Module # 12 – Component # 2

Classification of Plant Communities

Objective

Understand the function that plant communities and vegetation units have in drawing up a wildlife management plan, and to understand the methods associated with the classification of plant communities

Expected Outcome

- Understand the objective for a plant community study.
- Understand the braun-blanquet survey method.
- Determine a minimal area for survey in the braun-blanquet method.
Introduction

Differences in species composition, slope, rainfall, temperature, soil aspect and various other factors are responsible for the heterogeneity observed in the vegetation. The basis of plant community studies is the identification of homogenous vegetation units and the description and classification of these units. This identification is very important in drawing up a management plan for an area, because each unit has a different ecological capacity and resource value.

A homogenous vegetation unit can be defined as a unit of vegetation with uniform plant composition, topography, soil and climate.

These management units form the basis for management decisions regarding where fences, roads and waterpoints should be placed and act as basic units where veld condition and bush encroachment can be measured in future.

The objectives of a plant community study are the following:

- Identify homogenous units in the study area.
- Identify, describe and classify the plant communities of each homogenous area.
- Identify all plant species
- Determine management units
- Correlate the various environmental factors to the different vegetation classifications
- Identify ecologically sensitive areas
- Identify endangered / rare plant species
Braun-Blanquet Classification System

The Braun-Blanquet method for defining plant communities is the most widely applied and effectively standardized of all classification methods. It is therefore the most suitable method to use when classifying plant communities for drawing up a wildlife management plan. The aim of classification is to group together a set of individuals (which can be quadrats or vegetation samples) based on their attributes (floristic composition). These groups are then taken to be the plant communities.

The Braun-Blanquet method is basically formed on three ideas:

1. Plant communities all have specific species composition. Each community has inter-relationships with one another as well as with environmental parameters.

2. There are those species in the composition of the community that are used as a characteristic of the habitat (community) in which it grows. They are called diagnostic species.

3. The diagnostic species are used to classify these plant communities that are recognized together into a hierarchical system.

The Braun-Blanquet method is divided into an analytical phase and a synthetic phase, summarized as follows:
Analytical Phase

- The study area is divided into homogenous vegetation units (HVU’s) with the use of aerial photographs, land type series maps, vegetation maps as well as geological series maps.

- Sample sites, also known as quadrats, within each HVU are chosen that are representative of the area.

- The number of quadrats in each HVU are determined according to the size of the HVU and the level of detail required. A minimum of quadrats should be chosen in each HVU.

- The minimal area for a quadrat is determined using a species-area curve. This method will be discussed hereafter.

- In each quadrat, each species is recorded, and several parameters can be estimated within the quadrat: cover, sociability, vitality, periodicity, topographic characteristics and environmental characteristics.

- For our purposes the most important is the cover/abundance. This is visually estimated with a cover abundance scale.

- Ecotones are not included. An ecotone is a transitional area between two adjacent plant communities in which blending of plant species occur.
Synthetic Phase

Field data is entered into a matrix in which the **rows** represent **species** and **columns** represent **quadrats**. This called a **raw table**. The choosing of **sample sites** is done rather **subjectively**, and this is a **disadvantage** of the Braun-Blanquet method. However, the use of **computer programs for analysing** and ordinating the data have greatly decreased the subjectivity of this method.

### Some of the most widely used programs are:

- **TWINSPAN** – Two-Way Indicator Species Analysis
- **BBNEW** – Braun Blanquet New
- **DECORANA** – Detrended Correspondence Analysis

Plant communities are **named binomially**, and an applicable **physiognomic term** attached to the species names.

**For example:** *Themeda triandra – Vachellia caffra = Short open woodland community.*

<table>
<thead>
<tr>
<th>r</th>
<th>Very rare, usually a single individual, negligible cover</th>
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</thead>
<tbody>
<tr>
<td>+</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>1</td>
<td>1 – 5%</td>
</tr>
<tr>
<td>2a</td>
<td>6 – 12%</td>
</tr>
<tr>
<td>2b</td>
<td>13 – 25%</td>
</tr>
<tr>
<td>3</td>
<td>26 – 50%</td>
</tr>
<tr>
<td>4</td>
<td>51 – 75%</td>
</tr>
<tr>
<td>5</td>
<td>&gt;75%</td>
</tr>
</tbody>
</table>

Percentage cover ranges for the cover abundance scale of the Braun-Blanquet method.
Minimal Area

It is important to determine the suitable quadrat size for sampling the vegetation. This is done by first determining the minimal area. If the quadrat is too small, a community type cannot be clearly and easily defined from the data. If the quadrat is too large a lot of unnecessary effort and time will be wasted.

The minimal area method is as follows:

- A graph of species numbers against increase in quadrate size is used. This is also known as a species-area curve.
- The curve is derived by starting with a small quadrat and counting the number of species.
- The quadrat size is then doubled, and the number of species is counted again. This process is repeated with the quadrat size being doubled progressively and species number counted.
- At some point the graph will level off. This point is known as the minimal area.

A quadrat size of 10m x 20m (200m²); [33 x 66 ft] (2153 ft²) has been found suitable in most savanna areas.

The quadrat size is progressively doubled to determine the minimal area.
Important Note:

For the BB method to be effectively used, those **people responsible** for data collection, **must be able to identify many different plant species**. Attempting this method with a weak level of plant knowledge and plant identification ability – will result in **highly inaccurate raw data**, which leads to **incorrect classifications**, **inaccurate conclusions** and **poor management recommendations**.

