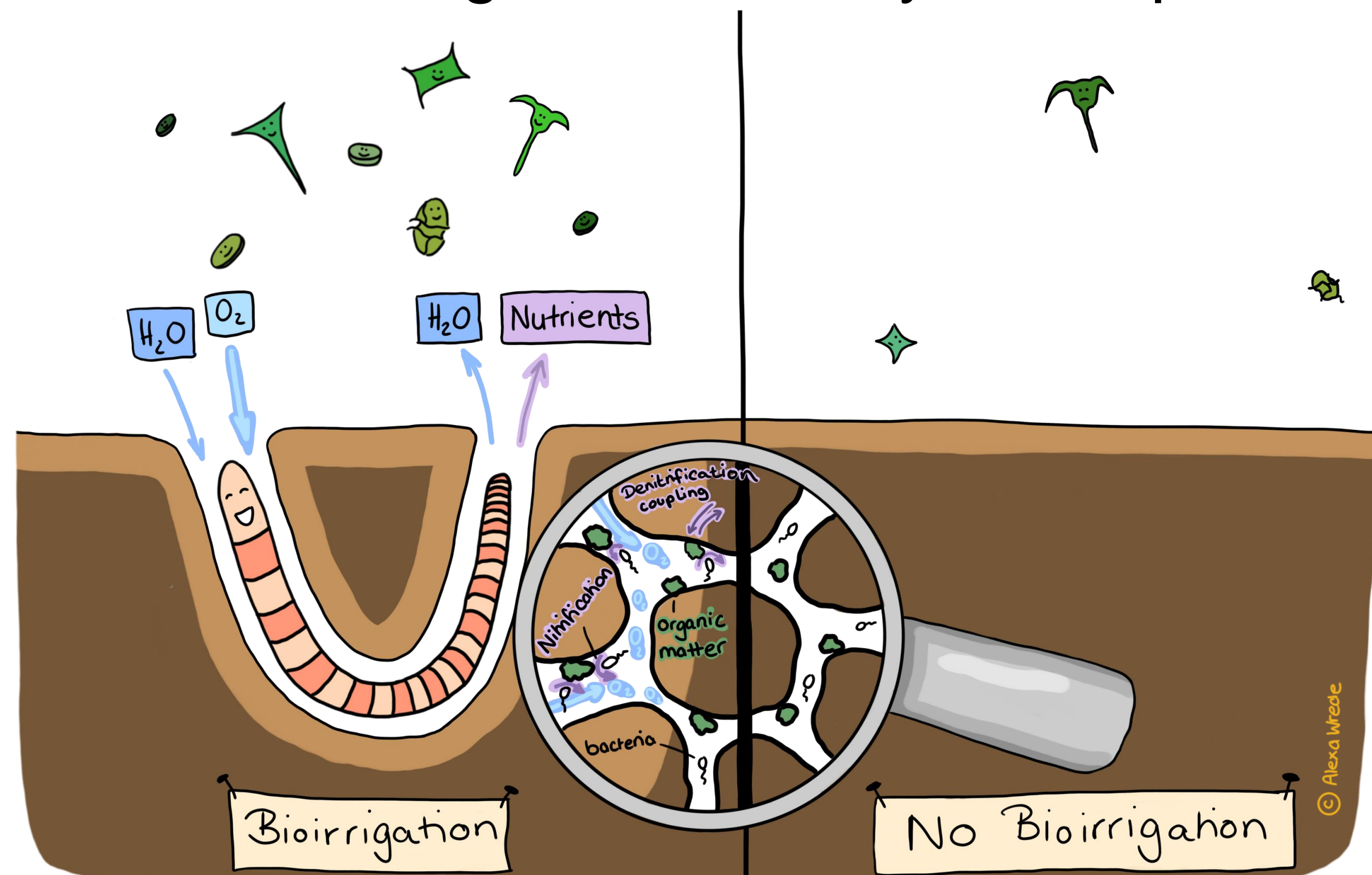


# A novel approach to predict bioirrigation and increase predictability of biogeochemical cycling

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## What is bioirrigation and why is it important?

