Nutrient Retention
Nutrient Cycling

Spiraling Length = $S_w + S_p + S_c$

$S = \frac{Flux}{Uptake}$

$S = \frac{N \times v}{N \times u}$

$N = \text{Standing stock (g/m)}$

$v = \text{Velocity (m/s)}$

$u = \text{Uptake rate (s}^{-1})$

$S = m$
Retention

\[ M_d = M_o \cdot e^{-kd} \]

- \( M_d \) = Mass at distance
- \( M_o \) = Mass at original location
- \( e \) = Natural logarithm
- \( k \) = Instantaneous retention constant
- \( d \) = Distance downstream
Retention

Distance (m)

Md

0.1
0.05
0.01
Retention

\[ \ln M_d = \ln M_o - kd \]

- \( M_d \) = Mass at distance
- \( M_o \) = Mass at original location
- \( e \) = Natural logarithm
- \( k \) = Instantaneous retention constant
- \( d \) = Distance downstream
Retention

![Graph showing retention vs distance with lines for different concentrations (0.1, 0.05, 0.01).]
Retention

Average travel distance \( = \frac{1}{k} \)

Average travel distance \( \approx S_w \)