



Ecosystems under stress

how well do they function?

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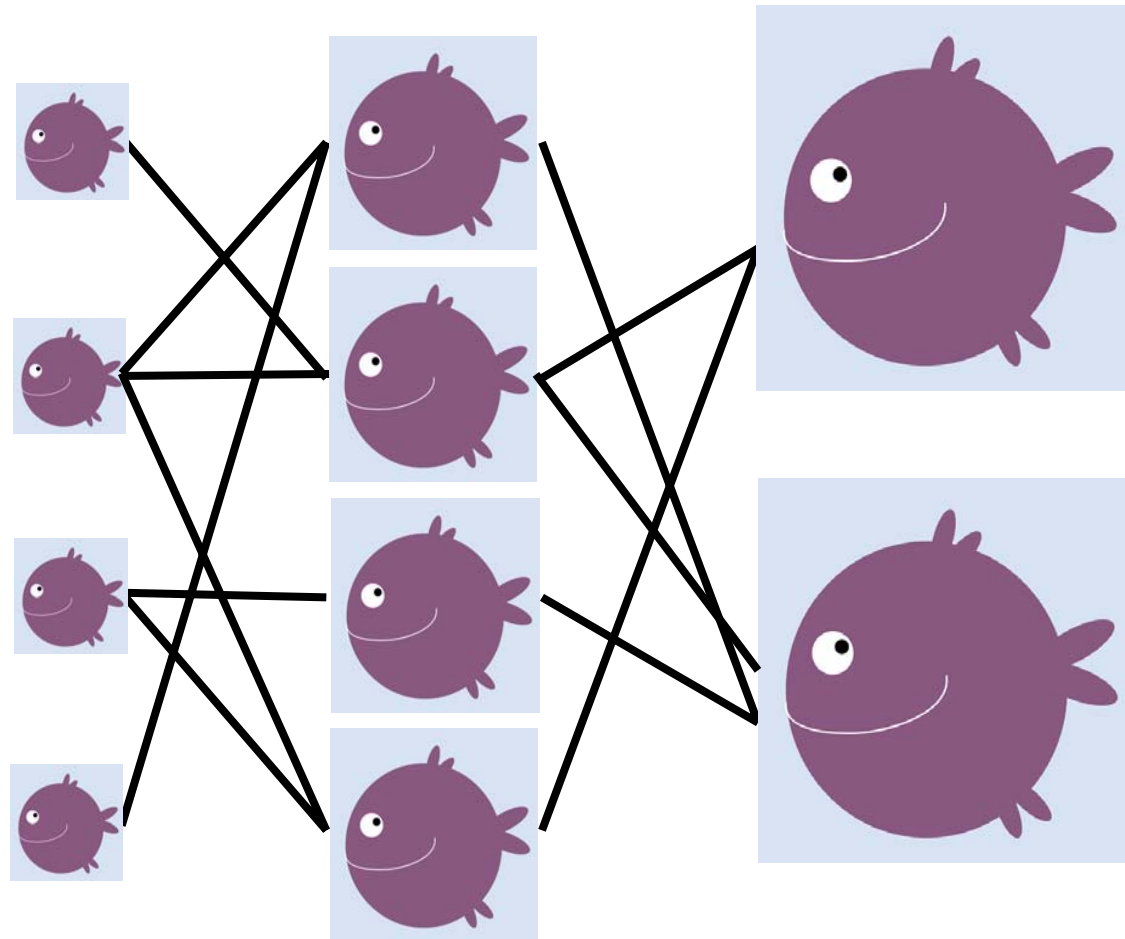
What?

- Chemicals change survival chances of species



What?