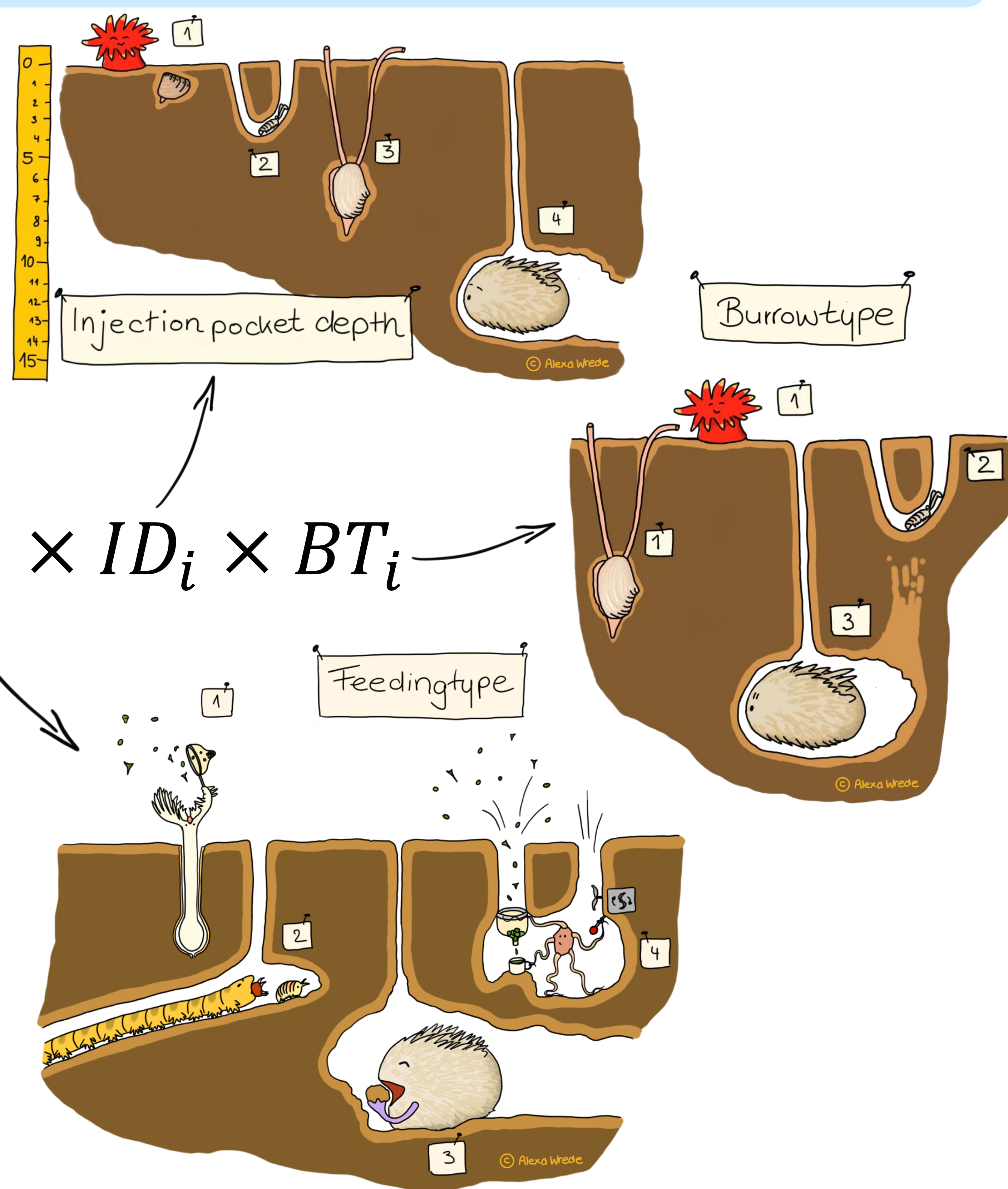


## The irrigation potential (IP<sub>c</sub>)

- Adaption of the bioturbation potential (BP<sub>c</sub>) of Solan et al. (2004)
- We replaced the sediment reworking traits by irrigation traits.
- Numbers in the cartoons indicate the score that is allocated to the respective trait category
- We changed the scaling of the body mass term to an exponent of 0.75

