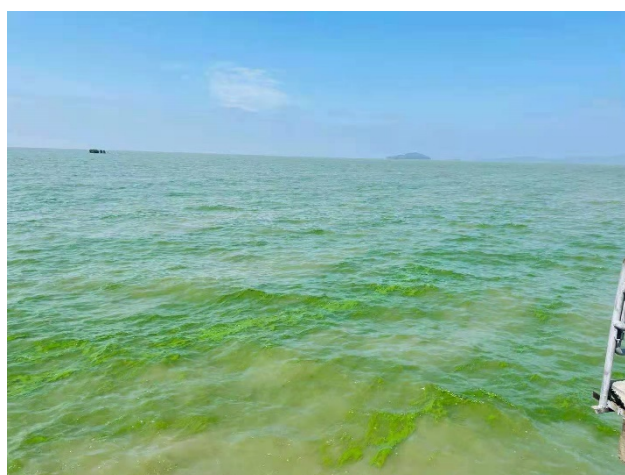


## Supplementary Materials

### Text S1

#### Main Components of Fluorescent Dissolved Organic Matter (FDOM)

The main components of FDOM were analyzed by fluorescence spectroscopy technique coupled with parallel factor analysis [47]. A fluorescence spectrophotometer (Hitachi F-4000) with a scanning speed of 2400 nm/min was employed to measure the excitation-emission matrix (EEM). The EEM fluorescence spectra was gathered with scanning emission (Em) wavelength from 250 to 600 nm at 1 nm increments, and the excitation (Ex) wavelength from 200 to 450 nm at 5 nm increments, respectively. The blank scans were performed every 10 analyses using Milli-Q water. And Rayleigh and Raman scattering (peak emission  $\pm 10$ –15 nm at each excitation wavelength) were removed from the EEM spectra, and then filled in the missing regions by the three-dimensional Delaunay interpolation of the surrounding data points [70]. The chromophoric DOM (CDOM) absorbance was used to correct the measured EEMs to eliminate the inner-filter effect, as described in previous studies [71,72]. During the experiments, a total of 150 EEMs spectra were obtained for PARAFAC analysis. The MATLAB (Mathworks, Natick, MA, USA) together with the DOM Fluor toolbox (<http://www.models.life.ku.dk/> accessed on 6 May 2022) were employed for data analysis [48,49].



**Figure S1.** The cyanobacterial blooms in China were recorded during the summer of 2021 off the lakeside of Taihu. Photo shows the *Microcystis* dominated total phytoplankton community growing in the near lake waters and deposited on the beaches of the countryside.