Assessment and Monitoring of Peatland Vegetation

Introduction

According to Buot, Jr. (2019), use of appropriate methods and tools for the students or researchers to get the exact data like abundance, density, frequency and other parameters of a species is very important. This part of the manual will introduce to the students and researchers the ecological techniques that are useful in monitoring biodiversity of forest ecosystem, particularly the important watersheds, natural parks and protected areas nationwide.

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Objectives

Upon completion of this module, you will be able to:

1. understand the special role of peatland in maintaining biodiversity.
2. understand the biodiversity values of peatlands that demand special consideration in conservation strategies and land use planning.
3. explain how peatland/s become vulnerable to human activities.

Course Methodology

In the report of Parish, Sirin, Lee, & Silvius (2007), they stated that peatlands are wetland ecosystem that are characterized by the accumulation of organic matter called **“peat”** which derives from dead and decaying plant material under high water saturation conditions.

The following are sampling techniques for areas dominated by grasses and other ground cover species:

A. Point Center Quarter Method *(Buot, Jr., 2019)*

This is a plotless method of sampling used especially in forest ecosystem Mueller-Dombois and Ellenberg 1974).

1. Lay out one main transect line representing the whole area, which may be running either from north to south or from east to west.
2. At a distance of 50 m in the main transect line, run an alternately left and right branching sub-transect.
3. In each sub-transect, locate five arbitrary points at a distance of 20 m.
4. Divide each arbitrary point into four quadrants.

5. Locate the tree nearest the point in each quadrant. Then take note of the following:

5.1 identify the species.

5.2 determine the basal area or diameter at breast height.

5.3 determine the point to plant distance (from the center of the crown or center of the rooted base rather than from the edge of the crown).

5.4 take note of the anthropogenic activities in the site.

