19th Discussion Forum on LCA, 27 March 2003

Risk assessment of pesticides in rivers for single substances and mixtures

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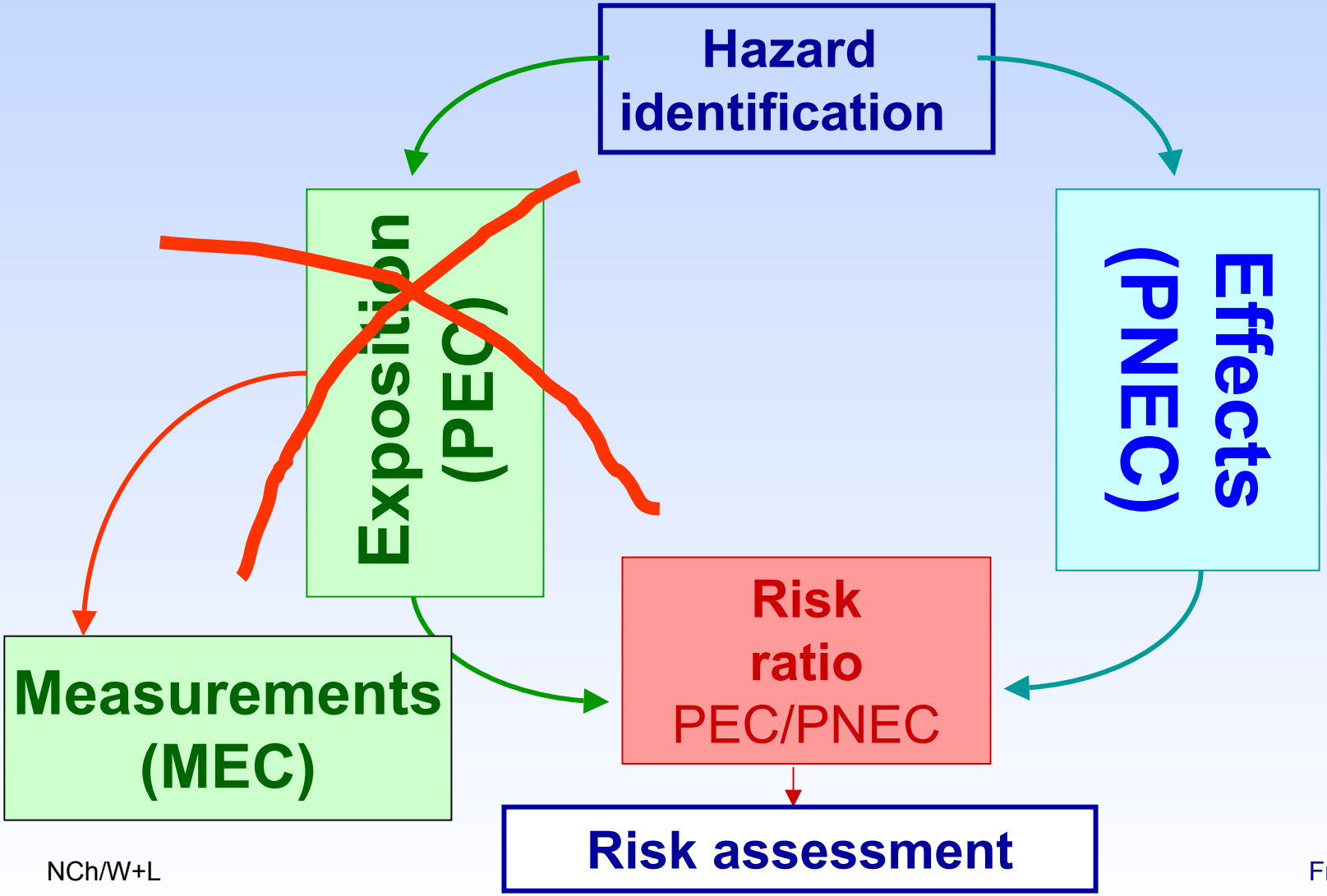
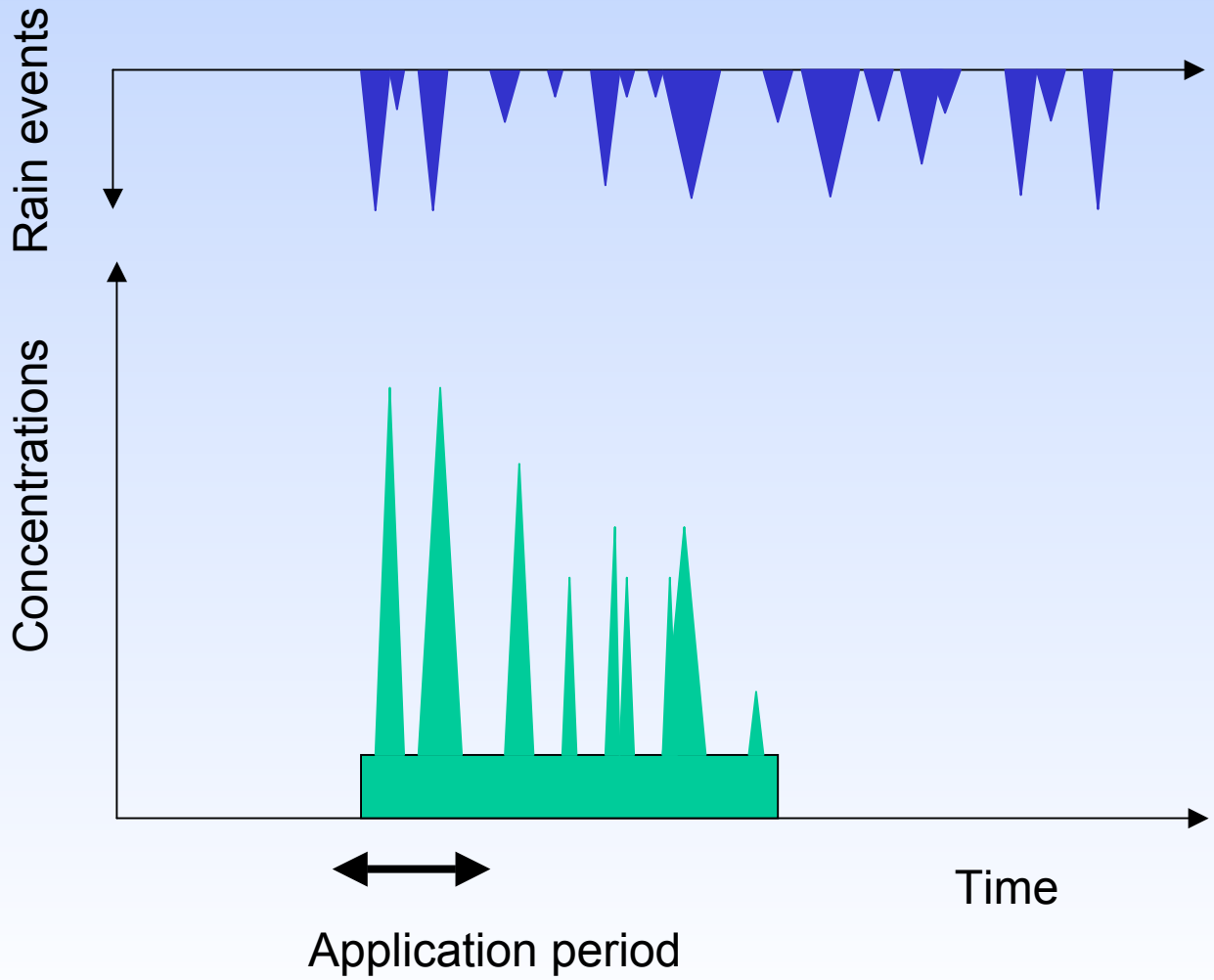
Water and Agriculture
EAWAG

