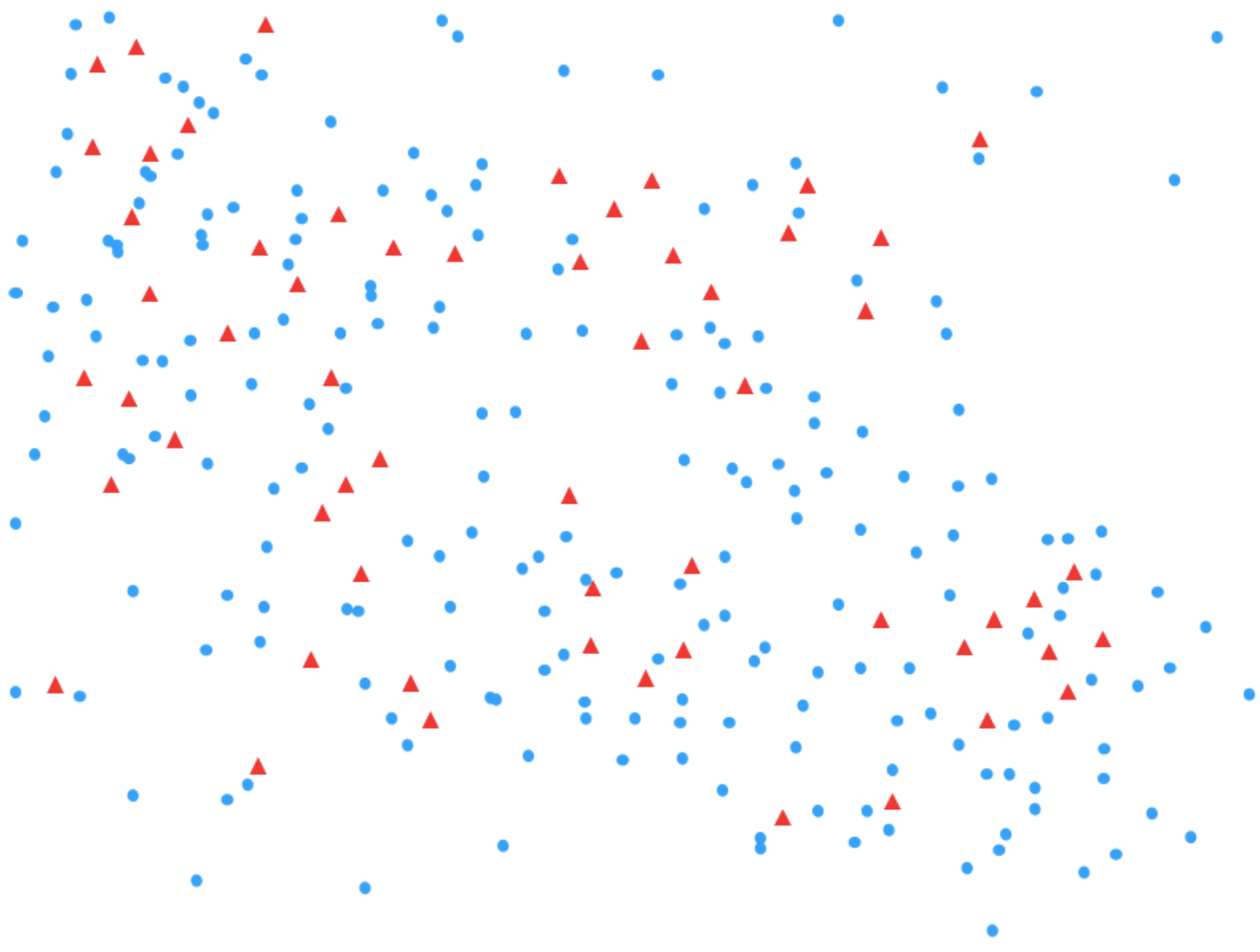
4.1 Continued
ECOSYSTEMS

Quadrat Sampling of Communities

Quadrats

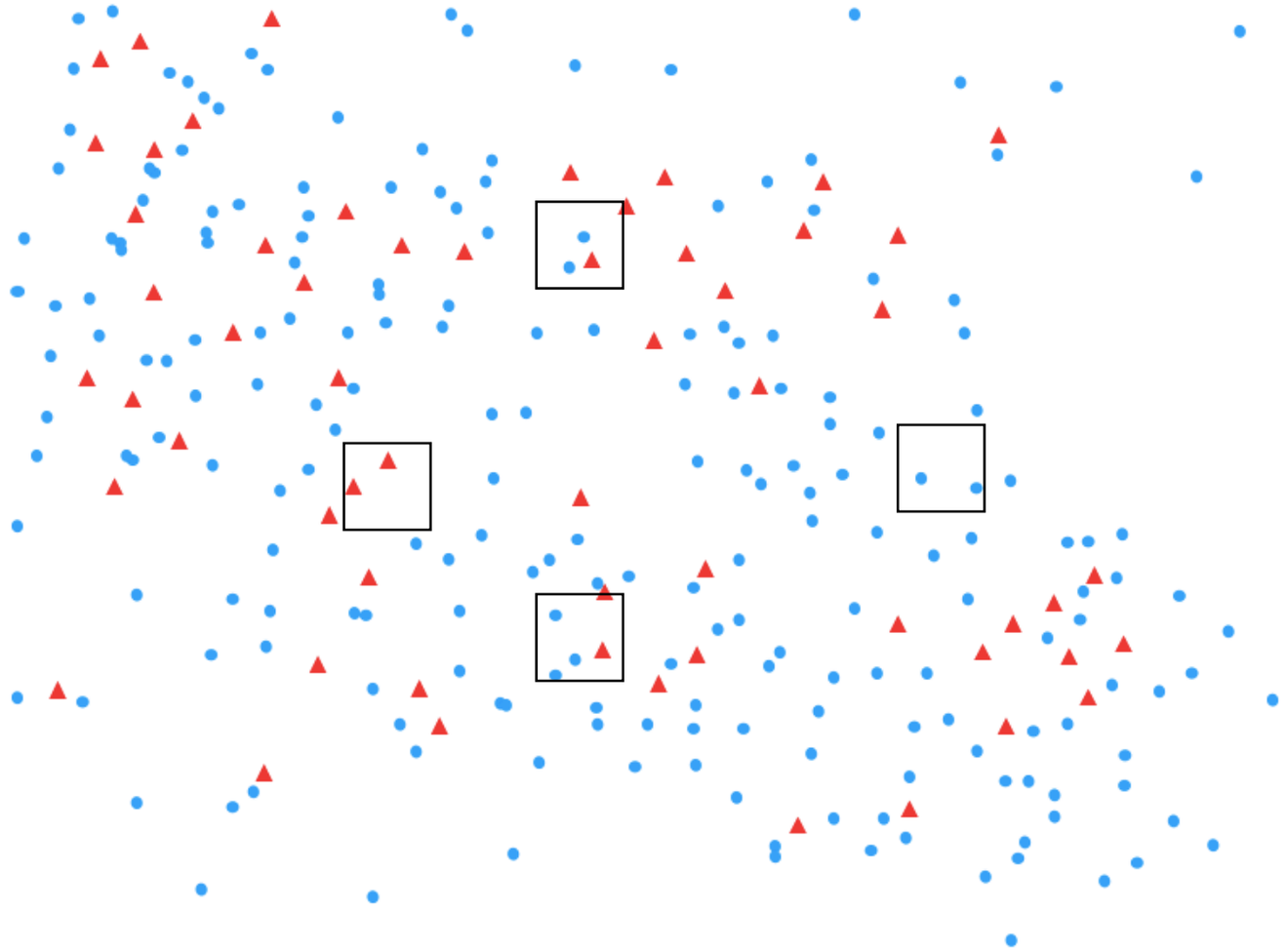
- is a ‘square' sample area used in research
- an area is measured and gridded.
- random numbers are used to choose sample areas
- multiple (many) quadrats are taken to get an accurate prediction



	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Quadrat /Association between Species using a Chi -square test