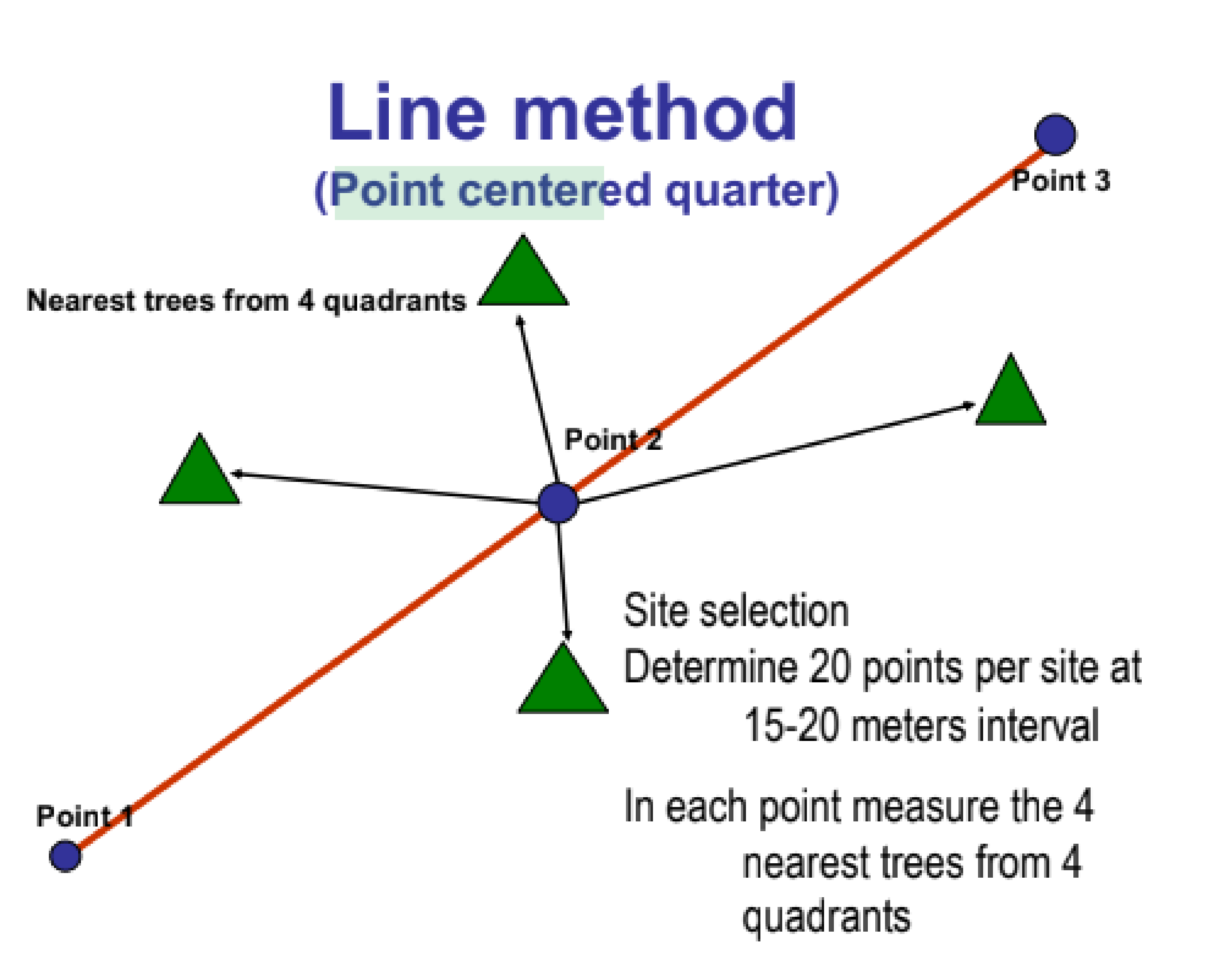

Figure 1. Laying down the points and the quadrants in a point centered quarter method.

6. Compute for the total density of all species as follows:

6.1 Total all points to plant distances for all species.

6.2 Obtain mean distance among plants.

$$\text{Mean distance} = \frac{\text{Total point to plant distance}}{\text{Total number of plants}}$$

6.3 Determine the mean area per plant.

$$\text{Mean area/plant} = (\text{mean distance})^2$$

6.4 Obtain total density of all species

$$\text{Total density of all species} = \frac{\text{Unit area (ha.)}}{\text{Mean area/plant}}$$

6.5 Compute for other parameters

6.5.1 Relative density = $\frac{\text{Individuals of a sp.}}{\text{Total individuals of all spp.}} \times 100$

6.5.2 Relative dominance = $\frac{\text{Basal Area for a sp.}}{\text{Total basal area for all spp.}} \times 100$

6.5.3 Frequency = $\frac{\text{Number of points at which a sp.occurs}}{\text{Total number of points sampled}}$ 100

6.5.4 RF = $\frac{\text{Frequency value for a sp.}}{\text{Total frequency value for all spp.}} \times 100$

6.5.5 I.V = Relative density + Relative Dominance + Relative frequency

B. Quadrat Technique

This technique makes use of plots or quadrats as sampling unit. The students or researchers may utilize the species area curve to determine the exact size of the plot or we may opt to use universally accepted plot size of 100 sq m distributed strategically throughout the area, enough to represent the biodiversity and the physical characteristics of the site. Others use 200 sq m size plot. This all depends on the heterogeneity of the sampling area. The number of plots also depends on the size and the heterogeneity of the biodiversity in the site.

