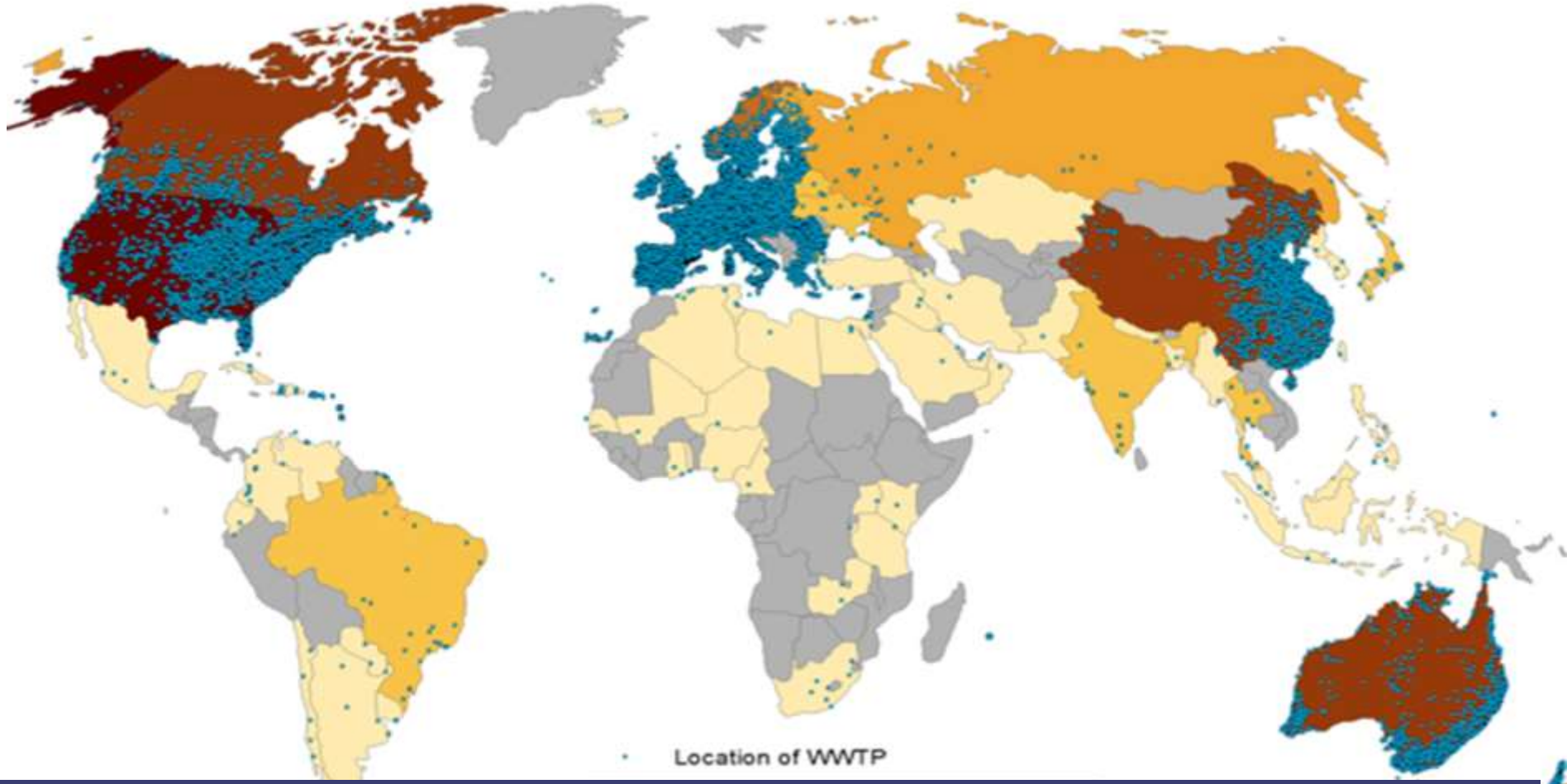
Presentation from

2015 World Water Week in Stockholm

www.worldwaterweek.org



Modeling the chemical fate of emerging pollutants in waterways of Africa, Asia, and Latin America for rapid risk assessments, geospatial exposure mapping, and screening purposes: A pilot study