The presence of two species is recorded using quadrat samples



A contingency table is created to show # of quadrats with one or both species

Species B \ Species A	Present	Absent
Present		
Absent		

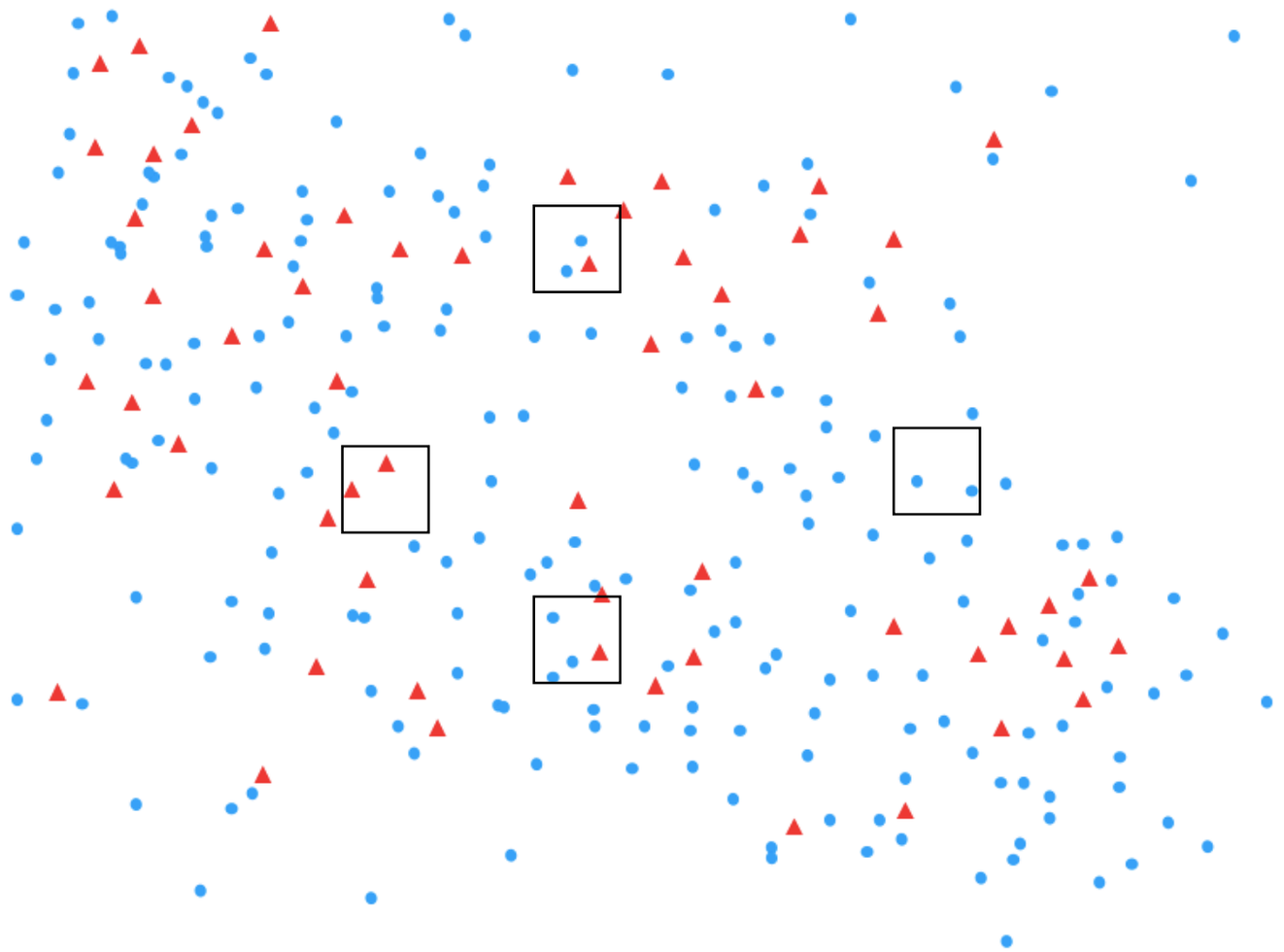
Expected results assuming no association are calculated using ….

$$\textit{Expected frequency} = \frac{\textit{row total x column total}}{\textit{grand total}}$$

Quadrat /Association between Species using a Chi -square test

Example sample results…

Species B	Species A: Present	Species A: Absent
Present	24 (25.2)	12 (10.8)
Absent	11 (9.8)	3 (4.2)



$$\textit{Expected frequency} = \frac{\textit{row total x column total}}{\textit{grand total}}$$