$$IP_c = \sum_{i=1}^n \left( \frac{B_i}{A_i} \right)^{0,75} \times A_i \times FT_i \times ID_i \times BT_i$$

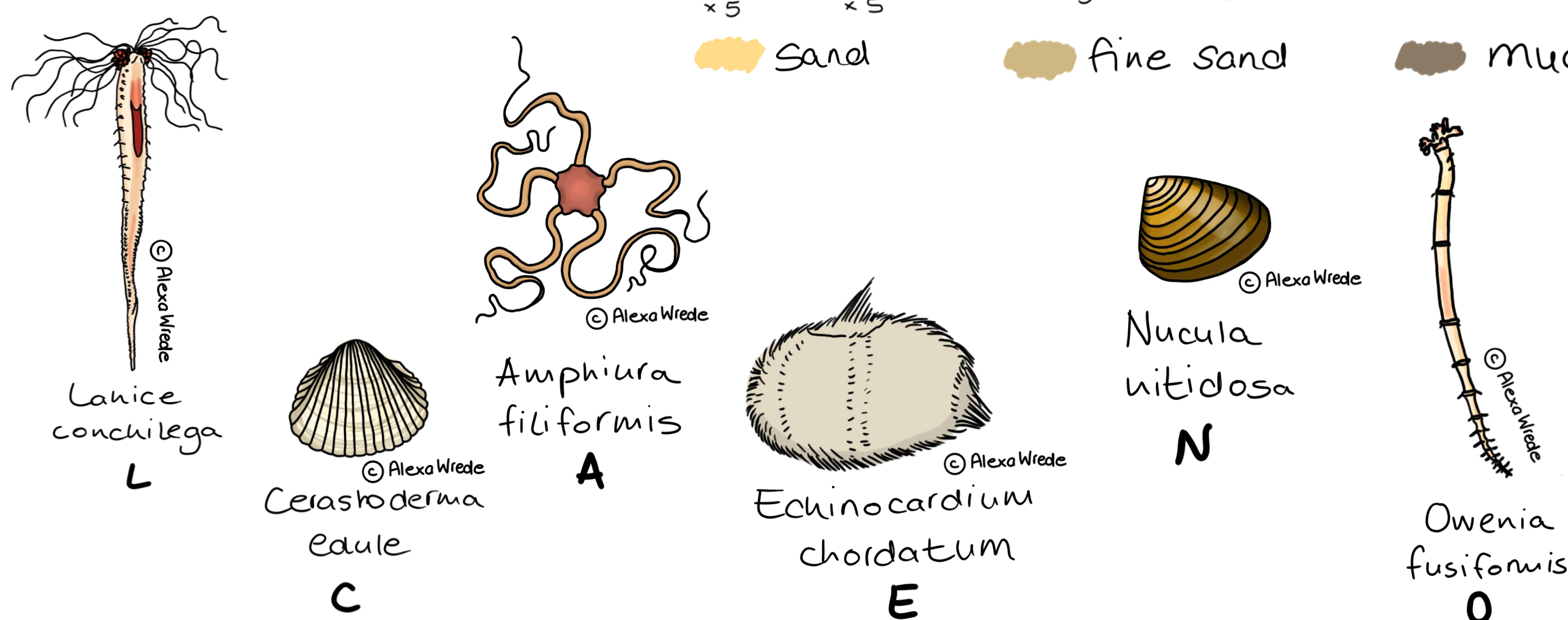
