中国地质大学 (武汉)
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Noise Environmental Impact Assessment

Definition

- Ambient noise:

The surrounding living environment will be interfered by sound which produced in industrial production, construction, transportation and social life.(Frequency: 20Hz～20kHz, Audible soun

- Fixed source

The location of the sound source does not move during the voice time.

- Mobile source

The location of the sound source will move according to a certain track during the voice time.

- **Point sound source**

The sound waves are radiated in spherical form. The amplitude of sound pressure is in inverse proportion to the sound wave propagation distance.

To any shape of sound, when the sound wavelength is much larger than the geometric size of the sound source, the sound source can be as the point sound source.

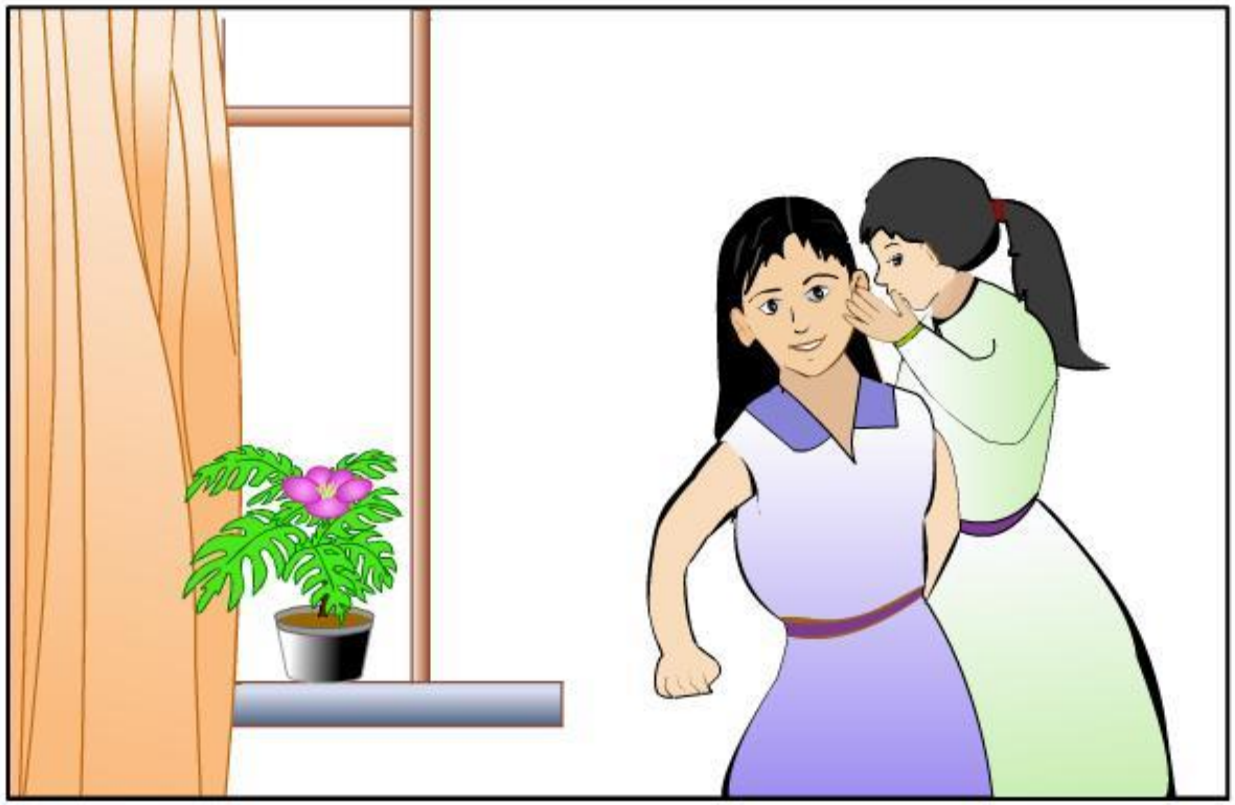
- **Line sound source**

The amplitude of sound pressure is in inverse proportion to the square root of sound wave propagation distance