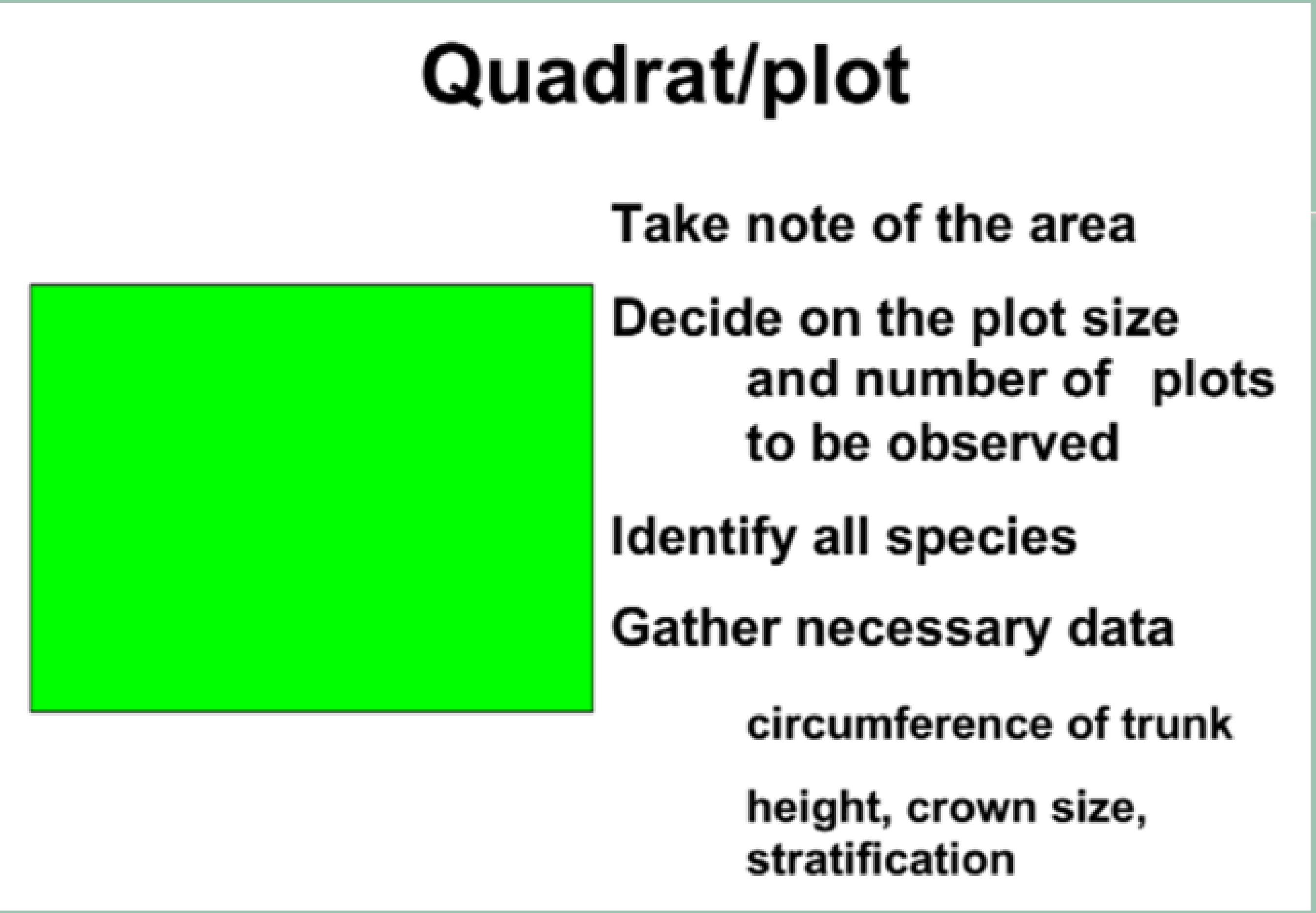

Figure 2. Setting up the plot in a quadrat sampling technique.

Once you have decided as to the size and number of plots, start the activity per plot:

1. identify the species.
2. determine the basal area or diameter at breast height.
3. determine the point to plant distance (from the center of the crown or center of the rooted base rather than from the edge of the crown).
4. take note of the anthropogenic activities in the site.
5. tabulate and analyze data of all plots (density, basal area, frequency, dominance).

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Types of Quadrat Sampling Techniques

1. Out in the field, use the tent stakes as the corners of your 10 x 10 grid, and run out the twine between the stakes, marking each meter with a piece of flagging tape.
2. Next, find the center of each sample grid, being careful not to trample this area, and mark it off with popsicle sticks and twine.
3. Identify each quadrat with a label, Q1 through Q10, and count the number of the plant within the sample area.
4. For plants on the border of the quadrat, only count them if the center of the plant falls within the sample area.
5. Record your data.