Risk assessment: PEC/PNEC

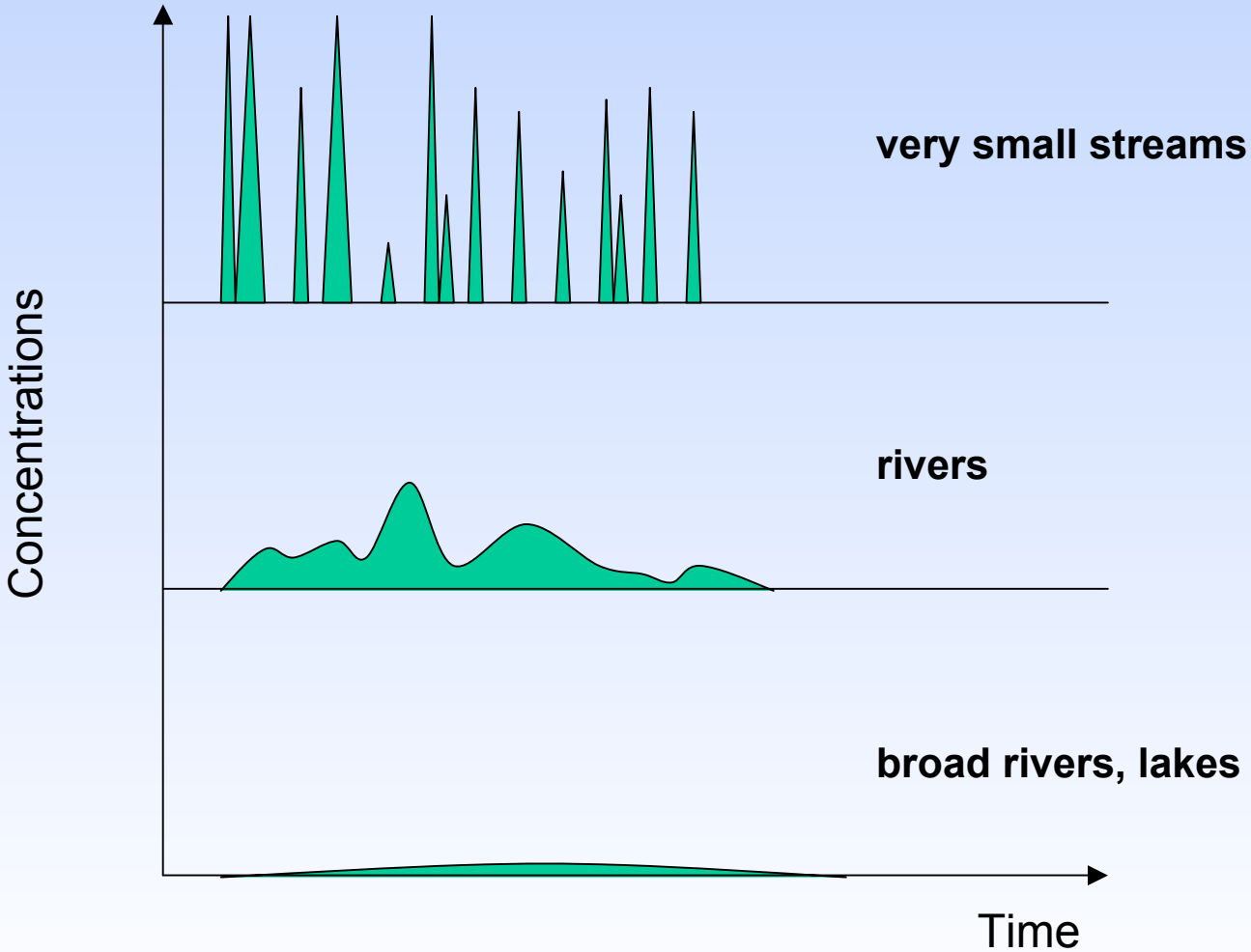


From B. Escher

Exposure characterization: **„seasonality“**



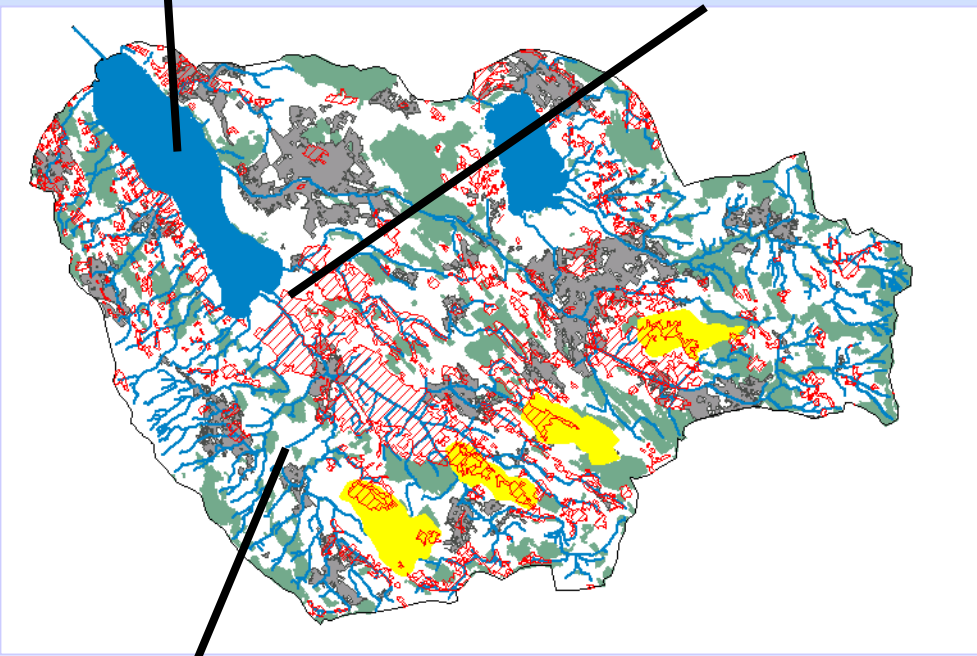
Exposure characterization: **„scale“**



Measurements used for risk assessment

Lake Greifensee - 160 km^2

Mönchaltdorfer Aa - 46 km^2



Very small streams - ~2 km^2

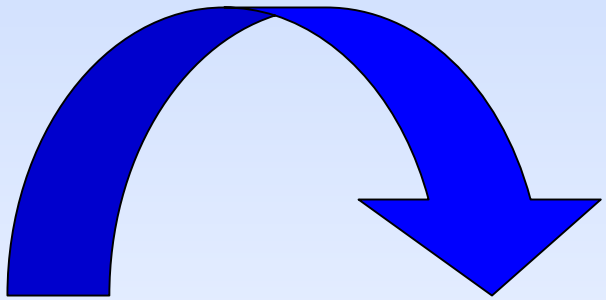
Compared with other Swiss data

PNEC determination

Algae | Daphnids | Fishs | …..