Quadrat /Association between Species using a Chi -square test

Calculate X^2

		Species A	
		Present	Absent
Species B	Present	24 **25.2**	12 **10.8**
	Absent	11 **9.8**	3 **4.2**

$$X^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

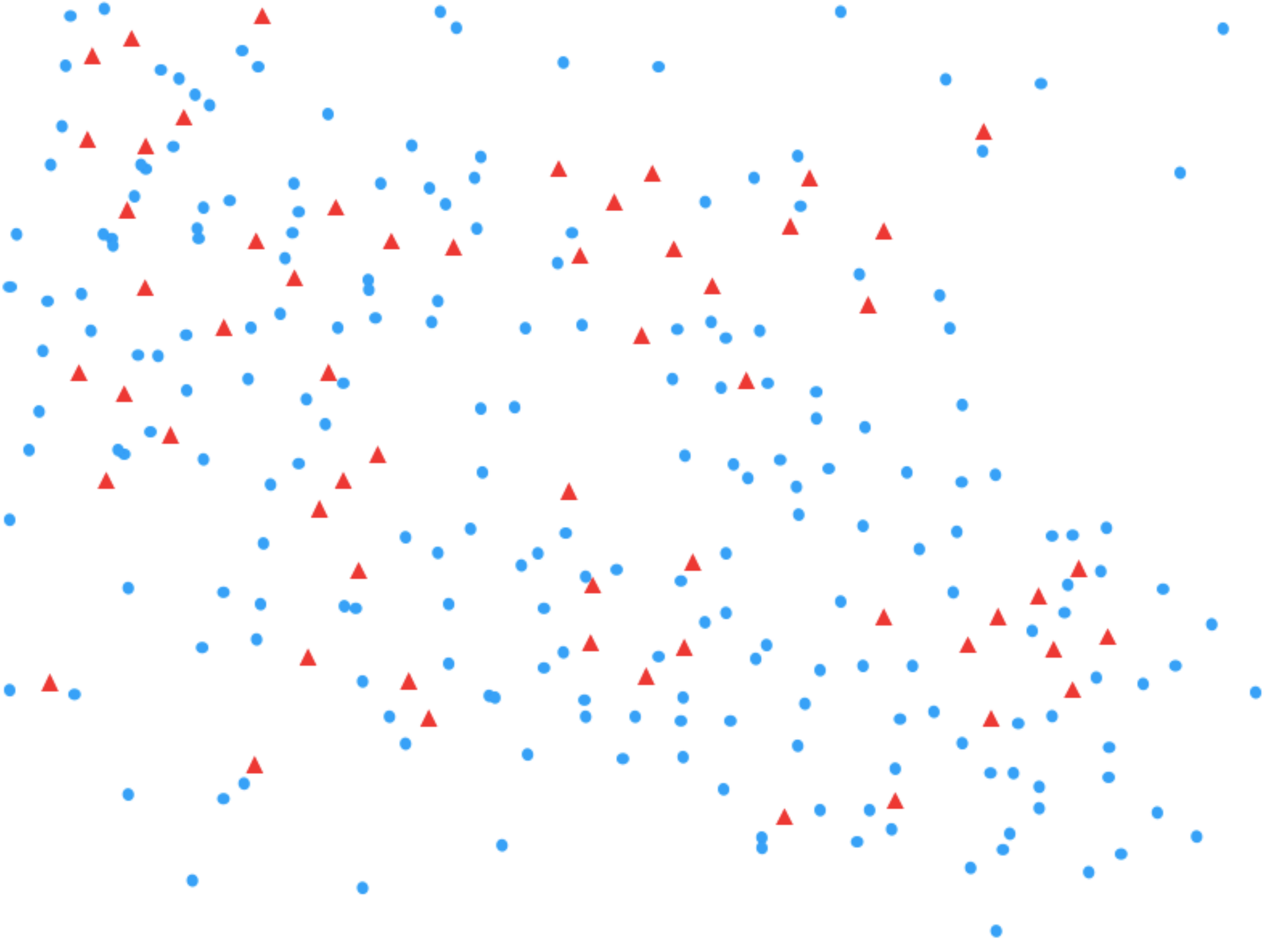
$$X^2 = \frac{(24 - 25.2)^2}{25.2} + \frac{(12 - 10.8)^2}{10.8} + \frac{(11 - 9.8)^2}{9.8} + \frac{(3 - 4.2)^2}{4.2}$$