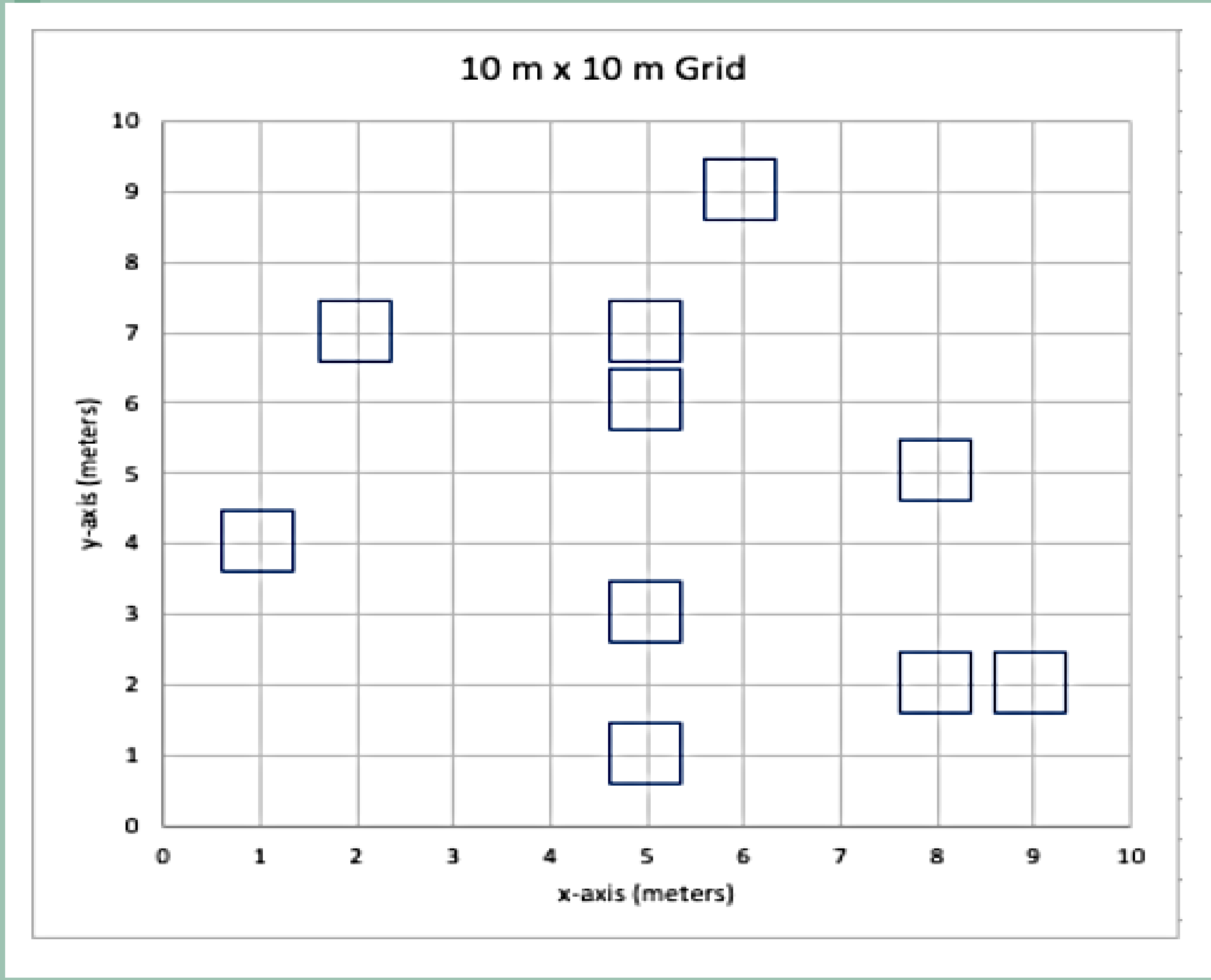

Figure 3. Random sampling within a 10m x 10m grid

Course Methodology

B. Line Intercept Technique *(Buot, Jr., 2019)*

This technique describes the vegetation changes along an environmental gradient or in relation to some marked feature of topography. It gives the number, linear extent, vertical extent and frequency of occurrence of individuals of different species in grasslands, agroecosystems and low statured forest lands (Tansley, 1946).

