Classifying plant communities

Module # 12-Component # 2

Classifying plant communities

Objective

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

Expected Outcome

- Understand the objective of a plant community study.
- Understand the Braun-Blanquet survey method.
- Determine a minimal area for survey in the Braun-Blanquet method.

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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 **identifying 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 **water points** should be placed and act as basic units where **veld condition and bush encroachment** can be measured in future.

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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.**

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Braun-Blanquet classification system

The Braun-Blanquet method for defining plant communities is the **most widely applied and effectively standardised of all classification methods**. It is, therefore, the most suitable method to use when classifying plant communities for drawing up a wildlife management plan. Classification aims 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 recognised together into a **hierarchical system**.

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The Braun-Blanquet method is divided into an **analytical phase** and a **synthetic phase**, summarised as follows:

Analytical phase

- The study area is **divided into homogenous vegetation units** (HVU's) using **aerial photographs**, **land type series maps**, **vegetation maps**, and **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 is 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** where the blending of plant species occurs.

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Synthetic phase

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

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 is** attached to the species names.

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

r	**Very rare, usually a single individual, negligible cover**
+	< 1%
1	1-5%
2a	6-12%
2b	13-25%
3	26-50%
4	51-75%
5	>75%

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

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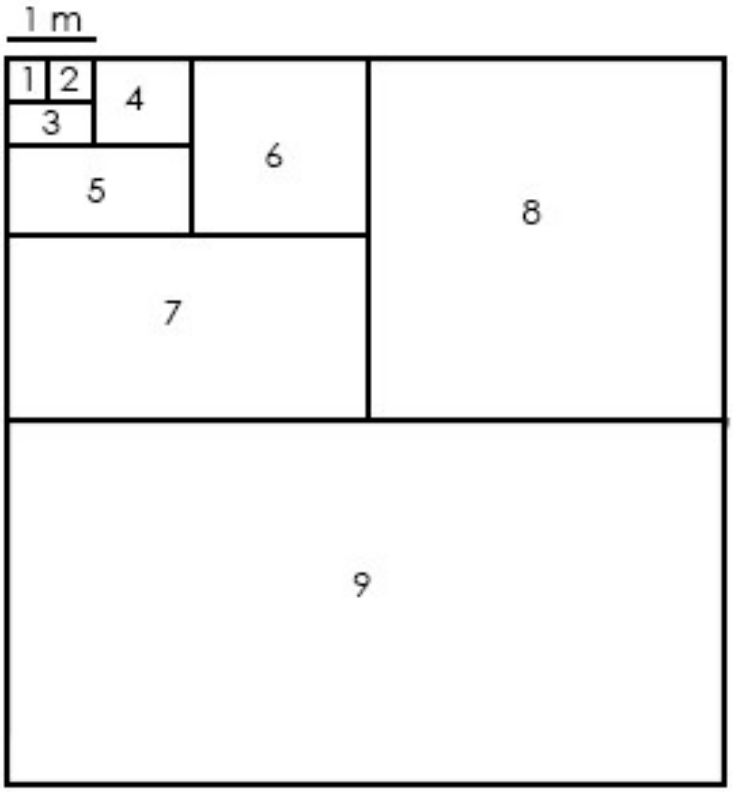
Minimal area

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 **10 m x 20 m** (200 m²); [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

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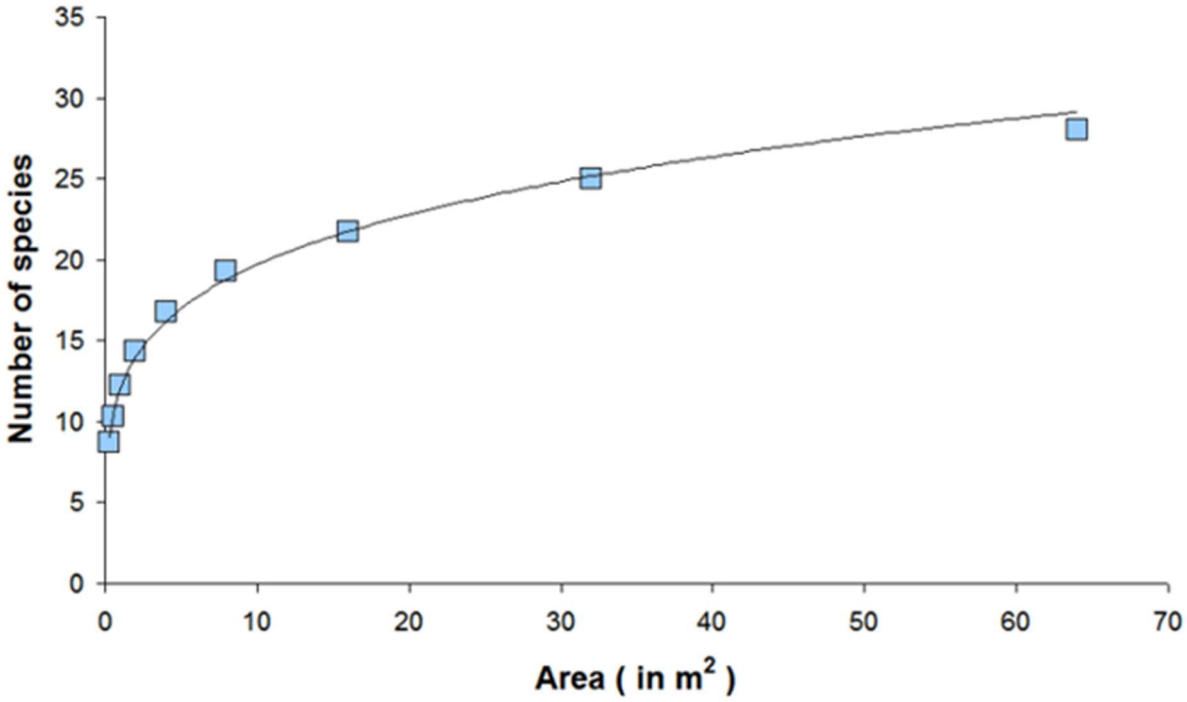
Important note:

