

## Annex 9

### Short introduction to the MEMA Access database design and its use.

T	Table
Q	Query
X	Cross-table (X-tab)
R	Report

#### **X Stratum analysis. (under Queries)**

This X-tab analyses the relations between the interpreted stratum and the actual stratum as seen in the field.

On this basis, it is possible to assess the correctness of the photo interpretation, and thus the relevance of the stratification.

Refer as well to section 2.3.

The ensuing analyses of the wood data are all based on the actual strata as seen in the field.

#### **X Plot analysis. (under Queries)**

This X-tab calculates the number of plots per forest, village and stratum, which are necessary elements in any further analysis.

The results of this X-tab must be entered into the tables called T Forests, T Villages and T MEMA Strata before any further analysis can be carried out correctly.

#### **Plot-data. (under Reports)**

This report can write out copies of the data-sheets as entered into the database.

#### **X Activities. (under Queries)**

This X-tab can analyse the number of plot per forest, village and stratum in which evidence of different activities have been observed.

By sorting and design-adjustments it is possible to analyse a combination of activities for a range of variables according to choice.

*In Design View:*

The *Fields* of *Row Heading* and of *Column Heading* can be changed between; *Forest Name*, *Village Name* and *Stratum Name*.

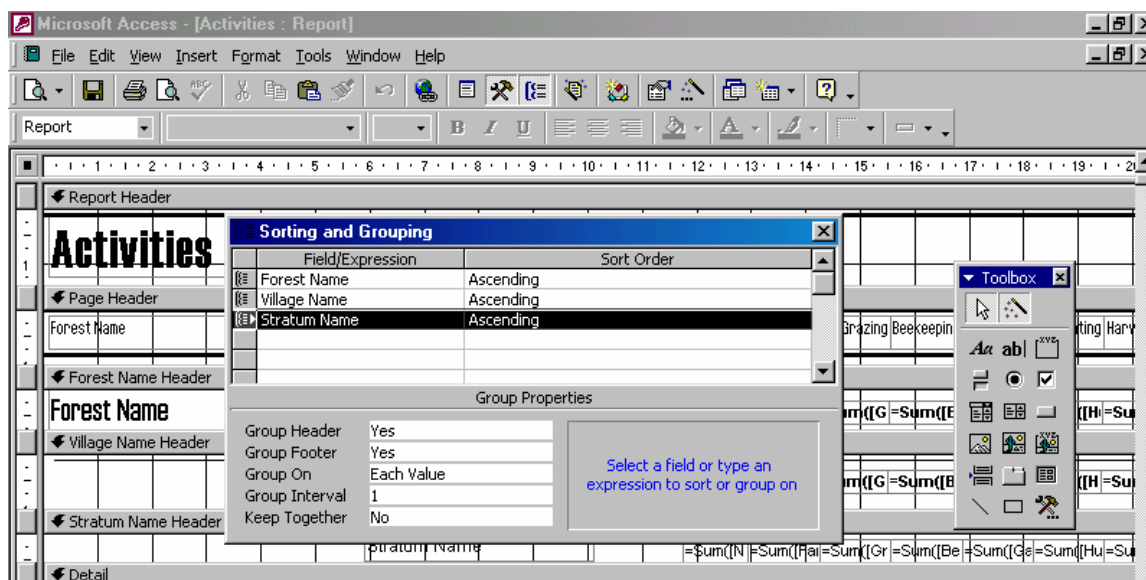
In the *Fields* where "*Total = Where*" the *Field* can be changed between *Farming*, *Grazing*, *Beekeeping*, *Game*, *Hunting*, *Harvesting*, *Pitsawing*, *Charcoal* and *Mining*.

The *Criterion* can be changed between *Yes* and/or *No*.