$$X^2 = 0.06 + 0.13 + 0.15 + 0.34$$

$$X^2 = 0.683$$

Significant $X^2 = 3.84$

not significant at 5%
therefore no association



Ecosystems

Communities interacting with the abiotic factors of the environment

These include

- air
- water
- soil/rocks
- geographical formations

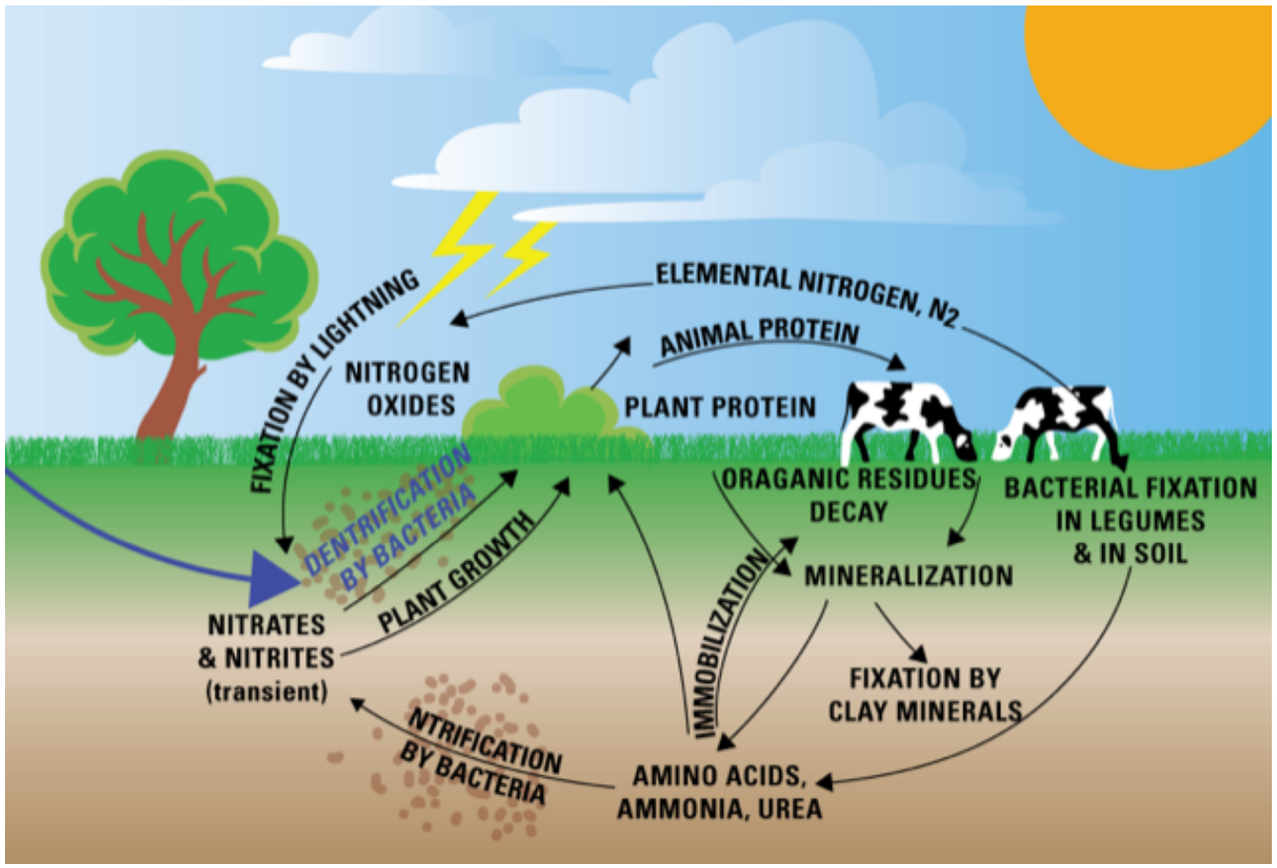
Both abiotic factors and organisms can influence each other.—> a highly interactive systems (ECOSYSTEM)

Ecosystems

Cycling of Nutrients is required for proper ecosystems

- inorganic nutrient are required by all organisms (eg. carbon, O2, calcium.. etc (Required elements)
- cycling maintains a constant supply
- rarely simple —> many withdraws and returns with cycles

eg consumption vs excretion



Mesocosms

Ecosystems are sustainable over time if…

- proper nutrient cycling (availability)
- detoxification (waste removal)
- supply of energy (light)

To test scientist use mesocosms

- sealed environmental set up to study ecological research

  - needs autotrophs

  - consumers (saprophytes/decomposers/ herbivores/carnivores)

  - consumers should be small in size and numbers (proportional to systems size)

https://www.youtube.com/watch?v=eZ6ke1H5Hws