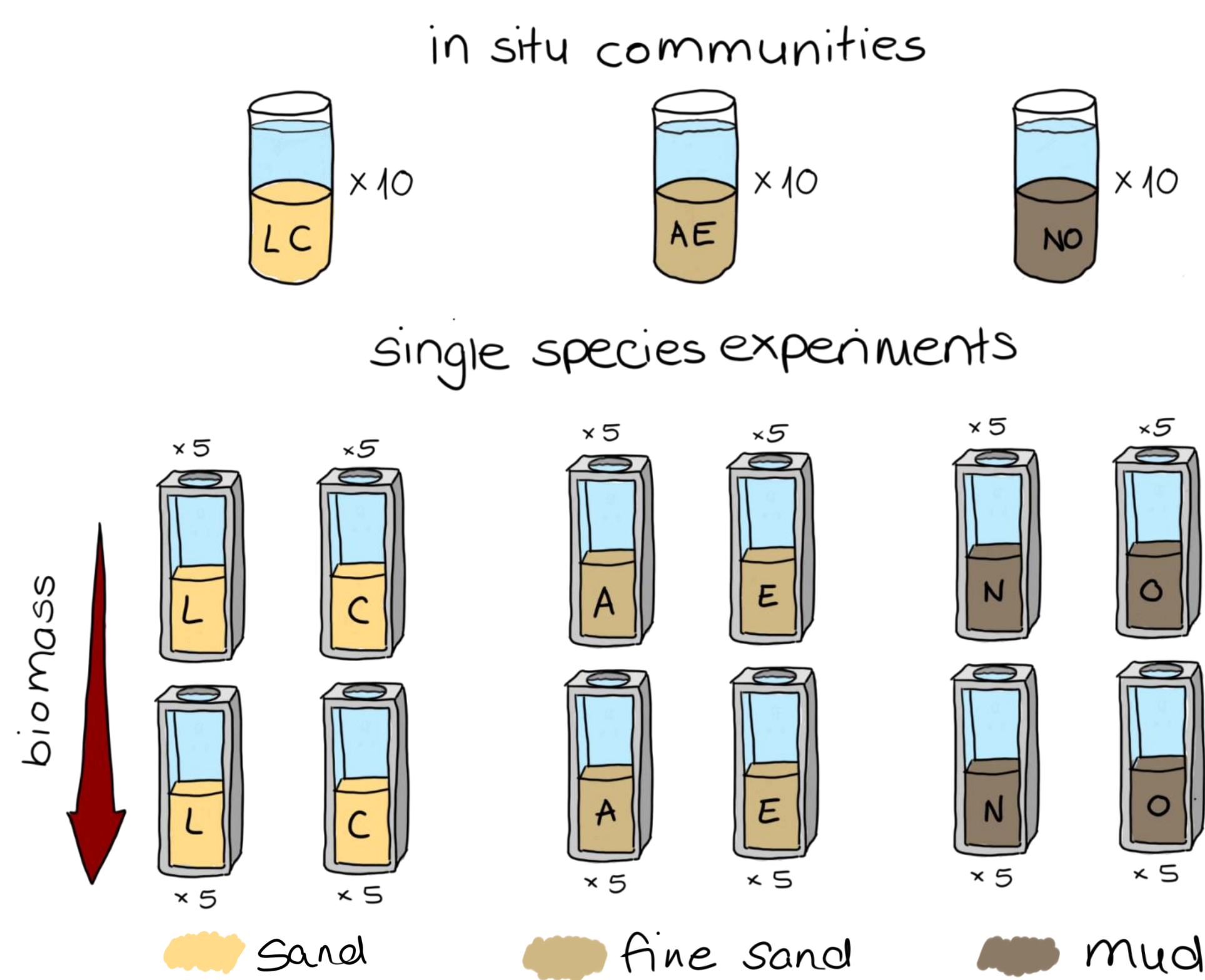
Body mass, Abundance, Injection pocket depth, Burrowtype, Feedingtype