- **Area sound source**

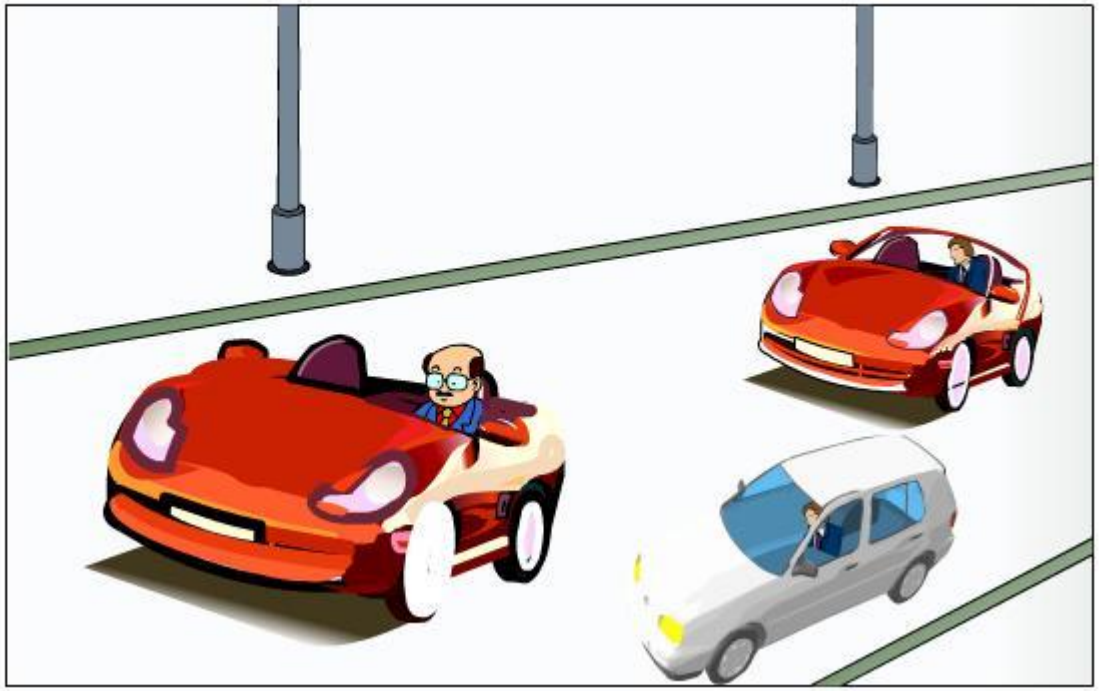
The amplitude of sound pressure will not change with sound wave propagation distance

20dB



60dB

90dB



140dB

Noise standard (Limits)

Level		Day dB(A)	Night dB(A)
0		50	40
1		55	45
2		60	50
3		65	55
4	4a	70	55
	4b	70	60

- **Monitoring**
- A sound level meter
- Project’s location
- Analysis of noise sources already exist;
- Analysis of noise sensitive objects (residential building, school, hospital, hotel,…)
- Day sample, night sample
- Draw a map for the results

Noise Prediction

noise distance decay --- point source

If:

Sound power level of the sound source is $L_{WA,}$ (dB);

The distance between sound source and receive point is *r,* (m);

