Habitat biodiversity using an index of diversity (*D*)

This technique is used to help assess the diversity of a habitat by taking into account both species richness (number of different species) and the abundance of each of these species. The index of diversity is useful for comparing the biodiversity of two (or more) habitats. A higher index indicates a higher diversity.

The following formula represents one method for calculating an index of diversity (*D*).

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

Where:

- Σ = sum of
- N = total number of individuals of all species
- n = number of individuals of each species.

Perhaps the easiest way to appreciate this is to work through an example.

Worked example

The table shows the numbers of different animals found in a quadrat on a rocky shore.

Name of animal	Number of individuals of each species (n)	$n(n-1)$
Sea anemone	12	$12(12-1) = 132$
Fish	1	$1(1-1) = 0$
Shrimps	5	$5(5-1) = 20$
TOTALS	$N = 12 + 1 + 5 = 18$	$\Sigma n(n-1) = 132 + 0 + 20 = 152$

The index of diversity of this habitat can now be calculated as:

$$\frac{(18 \times 17)}{152} = \frac{306}{152} = 2.01$$

Practice question

Consider two habitats each with species in them called A, B and C.

Calculating the index of diversity for each habitat and work out which habitat is more diverse.

Habitat 1

Species	Number of individuals of each species (n)	$n(n-1)$
A	50	**2450**
B	12	**132**
C	28	**756**
TOTALS	**90**	**3338**

Answer

The index of diversity (D) of habitat 1 can now be calculated as:

$$D = \frac{(90 \times 89)}{3338}$$

$$= 2.40$$

Habitat 2

Species	Number of individuals of each species (n)	$n(n-1)$
A	37	**1332**
B	24	**552**
C	29	**812**
TOTALS	**90**	**2696**

Answer

The index of diversity (D) of habitat 2 is:

$$D = \frac{(90 \times 89)}{2696}$$

$$= 2.97$$

The index of diversity for habitat 2 is higher than the index for habitat 1, so we can conclude that the diversity of habitat 2 is greater than for habitat 1.