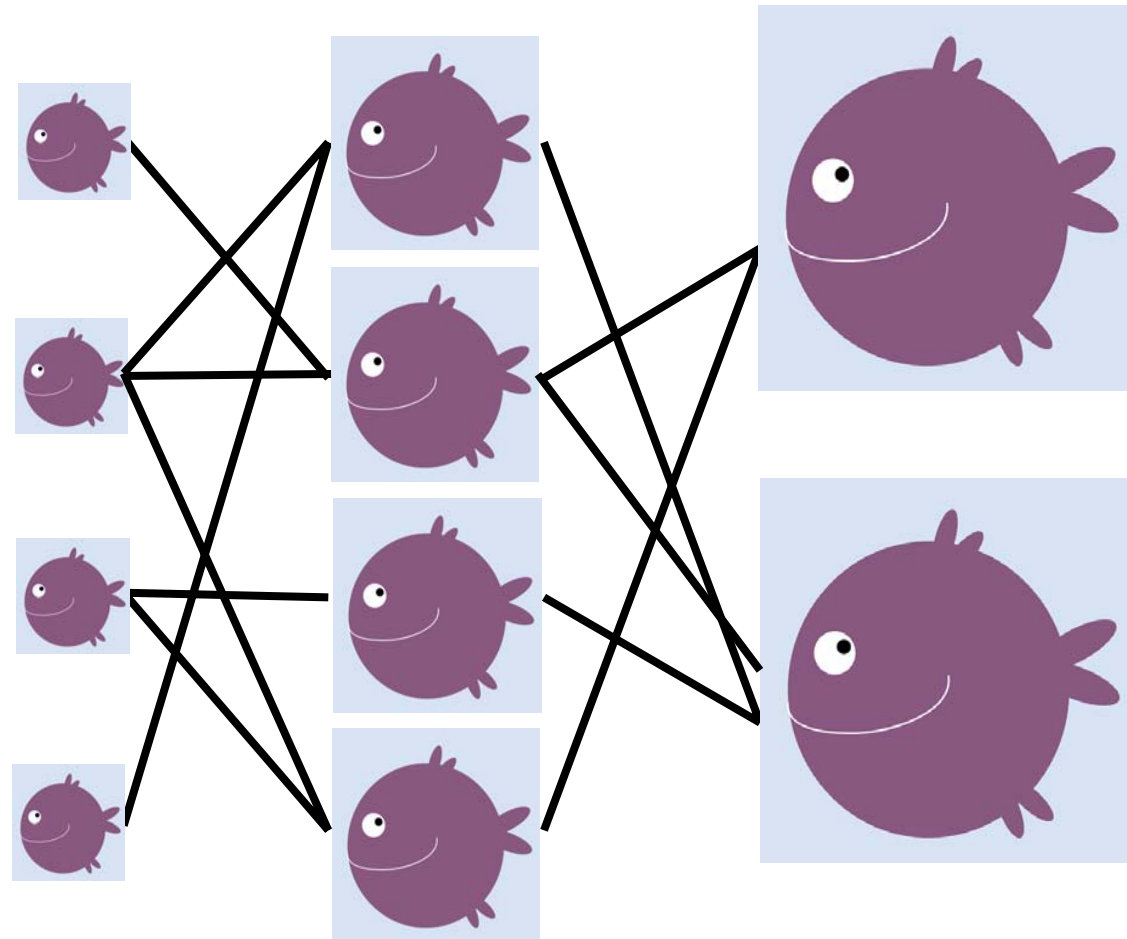
- Chemicals change survival chances of species
- Species do *not* live in isolation... they interact



What?

→ How do chemicals affect functioning???