Field:	Stratum Name	Village Name	Plot	Hunting	Game	
Table:	Q Activities	Q Activities	Q Activities	Q Activities	Q Activities	
Total:	Group By	Group By	Count	Where	Where	
Crosstab:	Column Heading	Row Heading	Value			
Sort:						
Criteria:				Yes		
or:					Yes	

## Activities. (under Reports)

This report shows the total number of plots and the total number of plots where evidence of a certain activity is observed per forest, village and stratum. If desired, the presentation can instead be per forest, stratum and village by changing the order of *Field/Expression* under *Sorting and Grouping* in *Design View*.



## X Regeneration/ha species. (under Queries)

This X-tab can show regeneration counts per species in the plots as average per hectare for plots in which the species has been found.

In *Design View*:

For the different groups of uses (*Timber, Poles, Fuelwood, Others*) the *Criteria* can be changed between *Yes* and/or *No* in order to see the results for any combination of these groups.

The *Total* needs to be set to *Where*.

The *Field* of *Column Heading* can be changed between; *Forest Name, Village Name* and *Stratum Name*.

Field:	Local name	Botanical name	\$stratum Name	Value: Avg([Regene	Total: Avg([Regene	Timber	Po
Table:	Q Forest Village Str:	Q Forest Village Str:	Forest Name			Q Forest Village Str:	Q L
Total:	Group By	Group By	Village Name	Expression	Expression	Where	Wf
Crosstab:	Row Heading	Row Heading	Stratum Name	Value	Row Heading		
Sort:	Ascending		Local name				
Criteria:			Botanical name			No	Ye
or:			Regeneration			Yes	No
			Plot			Yes	Ye
			No of plots per stre			No	No

### X Regeneration avg/ha species- village. (under Queries)

This X-tab can show different numbers per species and village concerning the regeneration counts in the plots.

There is however the very important difference that the numbers in the present X-tab are the average per all plots for each forest, village and stratum - and not just for the plots in which the species has been found.

In *Design View*:

For the different groups of uses (*Timber, Poles, Fuelwood, Others*) the *Criteria* can be changed between *Yes* and/or *No* in order to see the results for any combination of these groups.

### X Regeneration avg/ha species- stratum. (under Queries)

This X-tab can like the previous X-tab show different numbers per species and strata concerning the regeneration counts in the plots.

### X Stem counts total. (under Query)

This X-tab can show total numbers of counted stems in the plots.

In *Design View*:

For the different groups of uses (*Timber, Poles, Fuelwood, Others*) the *Criteria* can be changed between *Yes* and/or *No* in order to see the results for any combination of these groups.

The *Fields* of *Row Heading* and of *Column Heading* can be changed between; *Species Name (Local and/or Botanical)*, *Forest Name*, *Village Name* and *Stratum Name*.

Where the "*Field = Diameter*" and the "*Total = Where*" the *Criterion* can be changed to suit the desired interval of diameters.

- X Stem counts/ha >=10 per village. (under Query)
- X Stem counts/ha >=10 per stratum. (under Query)
- X Stem counts/ha <10 per village. (under Query)
- X Stem counts/ha <10 per stratum. (under Query)

These X-tab can show average numbers per hectare of counted stems in the plots.

In *Design View*:

For the different groups of uses (*Timber, Poles, Fuelwood, Others*) the *Criteria* can be changed between *Yes* and/or *No* in order to see the results for any combination of these groups.

### Regeneration - species. (under Reports)

This report summarises the regeneration counts per hectare - per forest and species

- Regeneration - uses per village. (under Reports)
- Regeneration - uses per stratum. (under Reports)
- Stem counts < 10 - uses per stratum. (under Reports)
- Stem counts < 10 - uses per village. (under Reports)
- Stem counts >= 10 - uses per stratum. (under Reports)
- Stem counts >= 10 - uses per village. (under Reports)

These reports summarise the regeneration and the stem counts per hectare - per forest and village or stratum in total and for each of the different uses (Timber, Poles, Fuelwood, Others).

### Q Vol/Plot/Village (under Queries)

This Query calculates merchantable volumes >= 10 cm. per plot on the basis of measured Average Diameter and Basal Area per plot. Below the Query is shown. The column headings shown in Danish below could not be changed. Translation added to the Screen Dump.