$L(E)C_{50}$

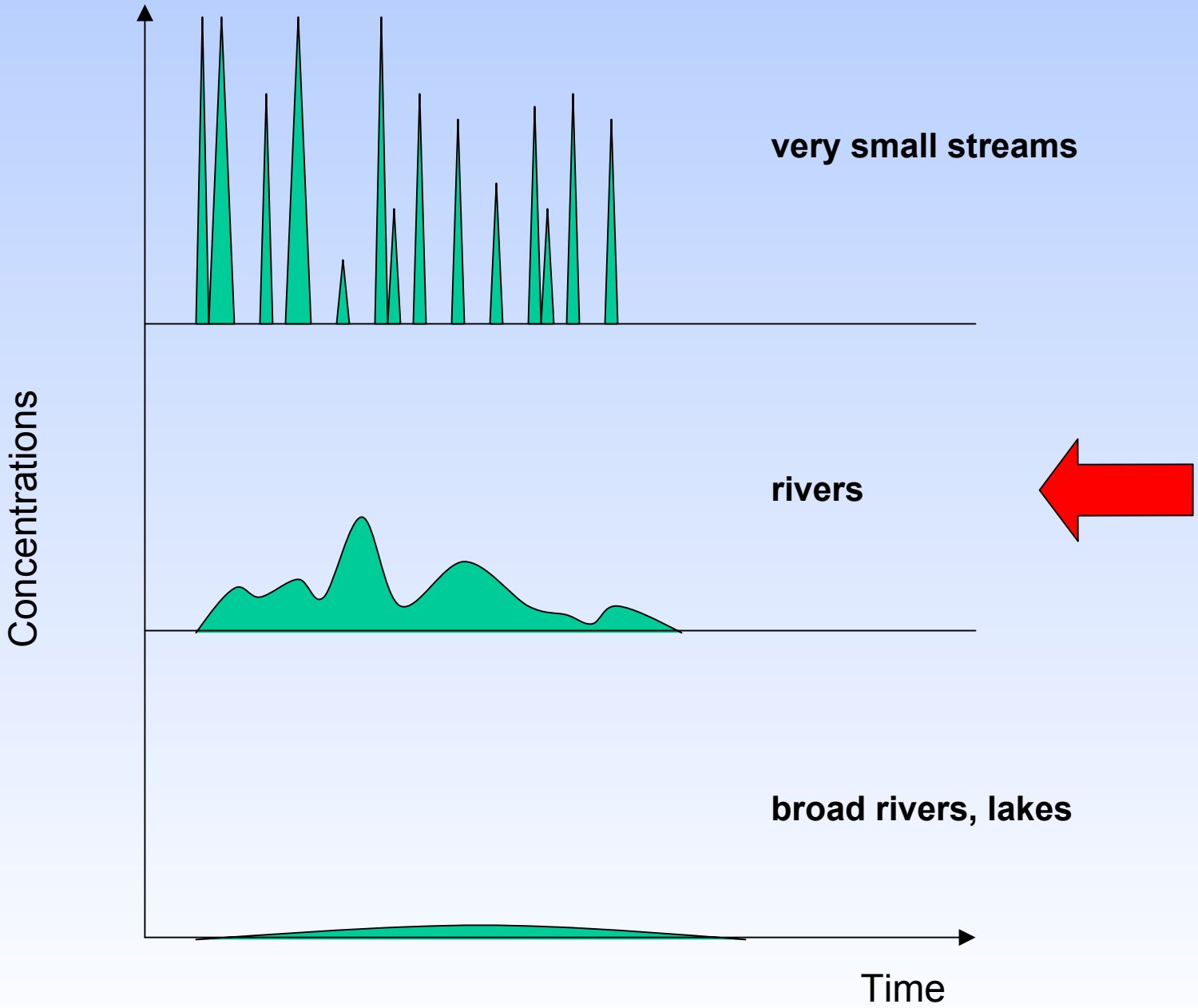
NOEC



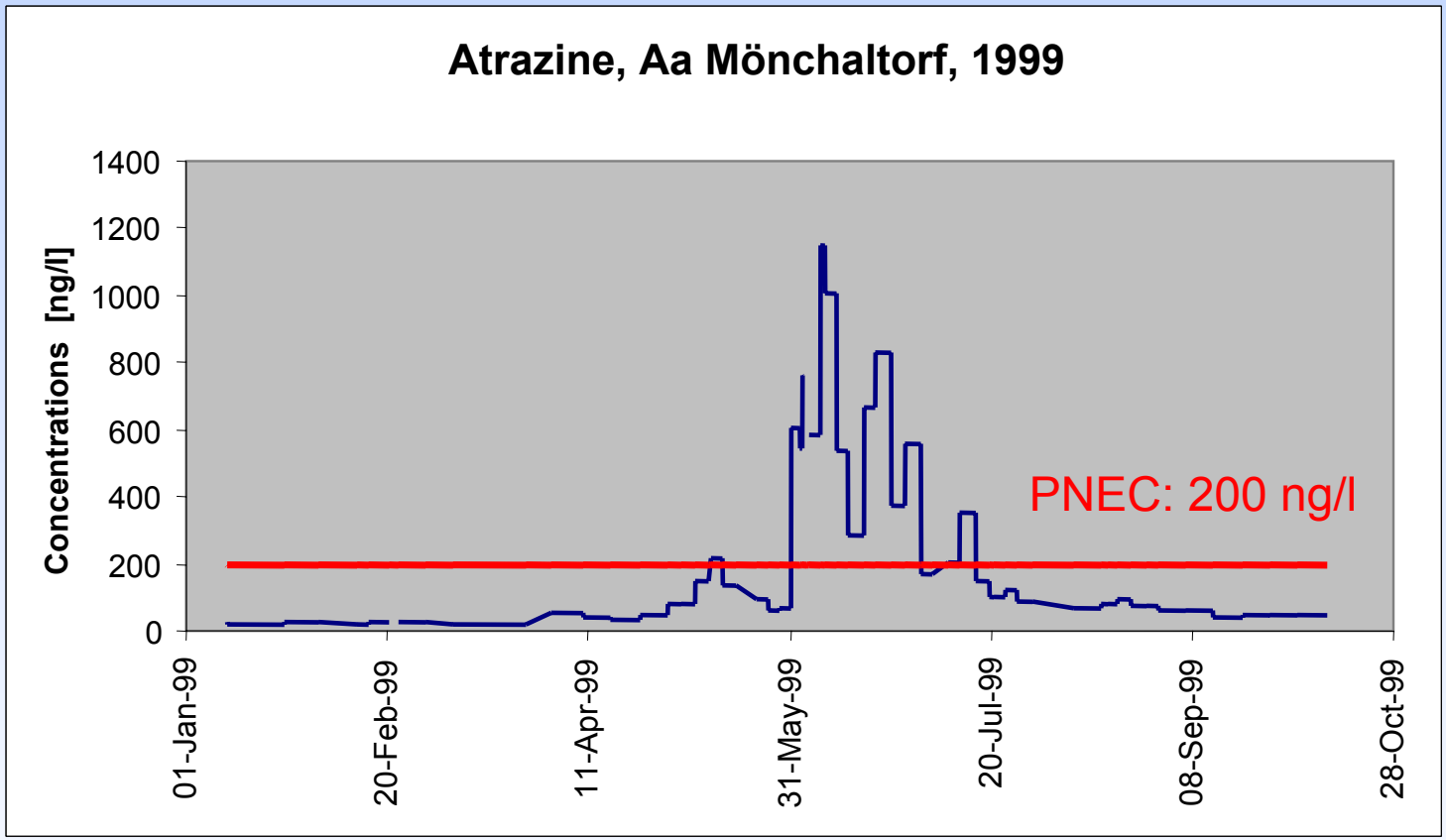
1. Selection of the most sensitive value in the database
2. Application of an appropriate security factor

