Innovative real-time biomonitoring of water quality -permanent water protection-
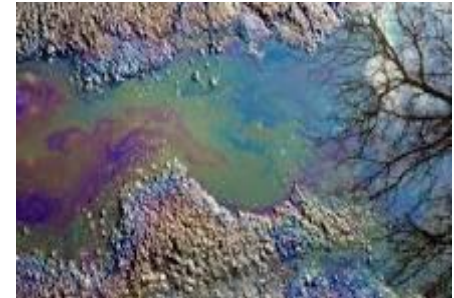
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www.limco-int.com
limco-international@gmx.de

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Bildquellen: www.google.de

Why do we need real-time biomonitoring?

1) **Early warning of acute chemical spills („Environmental police officer")**

Chemical accidents, *e.g.* Sandoz (1986: Rhine: Fire in stockroom for pesticides)
Bioterrorism, *e.g.* poisoning of drinking water (2005: Lake Constance: pesticides)

2) **Water body and nature reserve protection (EU-WFD, EU-EQS)**

Monitoring of point polluters (Emissions)
Monitoring of rivers (Immissions)

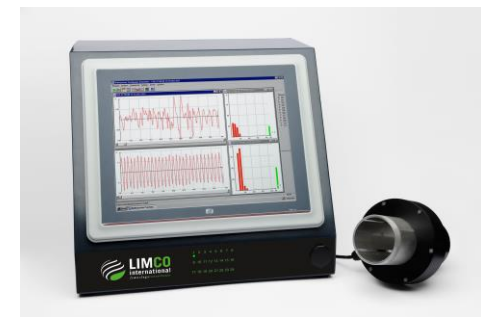3) **Public services monitoring and precaution**

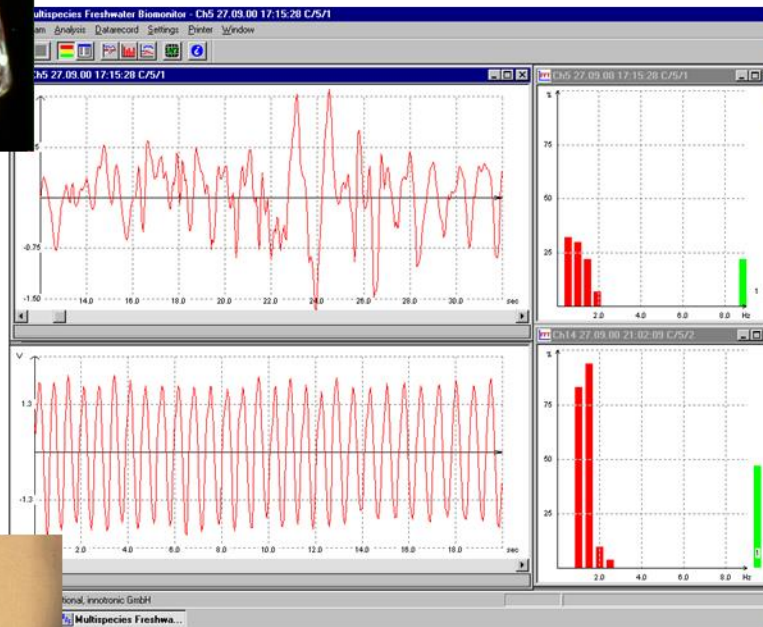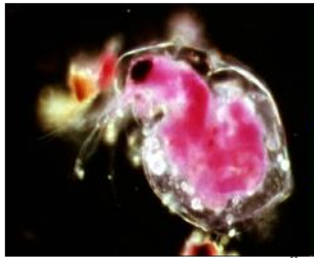Drinking water security
Monitoring of bath-water quality

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Multispecies Freshwater Biomonitor, MFB

Locomotion

"Ventilation"

Rhine-monitoring station at country border (D/Fr/Ch)