- Species do *not* live in isolation... they interact



How? Mathematics

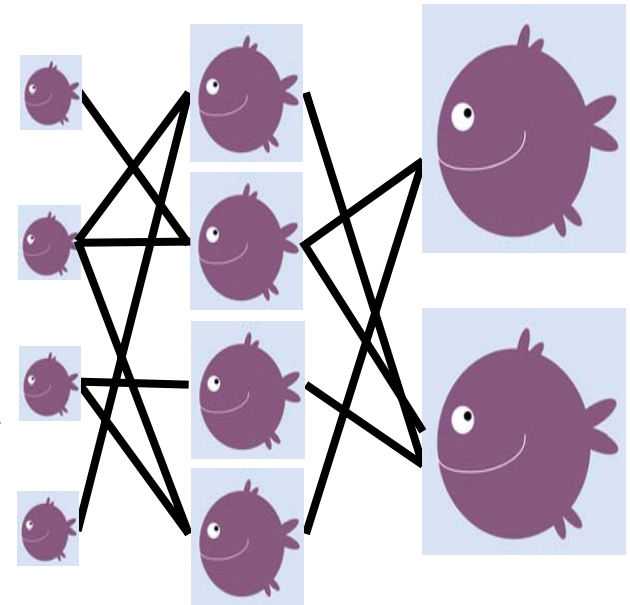
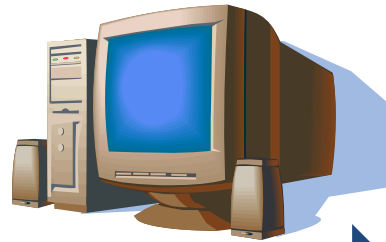
The image shows a mathematical derivation for the centroid of a circular cone. The derivation is as follows:

$$\begin{aligned}\frac{1}{V} \int z dV &= \frac{\pi r_1^2}{V H^2} \int_0^H z(H-z)^2 dz \\&= \frac{\pi r_1^2}{V H^2} \int_0^H (z^3 - 2z^2 H + zH^2) dz \\&= \frac{\pi r_1^2}{V H^2} \left[\frac{z^4}{4} - \frac{2z^3 H}{3} + \frac{z^2 H^2}{2} \right]_0^H \\&= \frac{\pi r_1^2 H^4}{V H^2} \left[\frac{1}{4} - \frac{2H}{3H} + \frac{H^2}{2H^2} \right].\end{aligned}$$

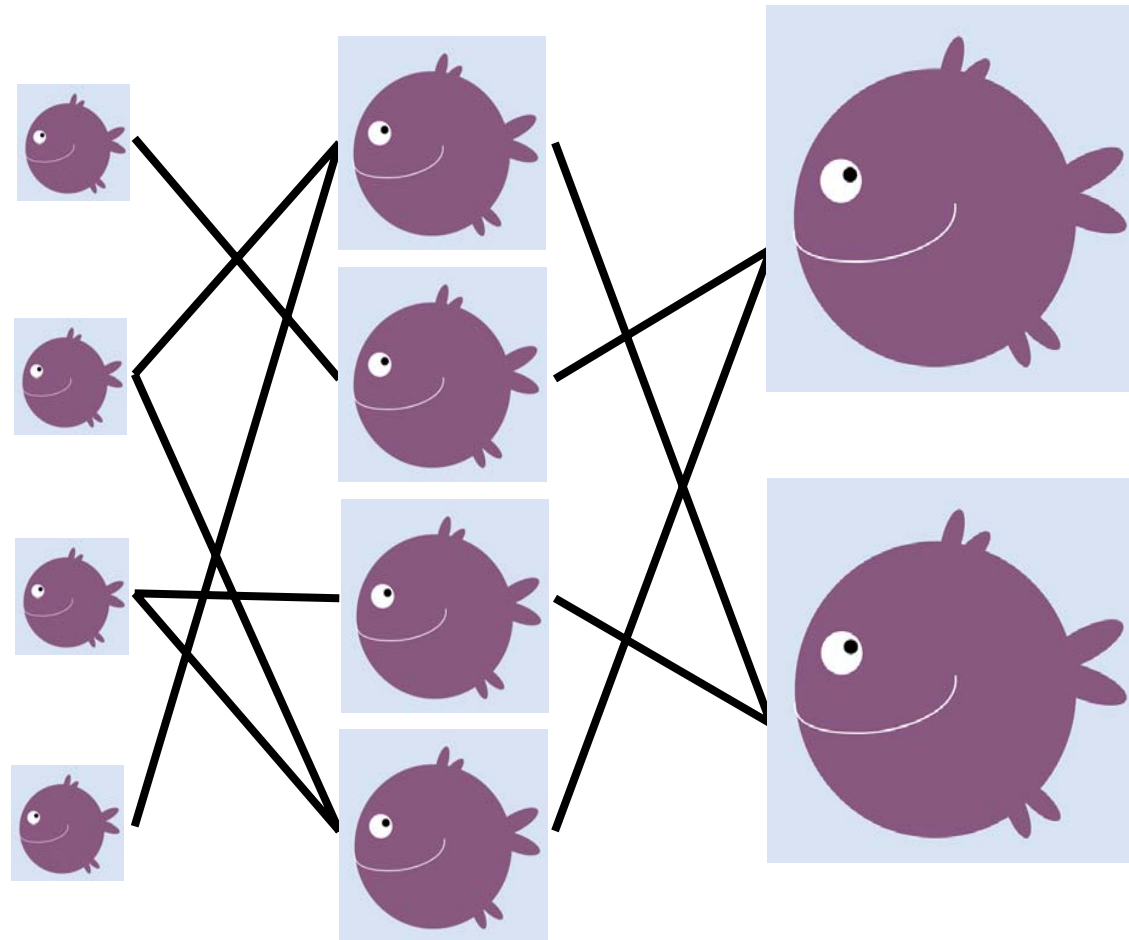
Below the equations, the text reads: "circular cone is $\frac{1}{4}\pi R^2 Z$, wh... height. The con... $30^\circ =$ "