PNEC

From B. Escher

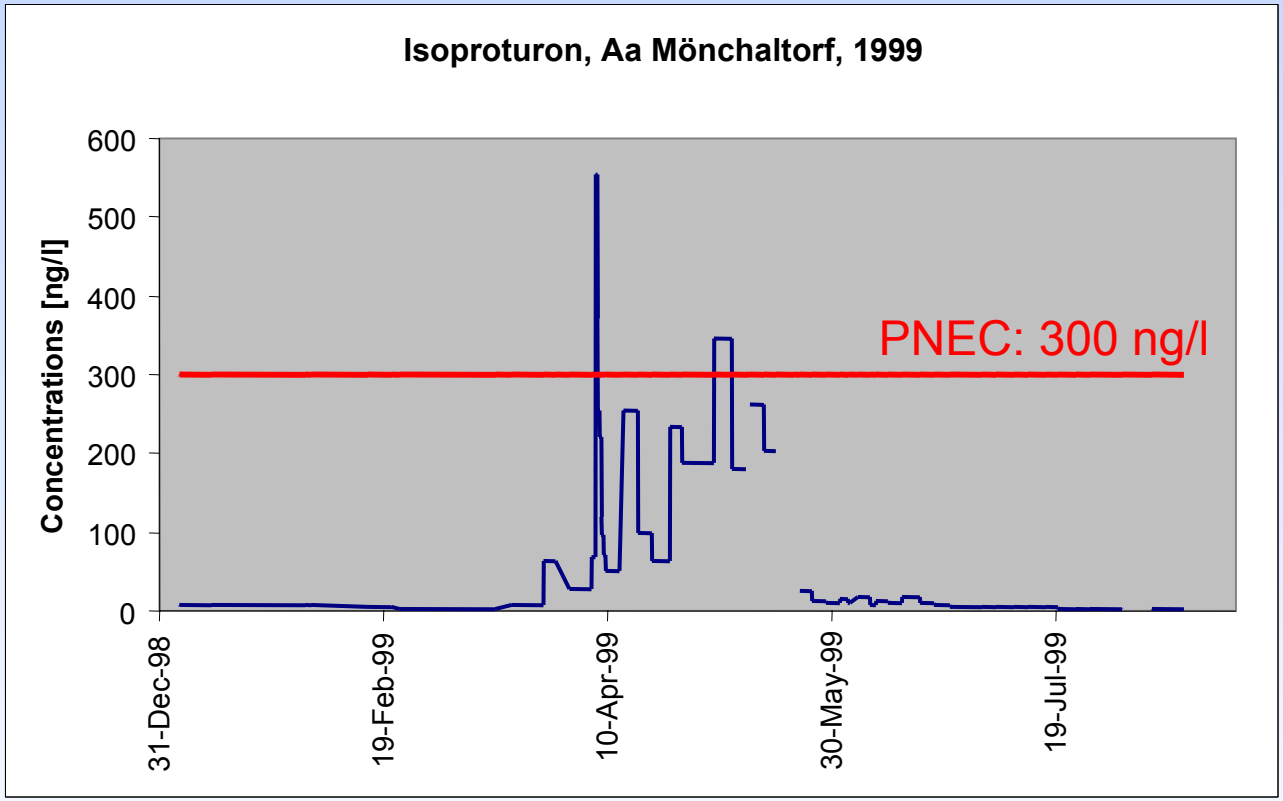

very small streams
rivers
broad rivers, lakes
Concentrations
Time

„Seasonal“ pesticides



Atrazine: herbicide, corn

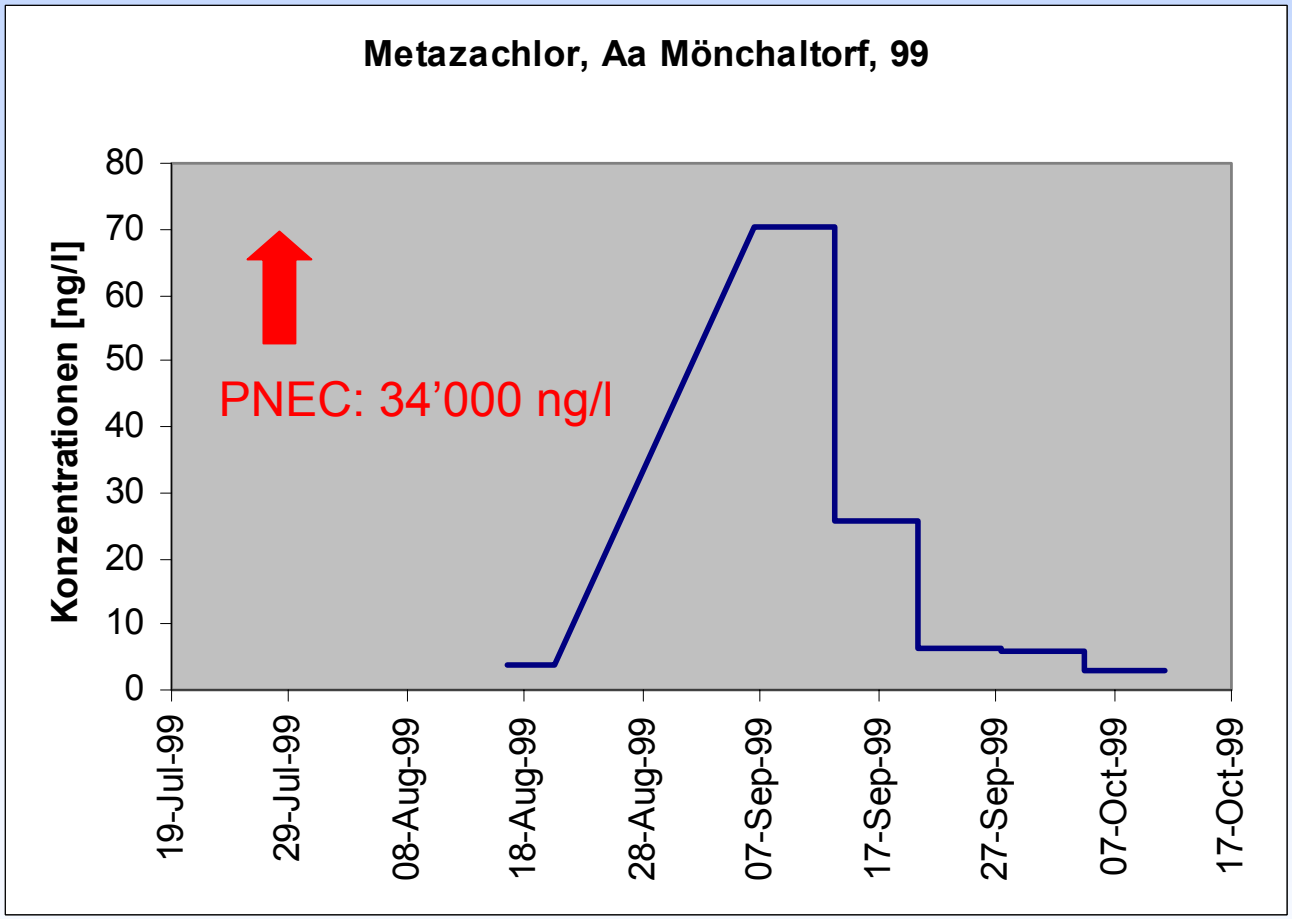
„Seasonal“ pesticides



Isoproturon: herbicide, cereals