Chem. pollution   Behaviour alarm

Chem. pollution	Behaviour alarm
23/5/06: Cu, Fluores.	X
28/5/06: TOC	X
20/5/06: Fluores.	X
30/5/06: Fluores.	X
5/6/06: ??	X
12-14/6/06: O_2-decrease, Cu	X
15-18/6/06: TOC, Öl, O_2-decr.	X

_____

Behaviour alarm : 20% change in locomotion (arrows)
Mortality alarm (red bar): did not occur (green bar)
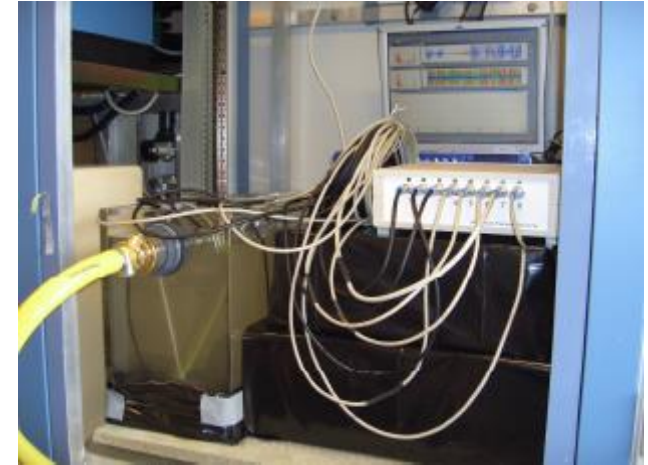
EU-Projekt: SWIFT-WFD
(Gerhardt et al. 2007)

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Groundwater indicators for drinking water monitoring
-drinking water intake from lakes, reservoirs and rivers-

Aktivität von *G. fossarum* und *N. casparyi*
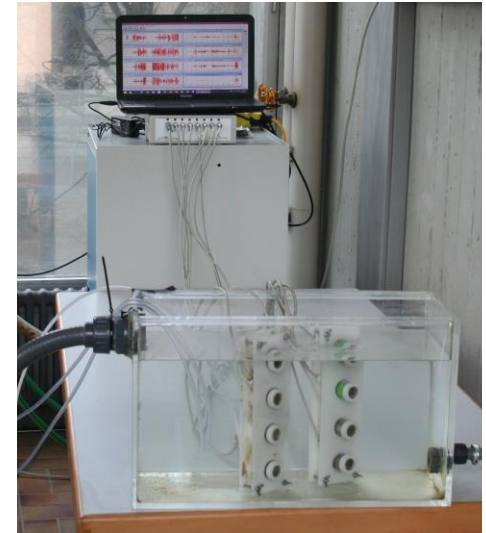(ansteigender Cu-Puls: 0,1 - 1,0 mg/l)

0.1 – 1 mg/l

G. fossarum
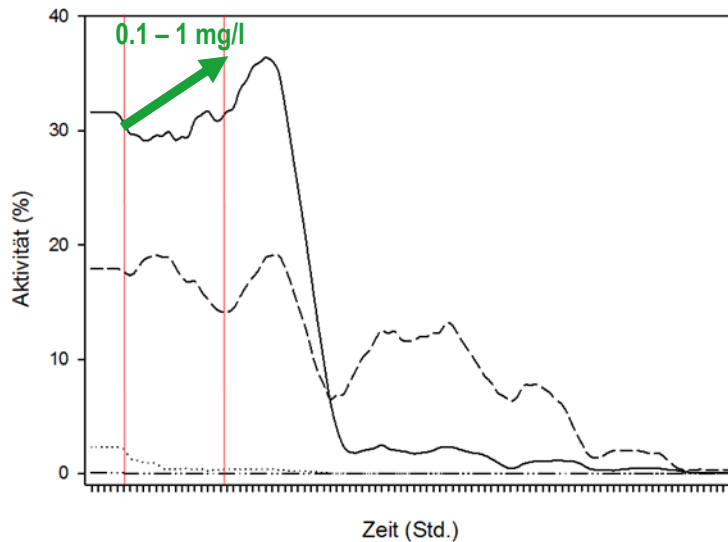
N. casparyi

Legend:
- Gammarus fossarum (Aktivität, N=4)
- Gammarus fossarum (Ventilation, N=4)
- Niphargopsis casparyi (Aktivität, N= 4)
- Niphargopsis casparyi (Ventilation, N=4)