Usman Khan

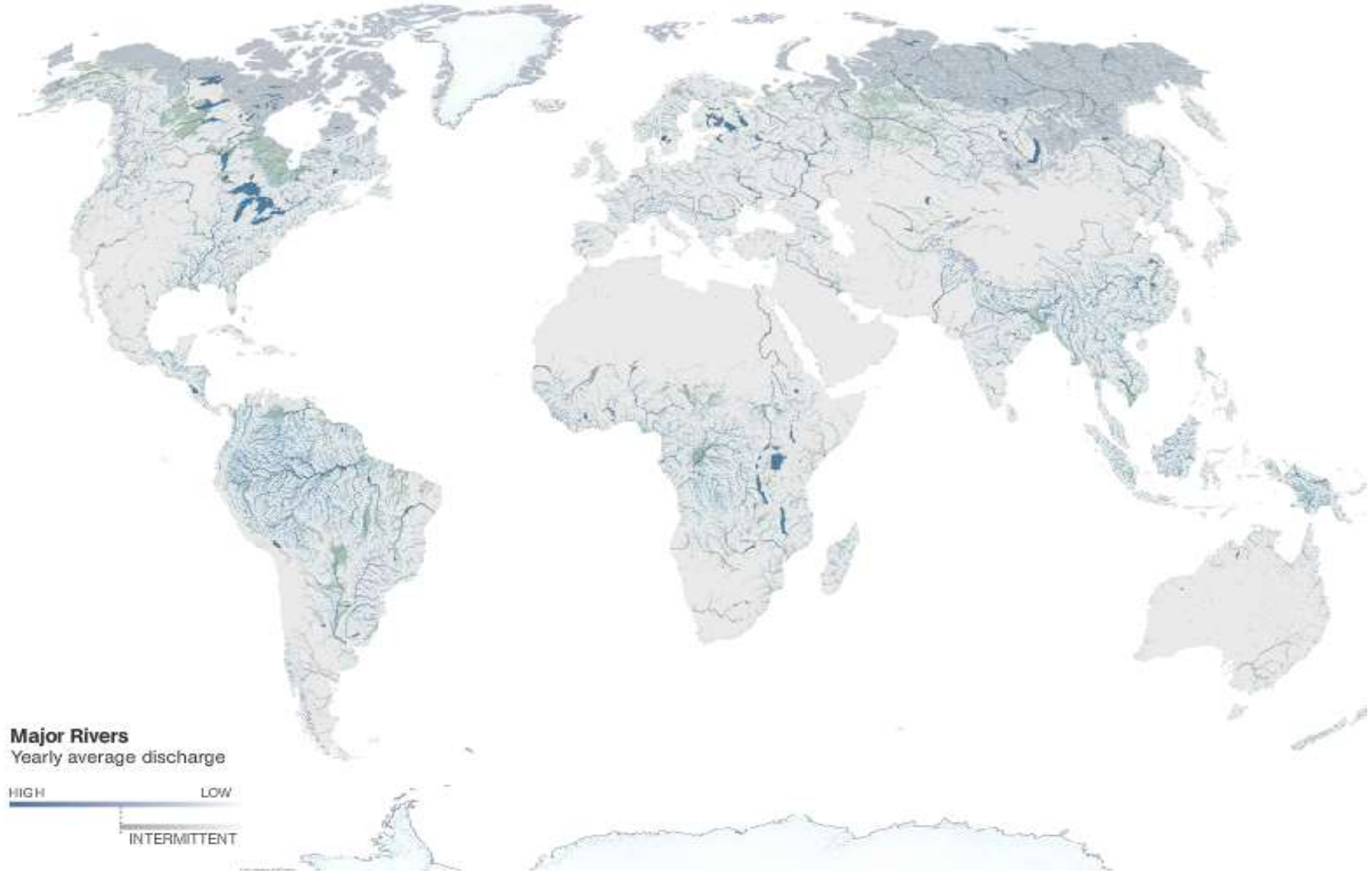
Why Model

Why Model

- Resources
- Low flow conditions
- What to measure
- Where to monitor
- Chemicals – impacts at levels below current analytical capabilities
- Chemicals – beyond current analytical capabilities
- Mixtures

