SUPPORTING INFORMATION

The efficiency of direct interception by a single fiber was computed as (12)

$$E_R = [2E_* \ln E_* - E_* + E_*^{-1}] / \Lambda \,, \qquad \text{[S1]}$$

where

$$E_* = 1 + \frac{d_P}{d}, \qquad \text{[S2]}$$

$$\Lambda = 1 - 2\ln\tau + \frac{\tau^2}{6} - \frac{\tau^4}{144} + \frac{\tau^6}{1080}, \qquad \text{[S3]}$$

$$\tau = \pi d\sqrt{W^2 + L^2}/(WL). \qquad \text{[S4]}$$

W and *L* are width and length of the mesh opening, respectively, and *d* is the fiber diameter. Direct interception efficiency reaches 100% when particle size is equal to mesh width. Although the model assumes $d_P << d$, the above expressions are still realistic as validated by several other studies where particles are larger than the mesh diameter (12, 17).

The efficiency of diffusional deposition by a single fiber is (12):

$$E_D = 3.7\Lambda^{-1/3} Pe^{-2/3} + 0.62 Pe^{-1}, \qquad \text{[S5]}$$

where Pe = *dU*/*D* is the Peclet number and *D* is the diffusion coefficient of the particles. For colloidal particles or non-motile organisms, diffusion arises from Brownian motion and $D = kT/(3\pi\rho\nu d_P)$, where $k = 1.38\times10^{-23}$ m^2 kg s^{-2} K^{-1} is Boltzmann's constant and *T* is temperature. For motile microorganisms diffusivity results from random motility, increasing with swimming speed, and *D* was computed using the semi-empirical results of Visser and Kiørboe ($D = 2.8 d_P^{1.71}$, *D* in cm^2 s^{-1} and d_P in cm, ref. 38).

Finally, the total efficiency of a rectangular filter, which was used in the calculations, is (12)

$$E = \frac{(E_R + E_D)d}{h_E}\left[1 - \frac{(E_R + E_D)d}{W + L}\right], \qquad \text{[S6]}$$

where $h_E = WL/(W+L)$ is the equivalent mesh spacing.