Forest Name	Village Name	Stratum Name	Plot	GennemsnitOf	GennemsnitOf	Vol>10
Kitapilimwa	Kitapilimwa	11 Cultivated farmland	19B4	14.3333333333	1.75	8.5108333333
Kitapilimwa	Kitapilimwa	6 Riverine forest	13C1	12.2	0	0
Kitapilimwa	Kitapilimwa	6 Riverine forest	13C2	17.5454545455	2.95	19.909318182
Kitapilimwa	Kitapilimwa	6 Riverine forest	13C3	35.294117647	4.7	19.785147059

Avg. of Diameter

Avg. of Basal Area

In Design View:

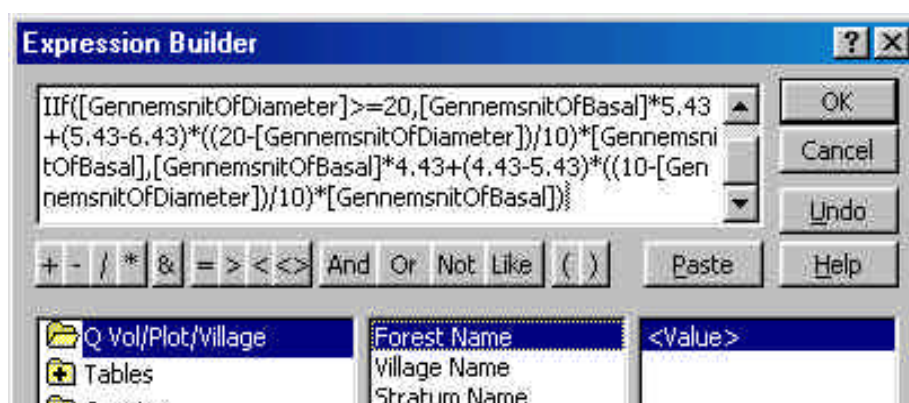
In the *Field, "Diameter"* where *"Total = Where"*, the *Field* can be changed between *Diameter and Basal Area* according to whether selection is to be carried on the basis of Diameter or Basal Area. The *Criteria* can be changed according to limitation on Diameter or Basal Area wished. As shown below, volume calculations will be carried out for average Diameters  $\geq 10$  cm.

In the *"Field, Stratum id"* where *"Total =Where"* the *Criteria* can be changed according to the strata wished to be analysed. In the shown situation calculations will be carried out fro all strata with the exception of Wooded Farmland, *"Stratum id =5 or 12"*.

Field:	Forest Name	Village Name	Stratum Name	Diameter	Stratum id	Vol>10: Iif([Genner	Plot
Table:	Q Forest Village Str:	Q Forest Village Str:	Q Forest Village Str:	Q Forest Village Str:	T MEMA Strata	Q F	Q F
Total:	Group By	Group By	Group By	Where	Where	Expression	Gro
Sort:							
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Criteria:				>=10	>0 And <5		
or:					>5 And <12		

In the *"Field – Vol >10"* where *"Total=Expression"* the calculation of volume is based upon the liner regressions described in chapter 5.1.1 As shown in the Screen Dump of the Expression Builder, the calculation is divided between diameters  $\geq 20$  cm. and diameters  $< 20$  cm. This method has been chosen to allow changes in the regression governing the calculations of volumes based on diameters between 10 and 20 cm. The calculations are based on the following expressions:

```
IIF([GennemsnitOfDiameter]>=20;("then")
Vol>10:= [GennemsnitOfBasal]*5,43 + (5,43-6,43)*((20-[GennemsnitOfDiameter])/10)*
[GennemsnitOfBasal];
("else")
Vol>10:= [GennemsnitOfBasal]*4,43 + (4,43-5,43)*((10-[GennemsnitOfDiameter])/10)* [GennemsnitOfBasal])
```