1. Lay a transect of about 30 m in length subdivided into intervals of any desired size.
2. Make an assessment of each interval and take the following data from each plant that underlie or overlie the transect line:
   - 2.1 name of the plant
   - 2.2 height of the plant
   - 2.3 cover of the plant (This refers to the length of the transect line intercepted by individual plants)

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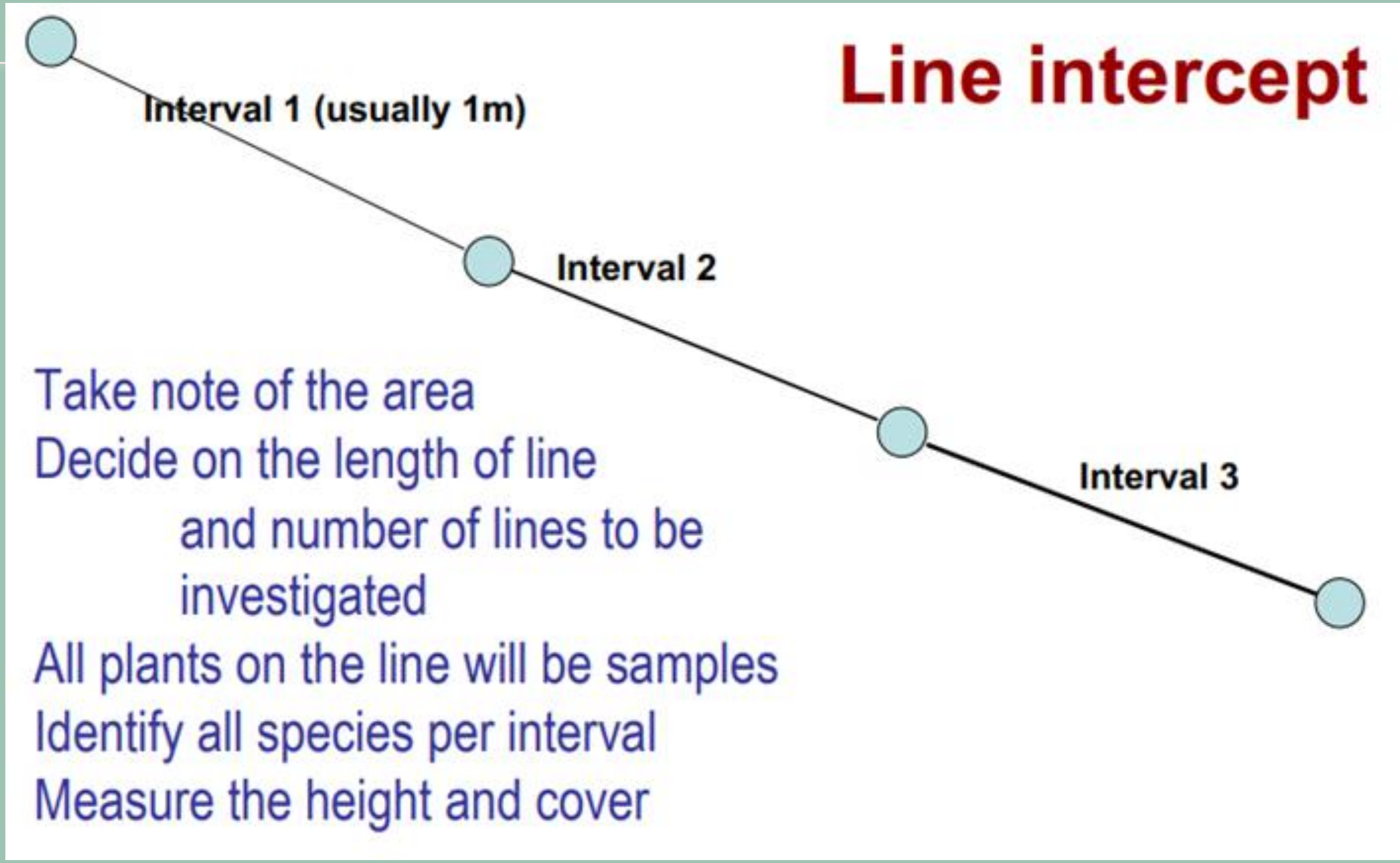