(9-1)

How? Mathematics

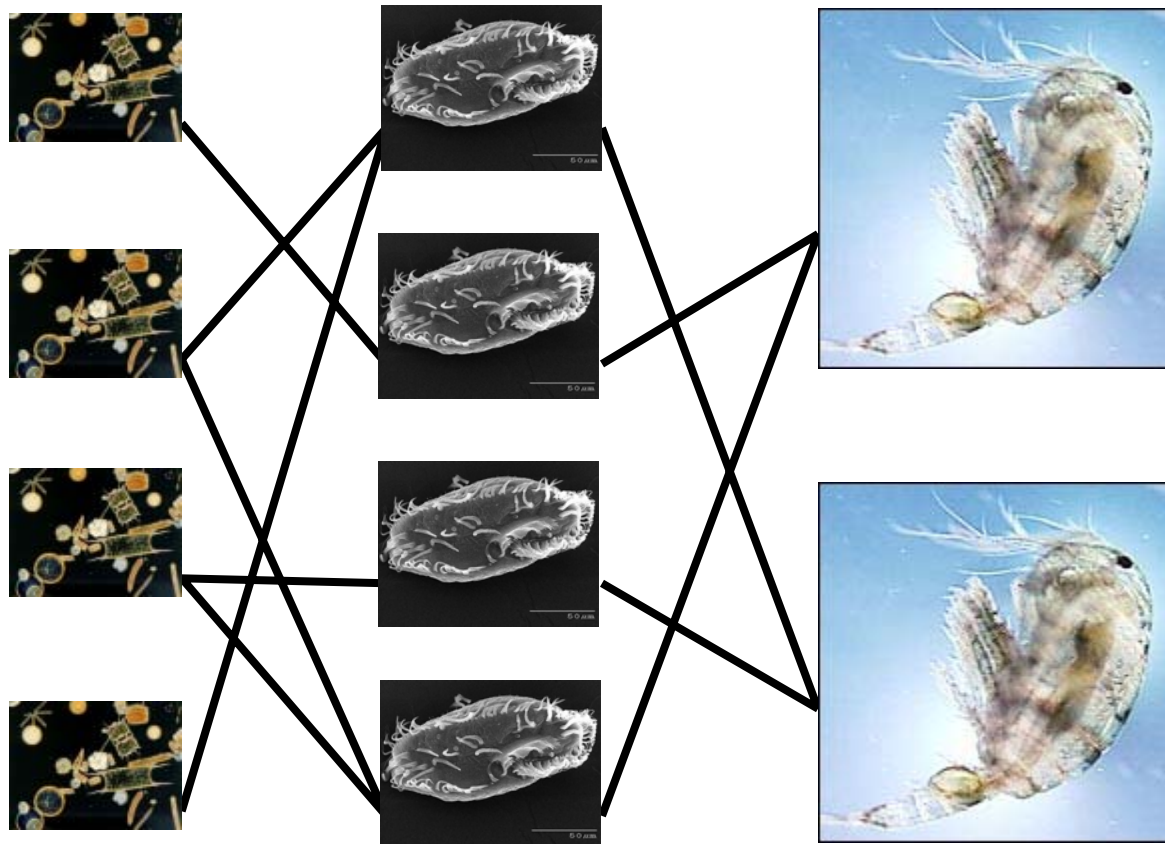


An example...