## Validation

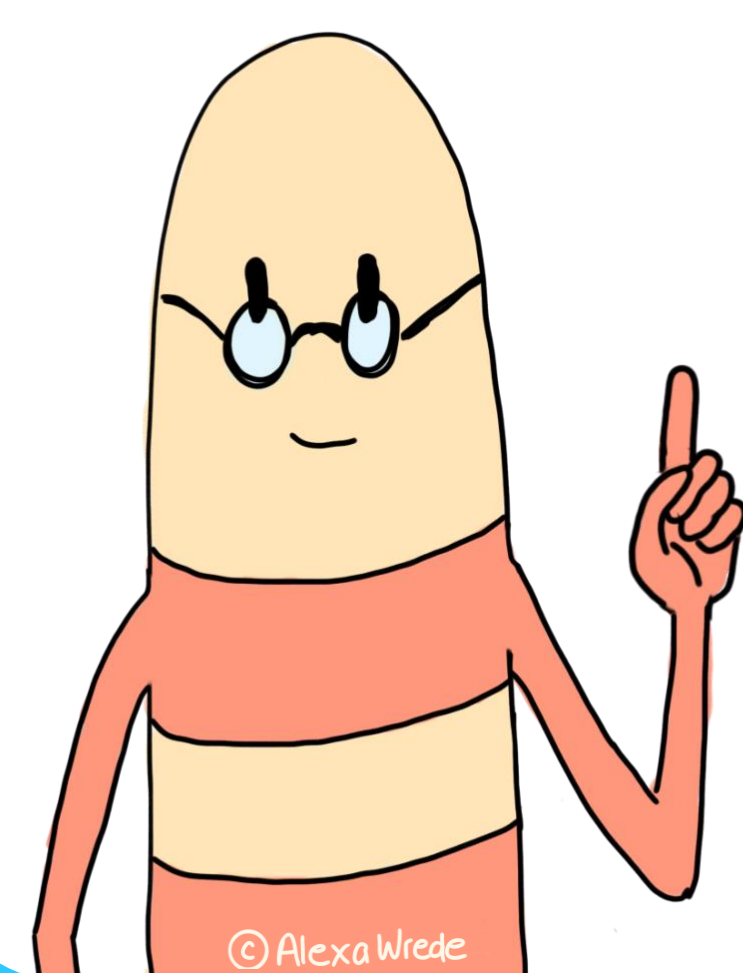
We measured:

- Bioirrigation rate
- Ammonium flux
- Nitrate flux
- Nitrite flux
- Silicate flux
- Phosphate flux