BMBF Project GroundCare 2015-2018
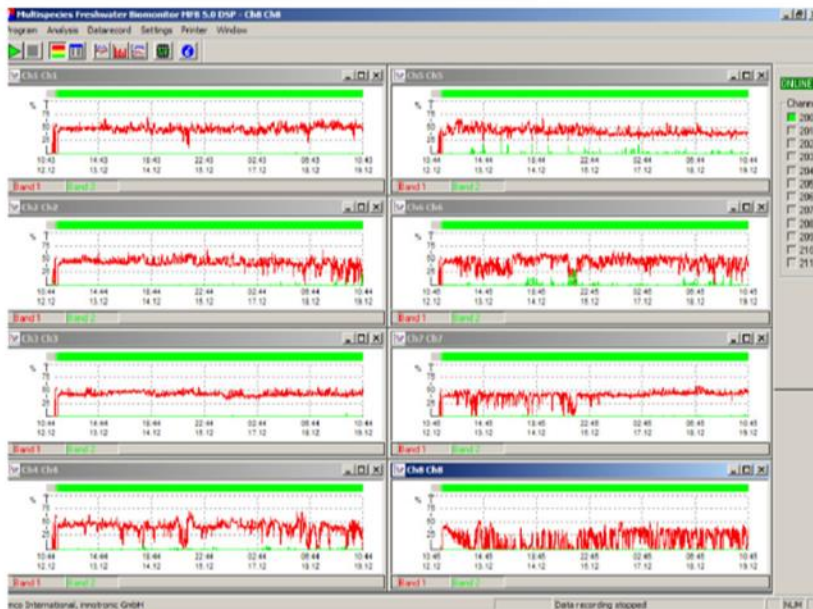Grimm & Gerhardt (2018)

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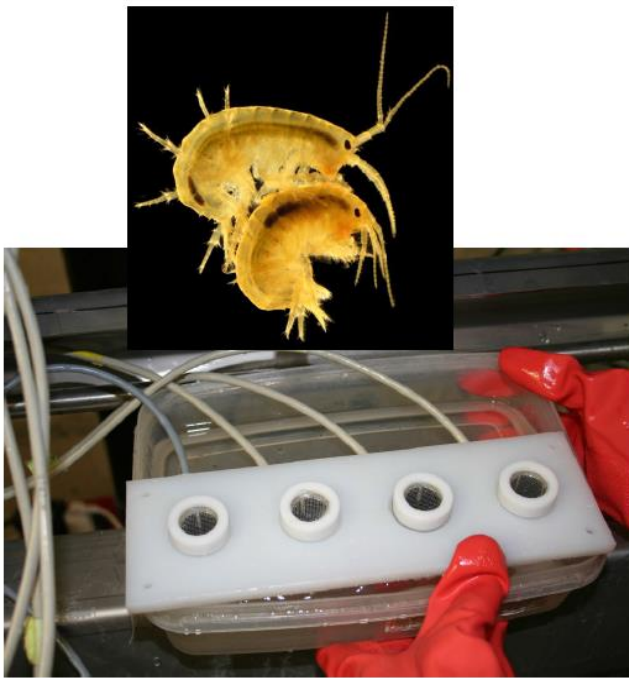
Wastewater treatment plant

illegal
pollution
with
Industrial
chemicals

Requirements for good water quality in rivers

We propose to apply real-time online biomonitoring………

- at point polluters (WWTPs, industry, cool-water-intakes)

- at country borders

- in nature reserves and at dams

- in (drinking) water intake locations,………

to protect river ecology, biodiversity, good water quality status (EU-WFD)
to find and track polluters (polluters pay principle)
to safeguard drinking water (precautionary principle).