A Global River Map

A Global River Map



Contaminant Fate Modelling – Overall Approach

Contaminant Fate Modelling – Overall Approach

1 Pharmaceutical consumption and metabolization

2 Partial removal in wastewater treatment plant and release into environment

3 Environmental accumulation, decay and fate in rivers and lakes

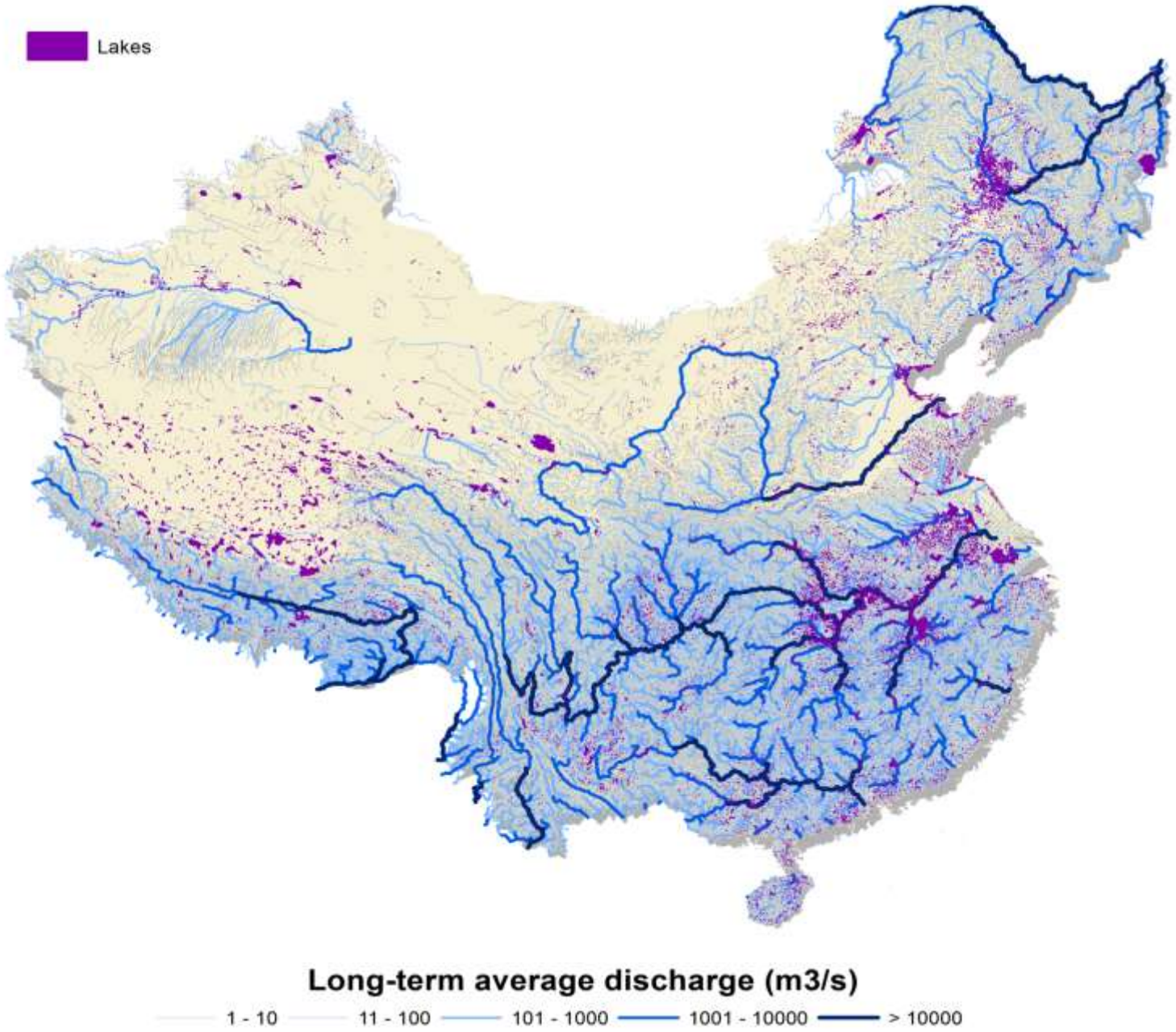
$$\frac{dC}{dt} = -kC$$

$$\longrightarrow C(t) = C(0)\, e^{-kt}$$

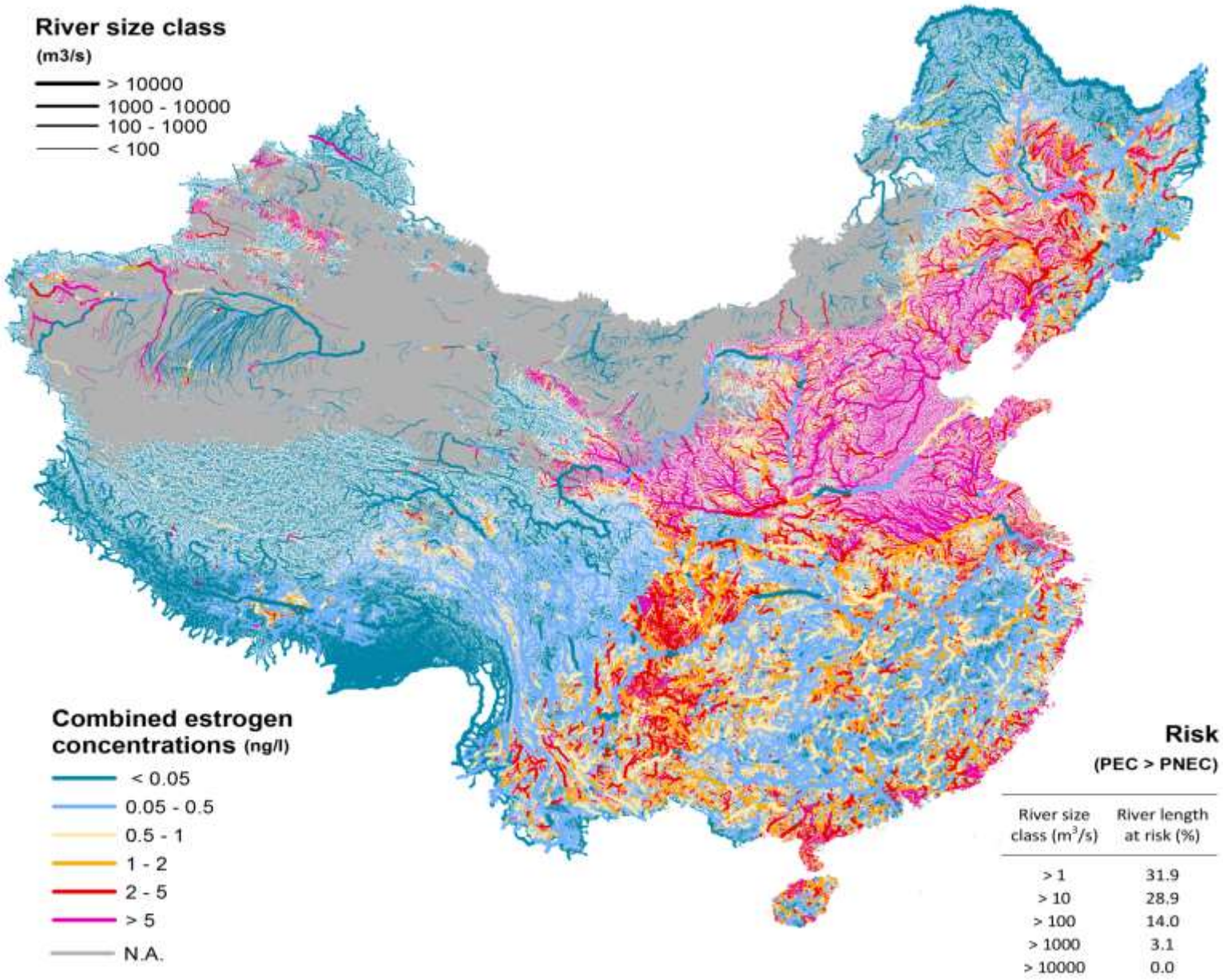
4 Spatially explicit environmental risk assessment

$$\frac{\text{PEC}}{\text{PNEC}} > 1$$

A Contaminant Fate Model for China


Lakes
Long-term average discharge (m3/s)
1 - 10
11 - 100
101 - 1000
1001 - 10000
> 10000


Population served (x 10000)
1 - 9
9 - 25
25 - 56
56 - 140
140 - 356


River size class
(m3/s)
> 10000
1000 - 10000
100 - 1000
< 100
Combined estrogen concentrations (ng/l)
< 0.05
0.05 - 0.5
0.5 - 1
1 - 2
2 - 5
> 5
N.A.
Risk
(PEC > PNEC)
River size class (m3/s) | River length at risk (%)
> 1 | 31.9
> 10 | 28.9
> 100 | 14.0
> 1000 | 3.1
> 10000 | 0.0

Beyond China

Collecting Water Treatment Plant Data Across the Globe