The minimal area is derived from the species-area curve
Environmental Information

In addition to the plant species data the following specific information for each quadrat should also be recorded:

- Aspect
- Exposure
- Gradient
- Geomorphology
- Topography
- Geology
- Percentage rock cover
- Rock size
- Degree of erosion
- Drainage
- Biotic influences
- Degree of degradation

Eland: Taurotragus oryx
Case Study: Msasa Nature Reserve

The study area was stratified into relatively homogenous vegetation units by recognizing and mapping uniform vegetation units on paired 1:50 000 aerial photographs with the aid of a stereoscope. Vegetation, topocadastral, soil and geological maps were all used in the identification of HVU’s.

The Braun-Blanquet method was used. A minimum of three sampling sites per HVU was selected. Each quadrat was 10m x 20m (200m²), as this was found to be the minimal area according to the species-area curve.

A complete species list was recorded, and the habitat data added. Species cover was estimated using the cover abundance scale. At each site a 15 cm (± 5 in) deep soil sample was taken and clay content estimated.

The field data was entered into a matrix in which the rows represent species and the columns represent quadrats. The TWINSPAN program was used to analyse the data. The data was then refined using the Braun-Blanquet procedures to deliver a phytosociological table. The DECORANA program was applied to the data to determine a probable vegetation gradient.

The results showed a total of 243 species in 67 sample quadrats. The vegetation was classified into 6 distinct communities and 9 sub-communities. (For the purpose of this chapter the sub-communities will not be discussed).
Classification of Plant Communities

The vegetation communities of Msasa Nature Reserve

LEGEND

1. *Dombeya rotundifolia* - *Setaria homonyma*
   Short open woodland community

2. *Englerophytm magalismontanum* - *Mimusops zeyheri*
   Short open woodland community

3. *Commelina africana* - *Trachypogon spicatus*
   Short open woodland community

4. *Ochna pulchra* - *Burkea africana*
   Low open woodland community

5. *Protea caffra* - *Gnidia capitata*
   Low open woodland community

6. *Hyparrhenia hirta* - *Cynodon dactylon*
   Closed grassland community

Dam
### Vegetation Communities

1. **Dombeya rotundifolia – Setaria homonyma**  
   **Short open woodland community**

   The size of the community is **320 ha** (790 acres)  
   Dominated by Hutton soils.

   - **Diagnostic tree species:** *Dombeya rotundifolia*, *Vachellia caffra*, *Ziziphus mucronata*
   - **Diagnostic shrub species:** *Zanthoxylum capense*
   - **Diagnostic grass species:** *Panicum maximum*
   - **Dominant shrub species:** *Protoasparagus laricinus*
   - **Dominant grass species:** *Setaria homonyma*

2. **Englerophytum magalismontanum – Mimusops zeyheri**  
   **Short open woodland community**

   The size of the community is **2610 ha** (6450 acres)  
   Dominated by Mispah soil forms.

   - **Diagnostic tree species:** *Mimusops zeyheri*, *Olea capensis*
   - **Diagnostic shrub species:** *Myrsine africana*
   - **Diagnostic forb species:** *Crassula swaziensis*
   - **Dominant tree species:** *Apodytes dimidiata*
   - **Dominant shrub species:** *Elephantorizza burkei*, *Rhus gracillima*
   - **Dominant forb species:** *Indigofera melanadenia*
   - **Dominant grass species:** *Aristida junctiformes*, *Loudetia simplex*,  
     *Cymbopogon excavatus*

3. **Commelina africana – Trachypogon spicatus**  
   **Short open woodland community**

   The size of this community is **341 ha** (843 acres)  
   Dominated by Mispah soil forms.

   - **Diagnostic tree species:** *Terminalia sericea*
   - **Diagnostic shrub species:** *Solanum giganteum*, *Protea welwitschii*
   - **Diagnostic forb species:** *Commelina africana*, *Lotonis calycina*
   - **Dominant tree species:** *Burkea africana*
   - **Dominant shrub species:** *Lippia javanica*
   - **Dominant forb species:** *Fadogia homblei*
   - **Dominant grass species:** *Melinis repens*, *Loudetia simplex*, *Eragrostis nindensis*
4. **Burkea africana – Ochna pulchra**  
*Low open woodland community*

The size of the community is **68 ha** (168 acres)  
Dominated by **Clovelly soil** form.

- Diagnostic tree species: *Ochna pulchra, Combretum zeyheri*  
- Diagnostic forb species: *Crassula capitella, Eriosenea cordatum*  
- Dominant tree species: *Burkea africana, Protea caffra*  
- Dominant forb species: *Parinari capensis, Indigofera melandenia*  
- Dominant grass species: *Melinis repens, Loudetia simplex, Trachypogon spicatus*

5. **Protea caffra – Gnidia capitata**  
*Low open woodland community*

The size of the community is **141 ha** (348 acres)  
Dominated by **Avalon soils**.

- Diagnostic forb species: *Gnidia capitata, Geigeria burkei, Gazania krebsania*  
- Diagnostic grass species: *Urelytrum agropyroides*  
- Dominant tree species: *Protea caffra*  
- Dominant shrub species: *Elephantorrhiza burkei*  
- Dominant forb species: *Parinari capensis*  
- Dominant grass species: *Panicum schinzii, Panicum natalensis, Eragrostis nindensis*

6. **Hyparrhenia hirta – Cynodon dactylon**  
*Closed grassland community*

The size of the community is **478 ha** (1181 acres)  
Dominated by **Clovelly soils**.

- Diagnostic forb species: *Verbena bonariensis, Commelina erecta*  
- Diagnostic grass species: *Cynodon dactylon, Hyperthelia dissoluta, Setaria sericea*  
- Dominant forb species: *Fadogia homblei*  
- Dominant grass species: *Hyparrhenia hirta, Digitaria eriantha, Eragrostis curvula*