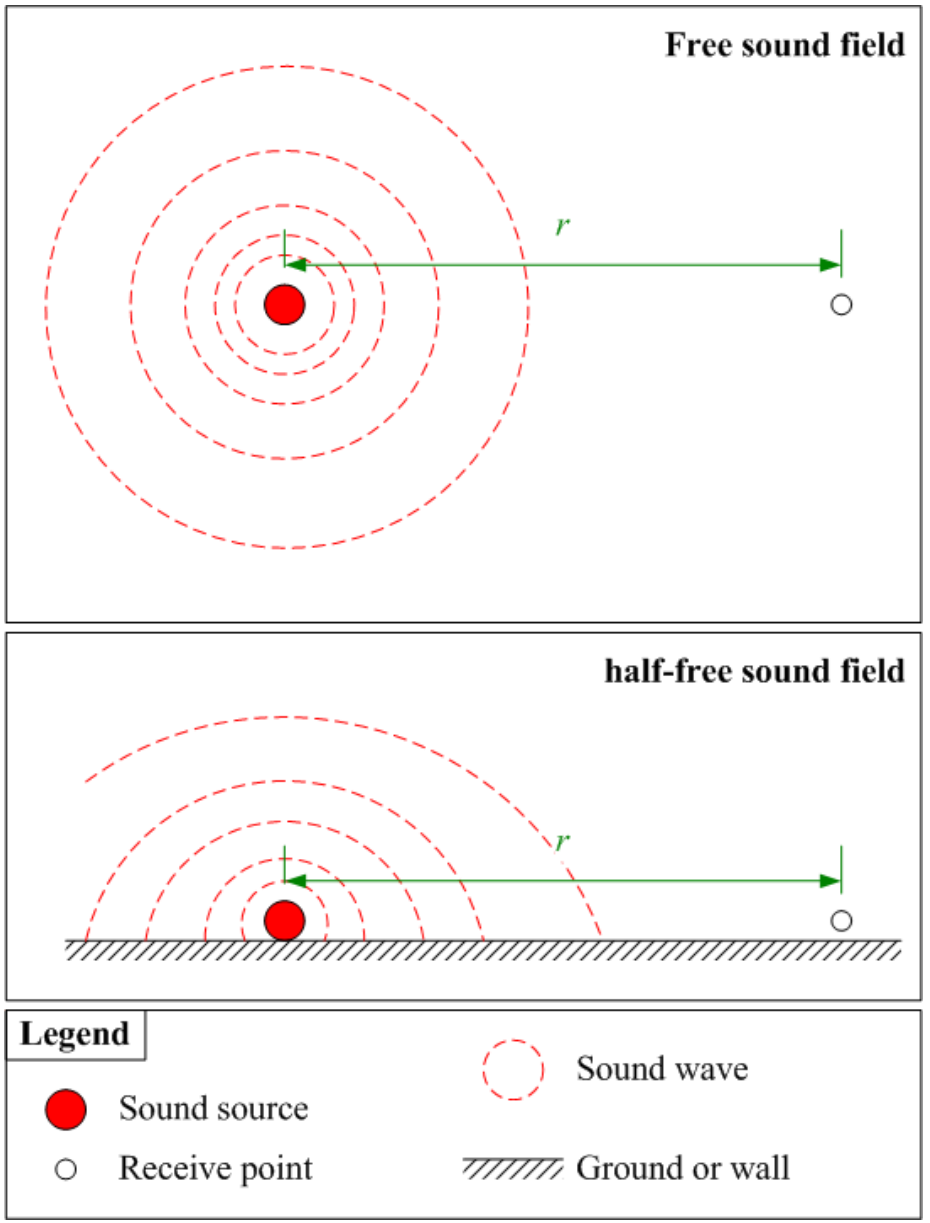
Then the sound pressure level of receive point is $L_A(r)$:

In free sound field:

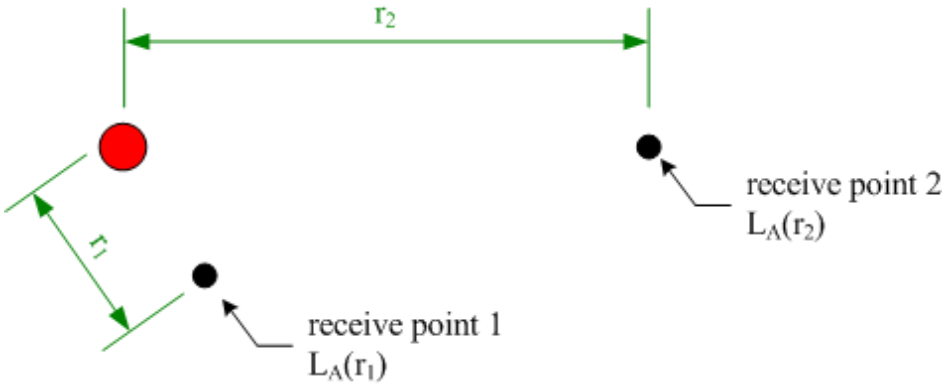
$$L_A(r) = L_{WA} - 20\lg r - 11$$

In half-free sound field:

$$L_A(r) = L_{WA} - 20\lg r - 8$$



noise distance decay --- point source



If:

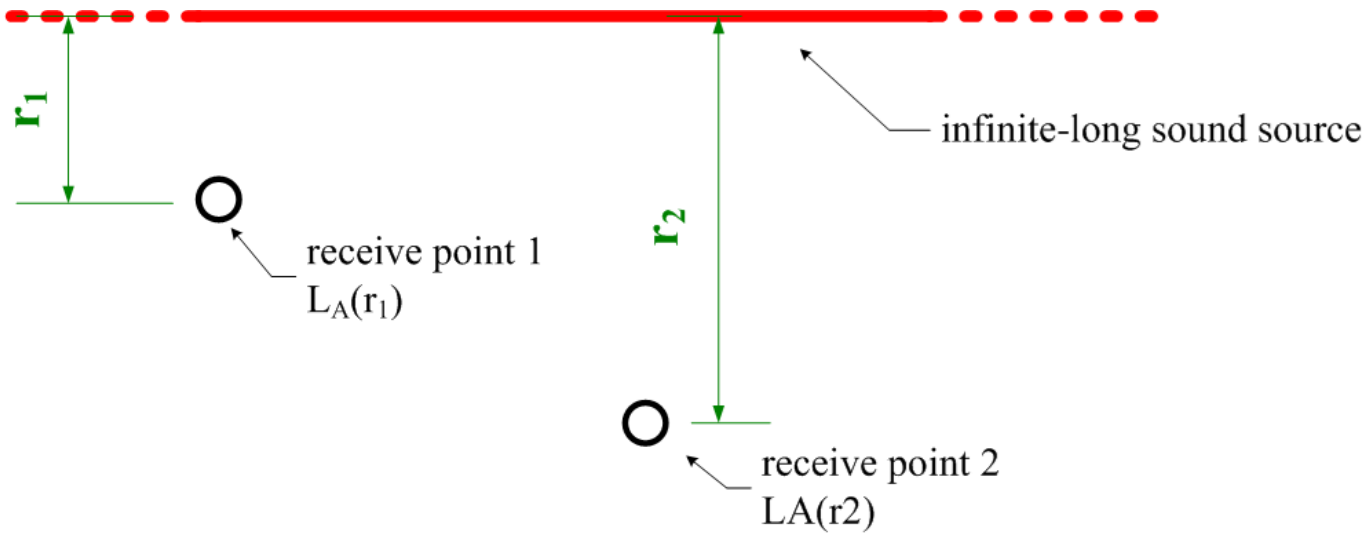
The sound pressure level of receive point 1 is $L_A(r_1)$

Then:

The sound pressure level of receive point 2 is: ($L_A(r_2)$)

$$L_A(r_2) = L_A(r_1) - 20\lg\frac{r_2}{r_1}$$

noise distance decay --- line source
infinite-long line source



If:

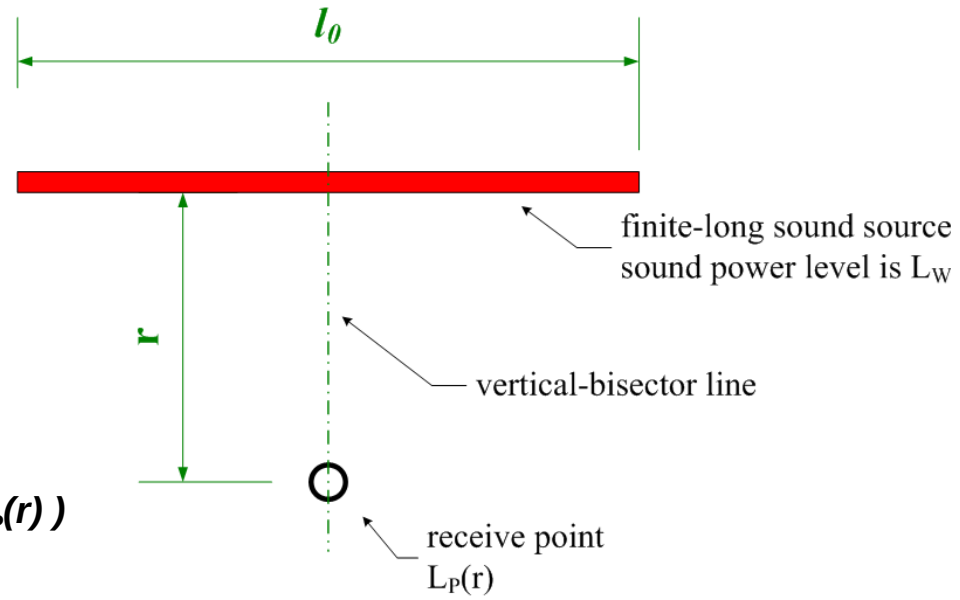
The sound pressure level of receive point 1 is $L_A(r_1)$

Then:

The sound pressure level of receive point 2 is: ($L_A(r_2)$)

$$L_A(r_2) = L_A(r_1) - 10\lg\frac{r_2}{r_1}$$

noise distance decay --- line source
finite-long line source



If:

The sound power level of sound source is L_W

Then:

The sound pressure level of receive point is: ($L_P(r)$)

$$L_P(r) = L_W + 10\lg\left[\frac{1}{r}\operatorname{arctg}\left(\frac{l_0}{2r}\right)\right] - 8$$

Ecology Environment Impact Assessment

- **Judgment**

- **Species in location: dominant species, rare species (data from local forestry agency / quadrate investigation)**

  Herbaceous plant: ≥1 m^2

  Bush-wood: ≥10 m^2

  Arbor Tree: ≥100 m^2

- **Judgment**

- Analysis of the impacts: (We need ecosystem experts' opinions)

Direct effects / Indirect effects

Reversible effects / Irreversible effects

Short-term effects / Long-term effects

Local effects / Regional effects

Once effects / Cumulate effects

- Judgment

- Significant impacts:

Sensitive area; (nature heritage, culture heritage, natural environmental protection district, Scenic area, water source area)

Sensitive ecological problem; (rare species disappear)