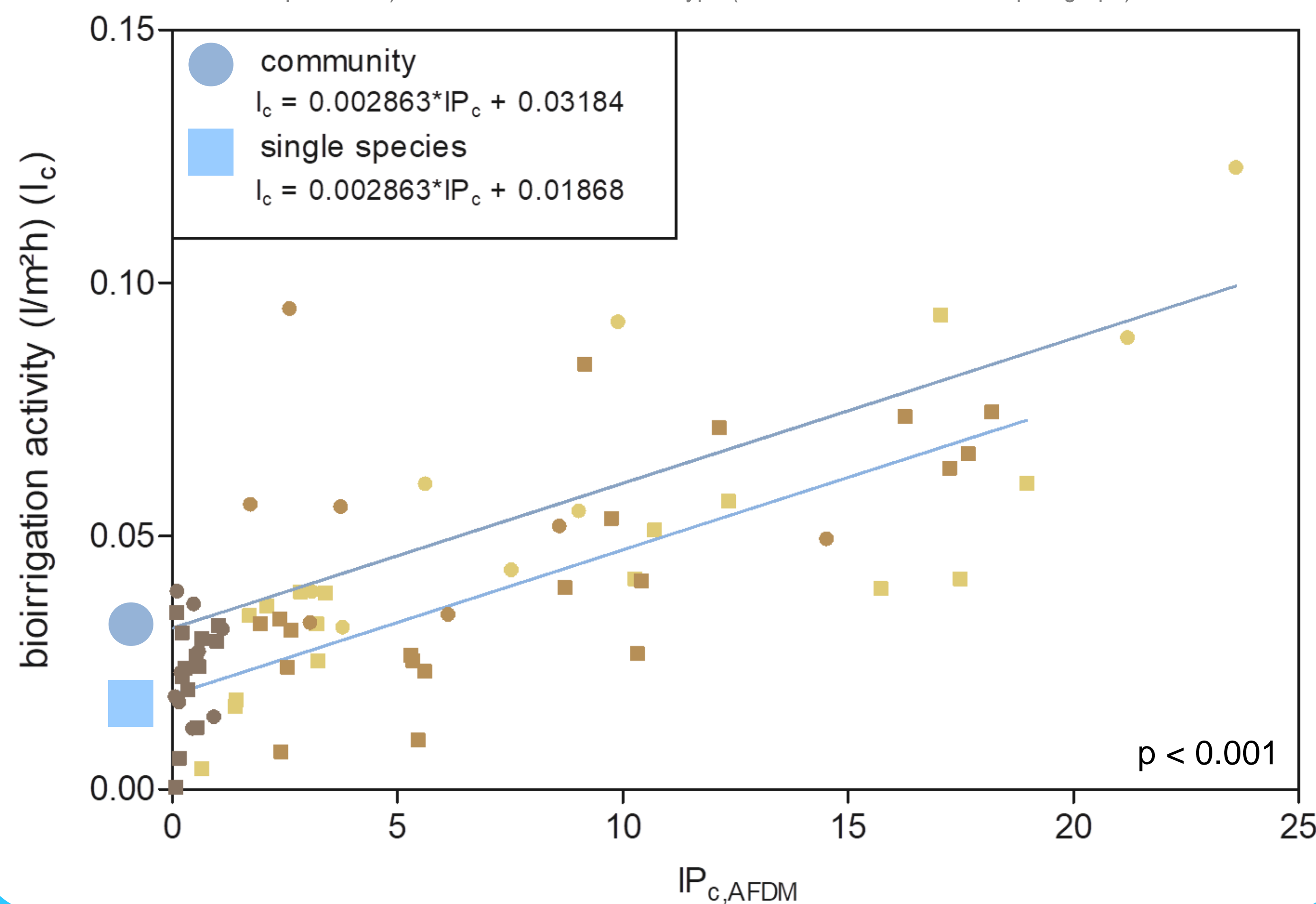
## Conclusion

- The irrigation potential predicts bioirrigation activity
- predictability of all measured nutrient fluxes was increased compared to the bioturbation potential
- The environmental conditions (e.g. sediment type, season, temperature) always affected nutrient flux



## Results

Fig. 1. Relationship between the irrigation potential calculated in ash free dry mass (IP<sub>cAFDM</sub>) and the bioirrigation activity (l/m<sup>2</sup>h). Results from best (lowest AIC) GLM I<sub>c</sub> ~ IP<sub>cAFDM</sub> + Treatment. The treatments are highlighted by circles (community experiment) and rectangles (single species experiments). Colors indicate sediment type (color code: see Validation paragraph).



References:  
• Solan, M., Cardinale, B.J., Downing, A.L., Engelhardt, K.A.M., Ruesink, J.L., Srivastava, D.S., 2004. Extinction and ecosystem function in the marine benthos. Science 306, 1177-1180.  
• In review in Ecological Indicators: Wrede, A., Beermann, J., Dannheim, J., Gutow, L., Brey, T., Organism Functional traits and ecosystem supporting services – a novel approach to predict bioirrigation