Figure 4. Field set up of a line intercept sampling technique

Course Methodology

3. Data for the different transect intervals should be recorded separately. The length of transect segments overlying bare ground should be measured and recorded in the same manner.
4. Get the average height of species encountered in the sampling line.
5. Compute for the following:

$$5.1\ \text{Relative Ht} = \frac{\text{Ave. ht. of sp. A}}{\text{Total ave. ht. of all spp.}} \times 100$$

$$5.2\ \text{Dominance or Cover} = \frac{\text{Total intercept lengths for a sp.}}{\text{Total transect length}} \times 100$$

Course Methodology

5.3 Relative Cover (RC) = $\dfrac{\text{Total intercept lengths for a sp}}{\text{Total of intercept lengths for all spp.}} \times 100$

5.4 Frequency = $\dfrac{\text{No. of intervals in which a sp. occurs}}{\text{Total number of transect intervals}} \times 100$

5.5 Relative Frequency = $\dfrac{\text{Frequency value for a sp}}{\text{Total of frequency values for all spp.}} \times 100$

Course Methodology

5.6 Summed Dominance Ratio (DR)

$$5.6.1\ DR = \frac{RC + RH}{2}$$

$$5.6.2\ DR = \frac{RC + RF}{2}$$

$$5.6.3\ DR = \frac{RC + RH + RF}{3}$$

6. Determine the dominant species.
7. Discuss the implications of your results.

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C. Transect or Line Survey

Instead of a grid, the student or researcher wanted to know the distribution and abundance of plants with respect to distance from a roadside, or elevation on a hillside, or along the side of a stream or hiking trail. Transect line survey may be more informative and also avoids bias.