The slope of the regression governing the 10 cm. DBH curve is changed by altering the numbers marked in bold below:

$$\text{Vol}>10:= [\text{GennemsnitOfBasal}] * \mathbf{4,43} + (\mathbf{4,43}-5,43) * ((10 - [\text{GennemsnitOfDiameter}]) / 10) * [\text{GennemsnitOfBasal}]$$

### Q Volumen pr stratum.

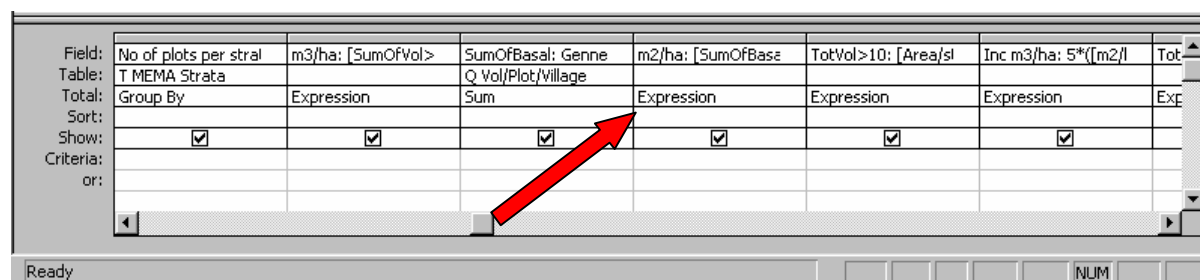
Volume / plot is calculated on the basis of total number plots measured within the stratum (incl. “zero-plots). Volume is expressed as m3/ha. Total volume is calculated by multiplying with total area per stratum.

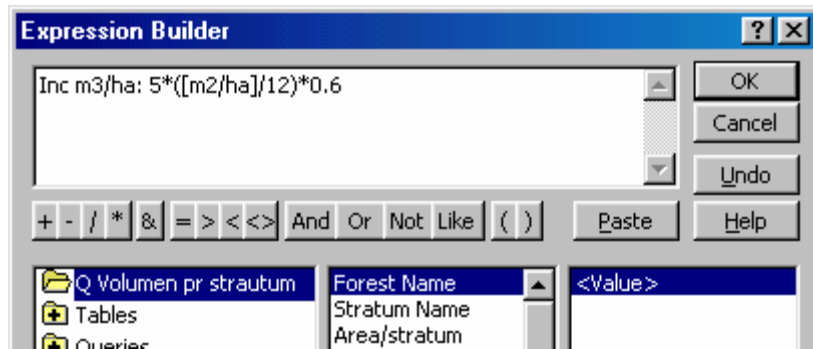
Increment is calculated as a function of average basal area / ha. Calculation is based on TAFORI and others, using an average increment of 5 m3 (total volume) / ha. in mature Miombo Woodland with an average basal area of 10 –12 m2 / ha. As we do not know the relation between basal area and increment, an estimate based on a liner relationship between the two have been used. A conversion factor of 0,60 between total and merchantable volume > 10 cm. is used in the following regression:

$$\text{Inc m3/ha}:= 5 * ([\text{m2/ha}] / \mathbf{12}) * \mathbf{0,6} \text{ where:}$$

[m2/ha] is Basal Area / plot based on total number plots measured within the stratum. Basal Area is expressed as m2/ha. Total Increment is calculated on the basis of the total area of the strata. Should the further work with the permanent sample plots provide the project with better documentation, it is possible to change the values for total Increment, Increment/Basal area relations and conversion factors between Total Volume and Volume >10.

*In Design View* the expression *Inc m3/ha* is located. The “*Field*” can be opened by using the expression builder and the regression can be changed as described above.





### **Volume and Increment pr Stratum (under Reports)**

The report presents the data derived from the described Query above. Volume and increment is calculated per Stratum in total and per ha. Figures based on total stratum area. The stratum sums are presented pr. Forest. Total and average Volumes and Increment are calculated pr. Ha. Total forest area.