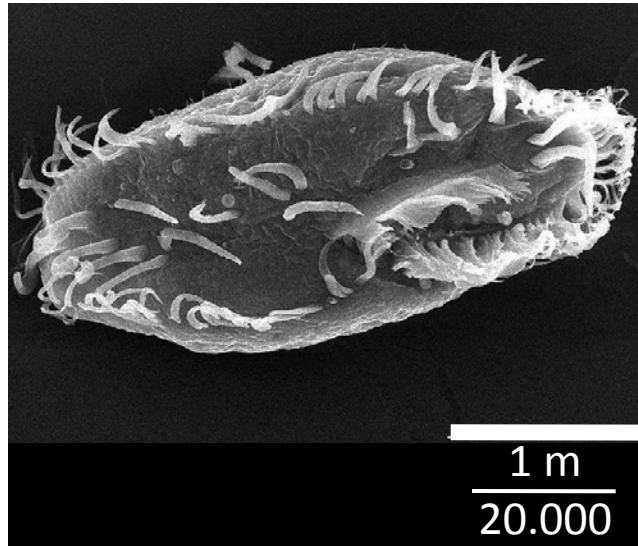
An example...

- Micro-ecosystem, polluted with an insecticide



The diet of protozoa

- example: protozoa

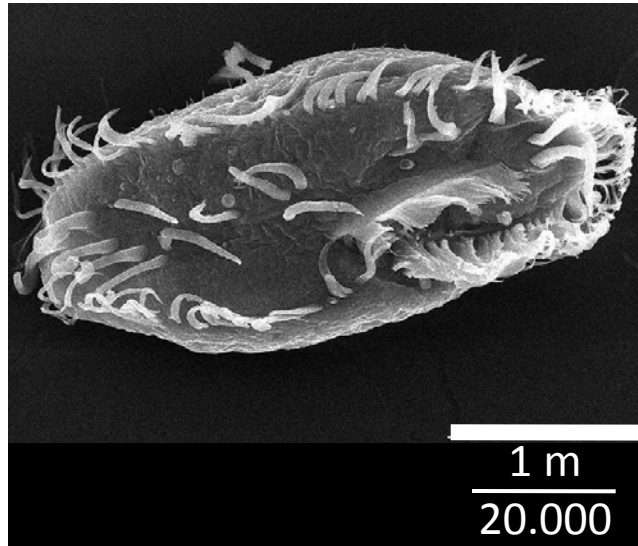


algae

bacteria

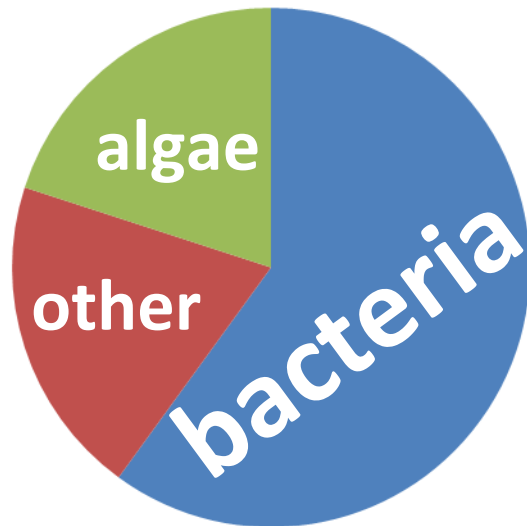
The diet of protozoa

- example: protozoa



The diet of protozoa

NOT POLLUTED



POLLUTED



Conclusion

Effects of chemicals??

→ there's more than meets the eye