1. Sample every 10 meters along the 100 m line.
2. Document your method.

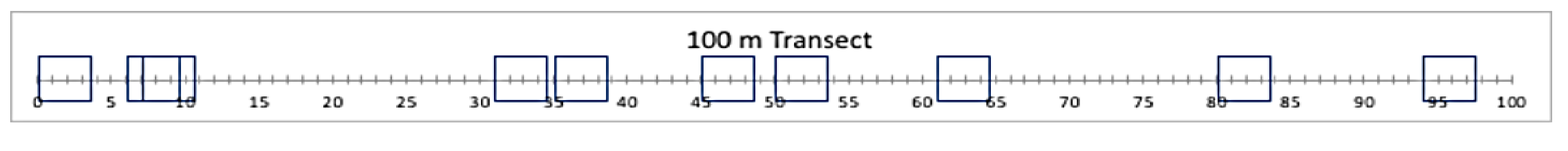


Figure 4. Random Sampling along a 100m transect

Course Methodology

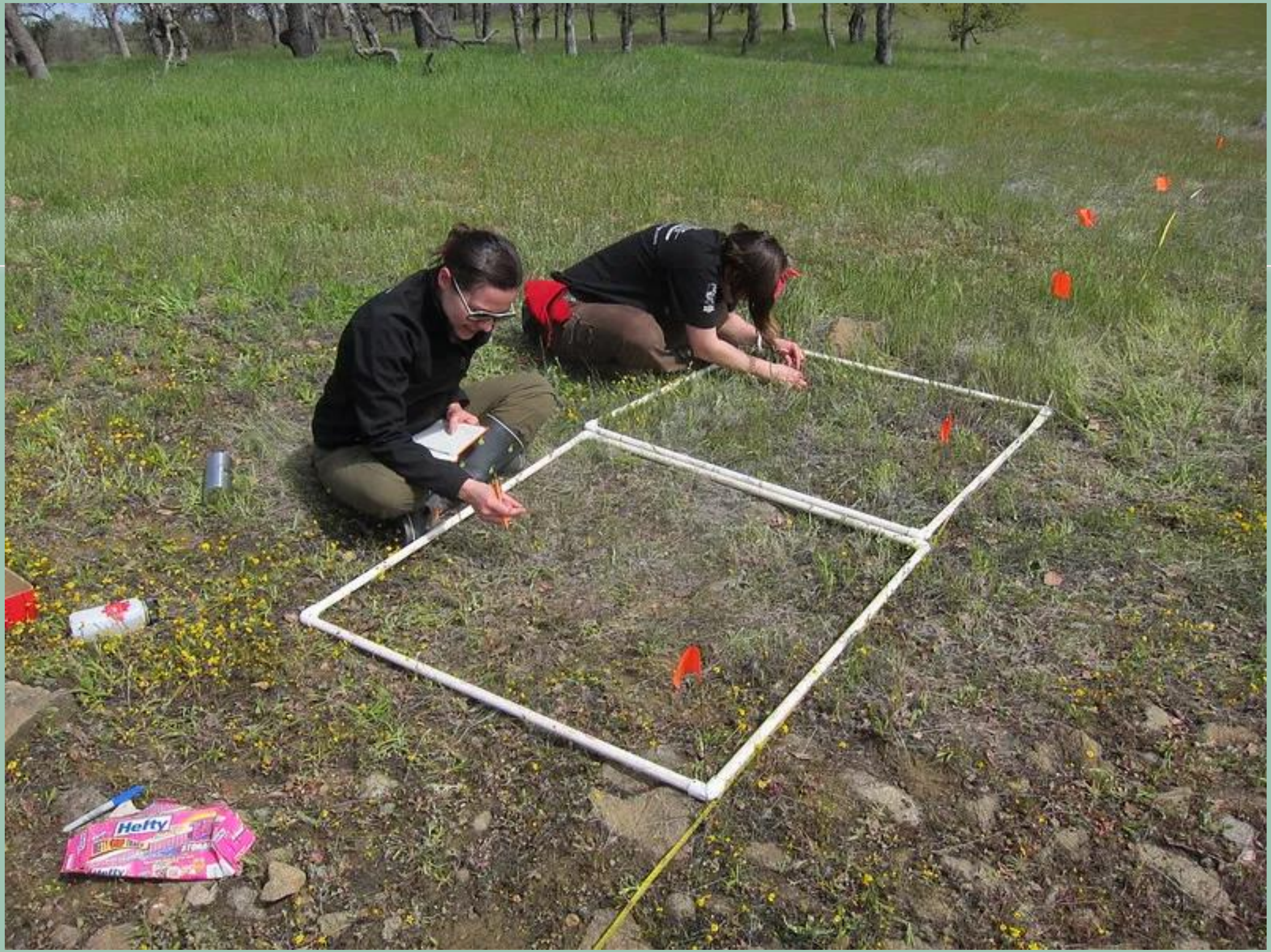
Data Analysis:

Data Analysis	Number of Plant Species
Q1	
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	
Q9	
Q10	
Sum	
Average (Mean)	
Standard Deviation	
95% Confidence Interval	

C. Belt Transect (Udayangani, 2021)

The key difference between belt and line transect is that belt transect uses a rectangular area centered on a line to collect information while line transect uses a straight line to gather data.

Belt transect is a systematic sampling method. It is a rectangular area centered on a line that is set across an area having a clear environmental gradient. In other words, a belt transect can be considered as a widening of the line transect to form a continuous belt or a series of quadrats. Hence, this method produces more data than a line transect. This method uses a quadrat to collect data. Quadrats are placed over the line to collect the data. Once the plants and/or animals inside the quadrat are identified, their abundance can be estimated. It also can be taken as a permanent sampling plot to gather data for a longer period of time.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Thank you for Listening!