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 weak plant knowledge and plant identification ability will result in highly inaccurate raw data, leading to **incorrect classifications**, **inaccurate conclusions,** and **poor management recommendations.**



The minimal area is derived from the species-area curve

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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 of rock cover
- Rock size
- Degree of erosion
- Drainage
- Biotic influences
- Degree of degradation

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Case study: Msasa Nature Reserve

The study area was **stratified into relatively homogenous vegetation units** by recognising 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 to identify HVU's.

The Braun-Blanquet method was used. A **minimum of three sampling sites per HVU** was selected. Each quadrat was 10 m x 20 m [200 m²], 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 [5.9 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 this chapter, the sub-communities will not be discussed).

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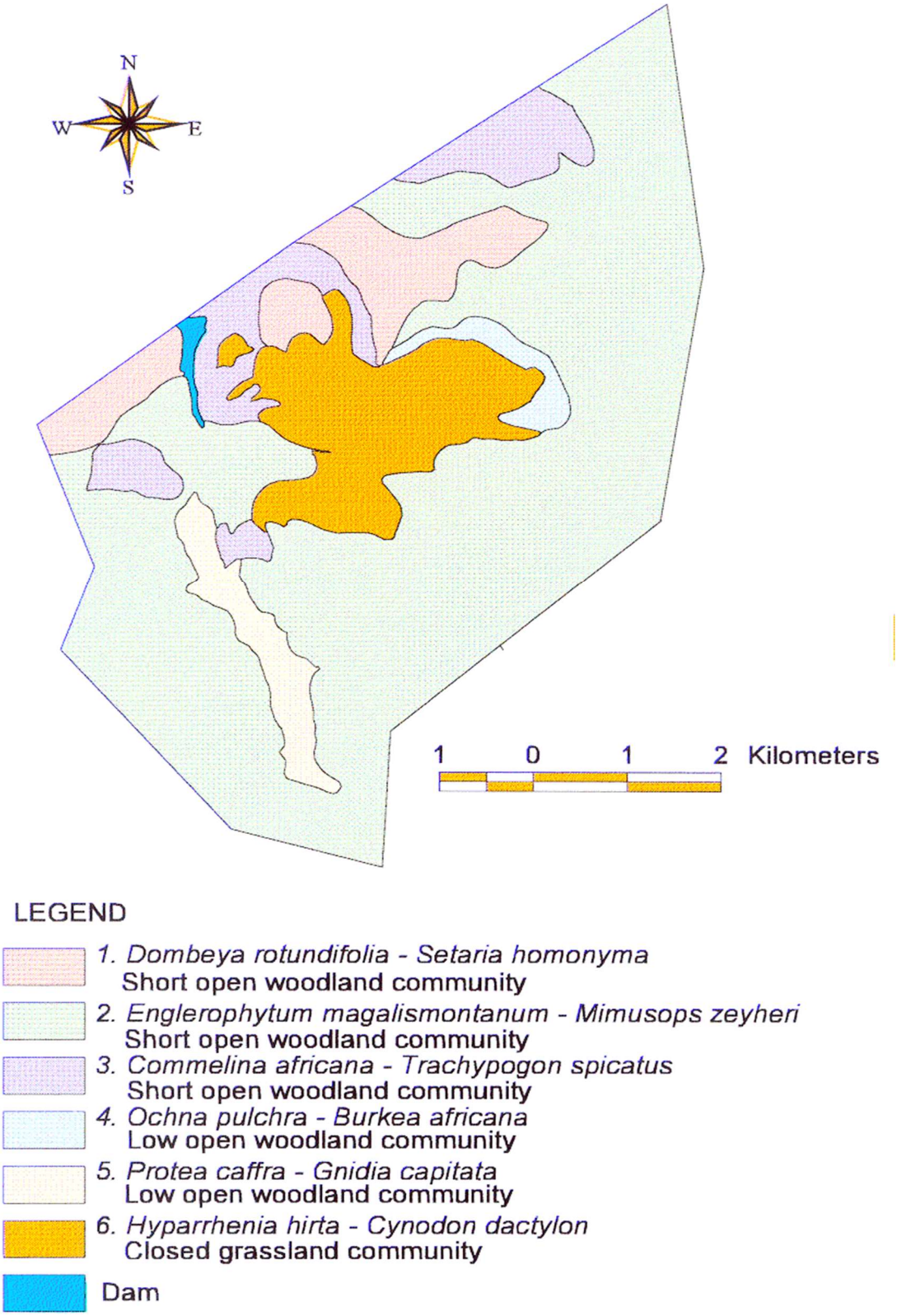

The vegetation communities of Msasa Nature Reserve

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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, Searsia 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*

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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, Eriosema 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*

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