-1)}{N(N-1)}$

Therefore,  $D = \frac{39098}{259(259-1)}$

$D = 0.6$

Simpson's Index of Diversity (SID) = 1-D

$SID = 1 - 0.6$

$SID = 0.4$

This means area B has low diversity compare to area A since it has low SID which is **0.4** while area A have High SID of **0.62**.

### Discussion in Area 'B' (Adjacent To Ecoscience)

The study from this area shows that the area was highly disturbed from overgrazing, fire and encroachment why do you think so?? From the type and number/abundance of species found in the area???. Therefore we were able to identify some of trees and shrubs but leaves were sprouted so it was difficult to identify and to collect sample (specimen). Some of the tree species identified were *Azanza garcaena*(68.8%),*Acacia species*(17.7%), *Homocopus species* (7.3%), *Ozoroa species*(4.4%) and *Dalbergia species*(2.2%).out of three tree species the area is dominated by *Azanza garcaena*.

Shrubs were also distributed in different plots and three species were able to be identified such as *Solanum incunum*(91.1%) *Dichrostachys species*(7.9%), and *Grewia monticola*(0.9%) which means *solanum incunum* is dominant shrub in area B.

## CONCLUSION AND RECCOMENDATION

### Conclusion

In area A and B there were different composition of species whereby area A (Ecoscience) there was high species diversity compare to area B which is located outside conscience. This implies

that in area A there is no human activity???-is grazing human activity? If so, grazing AT TIMES INCREASE DIVERISTY WHEN THE LAND IS NOT EVERGRAZED... which means currently the area is recovering from environmental perturbation. In area B, still there is highly disturbance from human activities like overgrazing, fire and encroachment. Moreover, the domination of *Solanum incunum* and *Azanza garckeana* in both area A and B, indicate that the area was subjected to disturbance overgrazing, fire or encroachment.

### **Reccomendation**

We recommend (RECOMMENDATION SHOULD BE BASED ON THE FINDINGS OF THE STUDY IN THE CONTEXT OF WHAT SHOULD BE A WAY FORWARD TO IMPROVE THE RANGELAND IN THE AREA....the following;

- The exercise like this needs time, expertise (botanists) and prior information so that students can prepare before the field work.
- More measures should be taken to conserve the area (conscience) because the area shows some signs of animal existence as indicator for habitat recovery.
- In the other area (area B) human activity should be minimized because there highly deterioration.

### **REFERENCE**

- Nuffield foundation (2008). Ecology and Simpson's Diversity Index. Activity brief; advanced applied science: GCE A2 Units.