SEMESTER – IV & V

RESEARCH METHODOLOGY AND FIELDWORK SOIL AND BIOGEOGRAPHY (PRACTICAL)

UNIT : II

TOPIC: LANDSCAPE SURVEYING AND SPECIES DIVERSITY

PRESENTED BY

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Landscape survey is a research tool for understanding the historic **landscape**, through a range of allied non-invasive analytical techniques, which can be applied at different scales and resolutions.

Landscape survey usually combines two strands of investigation: field **survey** and desk-based research.

What are the elements of a landscape?

These **elements** of design include mass, form, line, texture and color. In the **landscape**, they are used to transform space and create a unique experience. While color and texture add interest and richness to a design, it is mass, form and line that are critical to organizing space and providing structure.

Plant Sampling

- What is a sample?
    - "A portion, piece, or segment that is representative of a whole"
- Why do we sample?
    - it is usually impossible to measure the whole

Sampling Methods

- Transects and Quadrants
  - Plants and Non-motile animals
- Aerial observations
  - Large trees and animals

Transect Method

- A transect is a long rectangular sample plot.
- Use to study the variation in vegetation
- Vegetation varies with the changing enviornments
- Variations are caused by slope,exposure,adaphic and topographical irregularities.
- It also shows how one plant community replaced by other.
- Two types of transect method
➢ Line transect Method
➢ bisect transect Method

Line transect method

- Also called as line intercept method.
- The plant species are recorded along in aline.
- Useful for dense vegetation
- Give accurate information about vegetation

Bisect transect method

- It shows the vertical distribution of plant vegetation.

- It include strata or layer of community,from dominant trees,shrubs,herbs,climbers and ground flora relative position of underground parts like rhizome,bulb,tuber and roots of each plant.

- Their relative position are carefully measured.

- It is done by digging a trench in the community.

Quadrats

- A quadrat is a sampling unit used for quantative study of plant community.

- It may be rectangular or circular in shape.

- Used to measure coverage and abundance of plants or animals

- A grid of known size is laid out and all the organisms within each square are counted.

- But rectangular plots are useful.

Procedure

❑ Nails,cords and measuring tapes are required for making quadrat.

❑ Quadrat is fixed at four points with the the help of nails.Cords is tightly tied to four nails.

❑ At least 15-20 quadratso are taken.There interval of twelve steps between each quadrat.

❑ The size,shape and number of quadrates have been determined.The quadrats are distributed in random,uniform or stratified manner.

❑ All plant species inside the quadrats are recorded.Then number of indiviuals are counted.

❑ Their cover is measured by measuring tapes.

Measurements

- Sampling methods measure
  - Density
  - Coverage
  - Frequency
  - Biomass
  - Diversity

Density (D)

- The number of individuals per unit area
  - $D = n_i/A$
  - Eg. 10 dandelions/m^2

  n_i = number of individuals for species i

  A = the area sampled (could be the volume V)

- Relative density i (Rdi)
  - The Density of species i, D_i, Divided by the sum of all the densities of the other species sampled
  - $Rdi = D_i/\sum D$
  - Eg. 10/5+8+16

Coverage (C)

- The proportion of ground that is occupied or area covered by the plant/species
  - $C_i = a_i / A$

    a_i = the area covered by species ia

    A = the total are
- Relative coverage
  - The Coverage of species 1, Ci, divided by the sum total of the coverage of the other species sampled

Frequency (f)

- The number of times a given event occurs
  - Eg. the number of quadrants that contain maple trees as a ration of all the quadrants
  - $f_i = j_i/k$

    j_i = number of quadrants with species i

- Relative frequency

    k = total number of quadrants
  - The frequency of species i relative to the sum total of the frequencies of the other species found

Biomass (B)

- Can be calculated by measuring the mass of the individuals per unit area

  - $B = S$ W/A

  - More appropriate measure than density or frequency when

    - Number of individuals in hard to determine
    - Photosynthesis and carbon fixation, energy and nutrient transfer are more dependent upon biomass than the total number of individuals

Biomass Measurement methods

- Fresh or wet weight
  - Used when organisms are alive
- Dry weight
  - Used when the water content varies greatly
  - Oven dry at $105°C$ to remove water
- Ash-Free Weight
  - Used when inorganic content varies greatly
  - Oxidize at $500°C$ until only inorganic ash remains

Diversity

- The measure of variety of an ecosystem
- Consists of 2 components
    - The number of different species or the richness of species in a specific area
    - The relative abundance of the individuals of each species in a specific area

Simpson's Diversity (D)

- Measures species richness

$$D = \frac{N(N-1)}{\Sigma\, n(n-1)}$$

D=Diversity

N=total number of organisms of all species found

n=number of individuals of a particular species

- If D is high the area may be a stable ancient site.
- Low D may suggest pollution, recent colonization, or agricultural management

References:

https://www.slideshare.net/slideshow/methods-of-sampling-vegetationpptx-251807578/251807578

https://www.slideshare.net/slideshow/ecological-sampling/130345848