### **Vol>=10/Stratum/Village/Plot (under Reports)**

The report is based on **Q Vol/Plot/Village** and summarises predicted volumes > 10 cm. per stratum, village and plot. The volume predictions can be changed as described above concerning **Q Vol/Plot/Village**. A further three reports named:

**Vol>=10/Stratum/\*** are based on stratum summaries.

It should be noted, that all Averages shown are simple averages based on the number of plots with diameters > 10 cm. DBH actually measured. For example: In the Report Vol>10/stratum. predicted Volumes / ha. will be approx. 5-10% higher than the figures weighed against total number of plots.

### **Vol>=10/Village/Stratum/Plot (under Reports)**

This report is based on the same data as above and the same explanation applies as above.

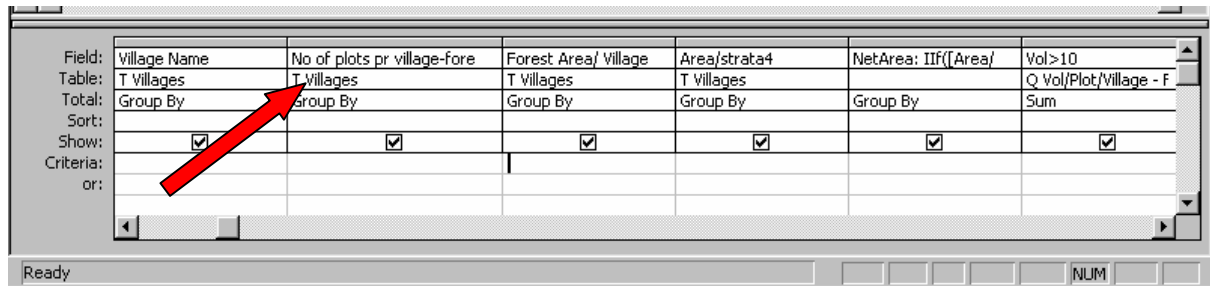
### **Q Vol/Plot/Village – Forest / Q Volume pr Village – Forests.**

As **Q Vol/Plot/Village**, but should not be changed as described above without corresponding changes in the **Q Volume pr Village – Forests**.

In *Design View*:

In the *Fields* where “*Total = Where*”, the *Criterion* can be changed according to limitation on Stratum a wished. In the normal situation, volume calculations will be carried out for the Stratum mentioned above. An overview of the Strata used can be found in the table **T MEMA Strata**.

When making changes in affected strata in Q Vol/Plot/Village it is necessary to change the No of plots pr village – forests. This can not be done directly in the *Design View* of **Q Volume pr Village – Forests**, but must be done by changing the numbers in the Table **T Villages** according to the required sorting. The number of Villages pr. Strata is found in **X Plot analysis** (in Query). The following images show where plot numbers are found in the *Design View* and where they are to be changed in **T Villages**



Village id	Village Name	No of plots per village	No of plots pr village-forest	Division	Distance	Inh
1	Chamdindi	26	22	0	65	
2	Nyang'oro	36	28	0	0	
3	Mangawe	36	36	0	0	
4	UsoLanga	20	16	0	0	
5	Mkulula	60	47	0	0	
6	Makuka		0	0	0	

**Nyang’oro; Area and Volumes pr. Village: (Excel-spread-sheet):**

On the basis of the **Q Volumen pr stratum** it is possible to extract basic information at stratum level concerning Total Volume, Basal Area and Increment / ha. This information can be transferred to the spread-sheet. The information can also be extracted from the corresponding Reports. The data is entered in the area of the Spread-sheet shown on the next page.

Pr. ha. forested land

Stratum	Area	m3/ha	m2/ha	Inc m3/ha
2 Lowland woodland	22.755	21,34	4,28	1,07
3 Highland woodland (miombo)	12.179	32,49	6,29	1,57
5 Wooded farmland	15.334	15,92	3,17	0,79