- Coverage

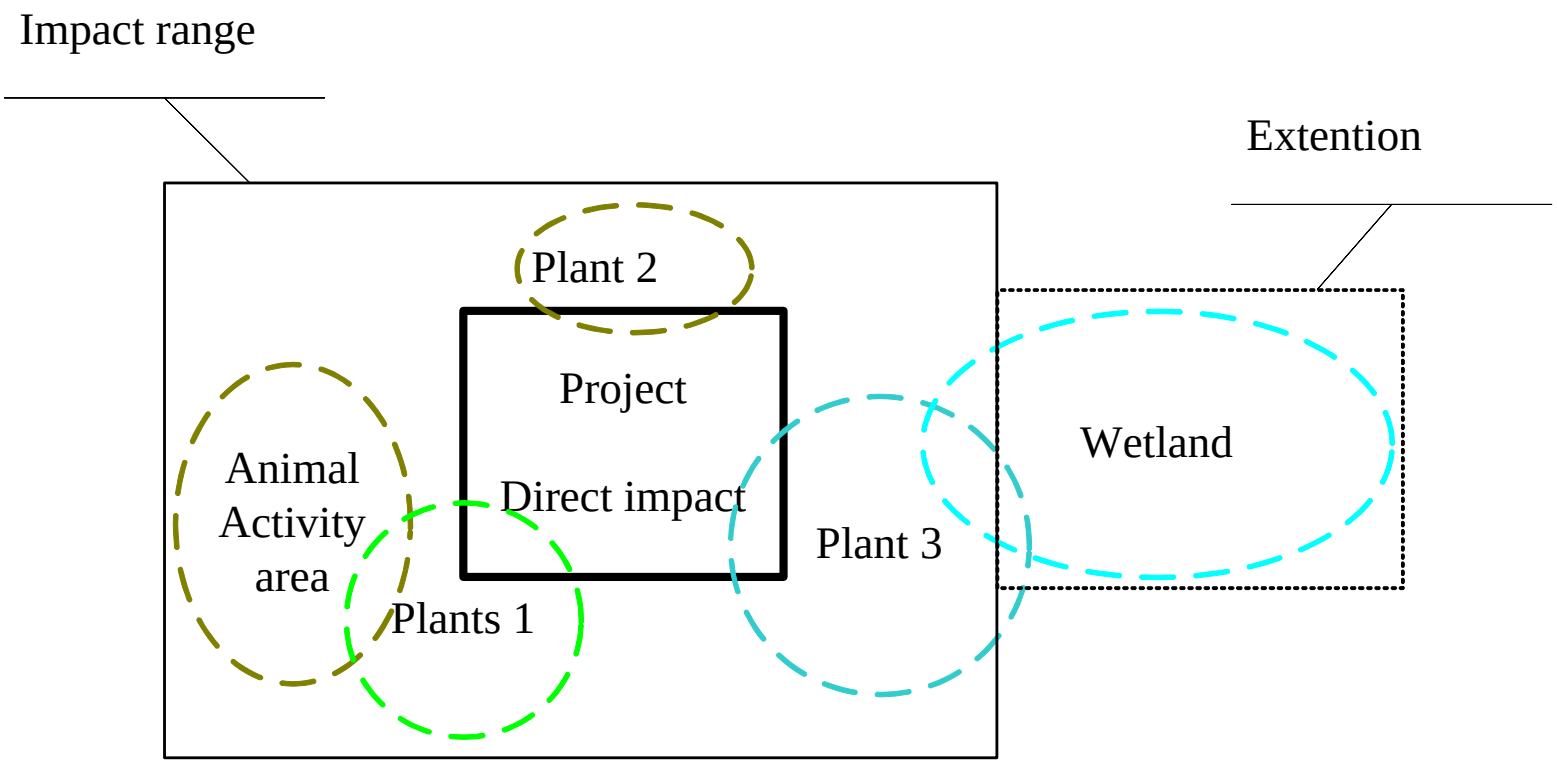
- significant impacts --- first grade (action-classes)
- impact range : $>$ 50km^2 --- first grade
- impact range : 20~50km^2 --- second grade
- impact range : $<$ 20km^2 --- third grade

Ecological factors influence each other and depend each other

Extension:8~30km (first grade); 2~8km (second grade); 1~2km(third grade)

- Coverage

Extension:8~30km (first grade); 2~8km (second grade); 1~2km(third grade)



- Method
- quadrat investigation

Herbaceous plant: ≥1 m^2

Bush-wood: ≥10 m^2

Arbor Tree: ≥100 m^2

We need the following parameters :

Density, Relative density;

Dominance, Relative dominance;

Frequency, Relative frequency;

Importance value;

- Method
- Calculate (e.g. Tree X, Tree Y and Tree Z)

$$density\ (x) = number\ (x) \div quadrat\text{-}size$$

$$relative\text{-}density\ (x) = \frac{density\ (x)}{density\ (x) + density\ (y) + density\ (z)} \times 100\%$$

- Method
- Calculate (e.g. Tree X, Tree Y and Tree Z)

$$dominance\ (x) = coverage\ (x) \div quadrat\text{-}size$$

$$relative\text{-}dominance\ (x) =$$

$$dominance\ (x) \div [dominance\ (x) + dominance\ (y) + dominance\ (z)\ ] \times 100\%$$

- Method
- Calculate (e.g. Tree X, Tree Y and Tree Z)

$$frequency\ (x) = quadrat\text{-}number\ (x) \div quadrat\text{-}number$$

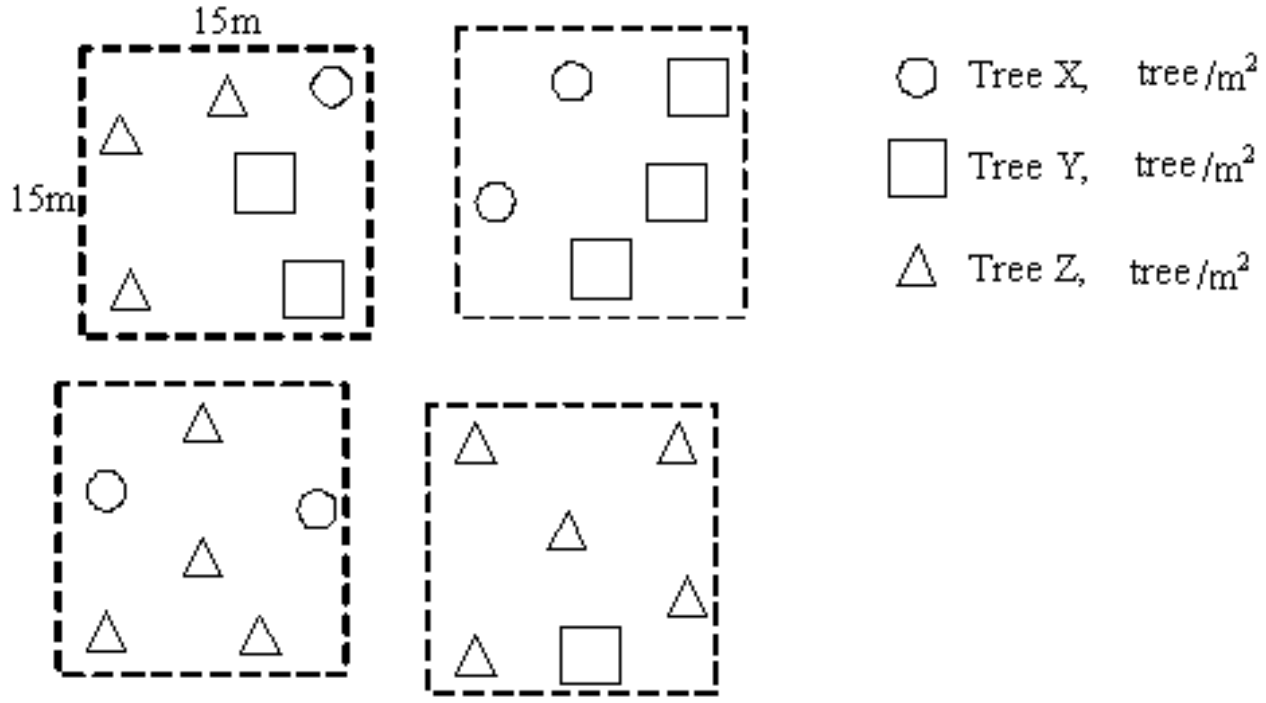
$$relative\text{-}frequency\ (x) = \frac{frequency\ (x)}{[frequency\ (x) + frequency\ (y) + frequency\ (z)]} \times 100\%$$

- Method
- Calculate (e.g. Tree X, Tree Y and Tree Z)

importance-value (x) =

relative-density (x) + relative-dominance (x) + relative-frequency (x)

- Method
- Calculate (e.g. Tree X, Tree Y and Tree Z)



- Method

Other methods:

Search information;

3S tech.

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