NCh/W+L

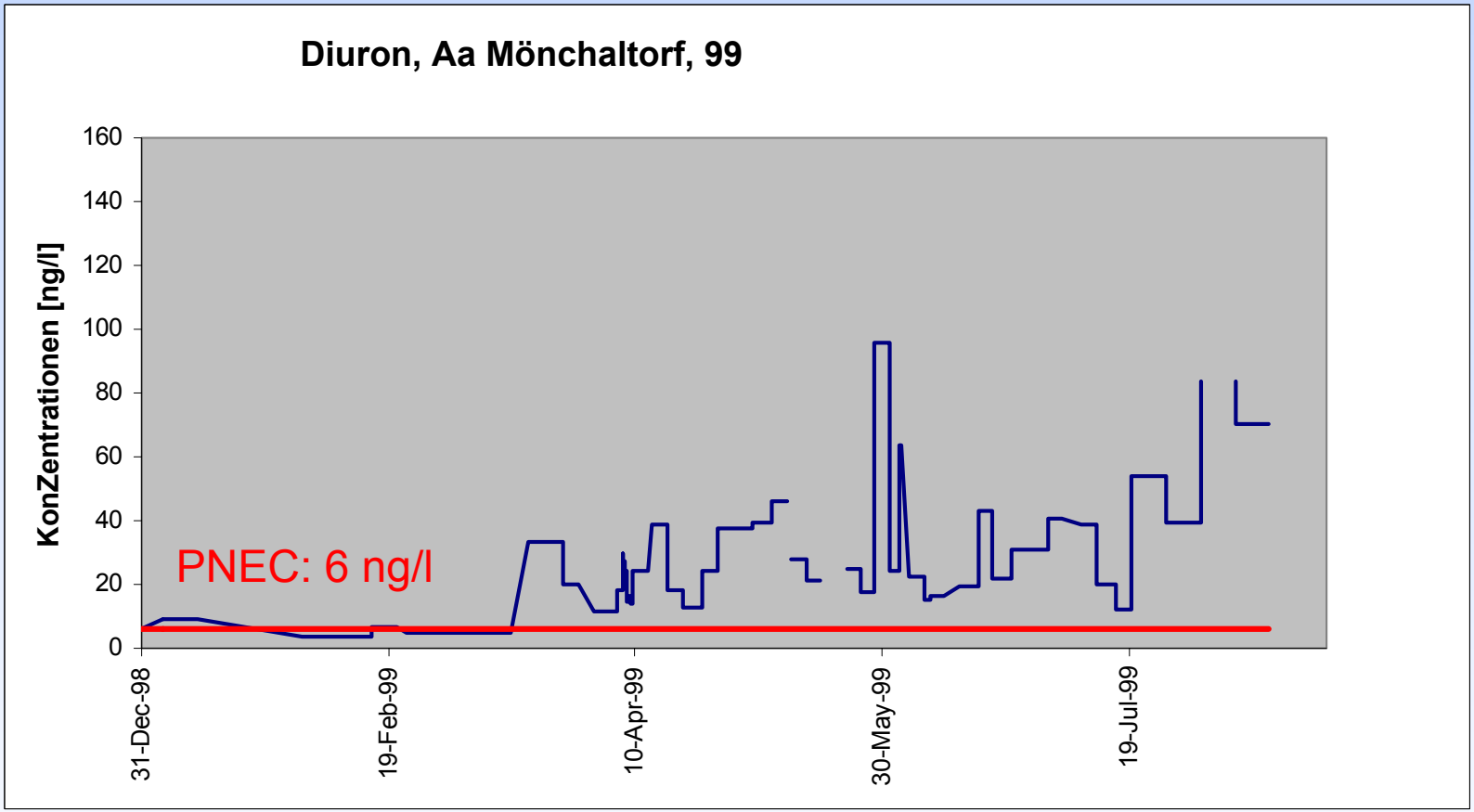
„Seasonal“ pesticides



Metazachlor: herbicide, vegetables and fruits

NCh/W+L

„Non-seasonal“ pesticides



Diuron: herbicide, fruit + other sources ?

NCh/W+L

Mixtures of pesticides

- Pesticides never occur alone in surface waters but in mixtures.
- The different active ingredients of a mixture of pesticides can act “together” on organisms
- Pesticides having the same mode of action have been shown to be additive in term of concentration

Risk assessment: single substance

No risk if:

$$\frac{MEC}{PNEC} < 1$$

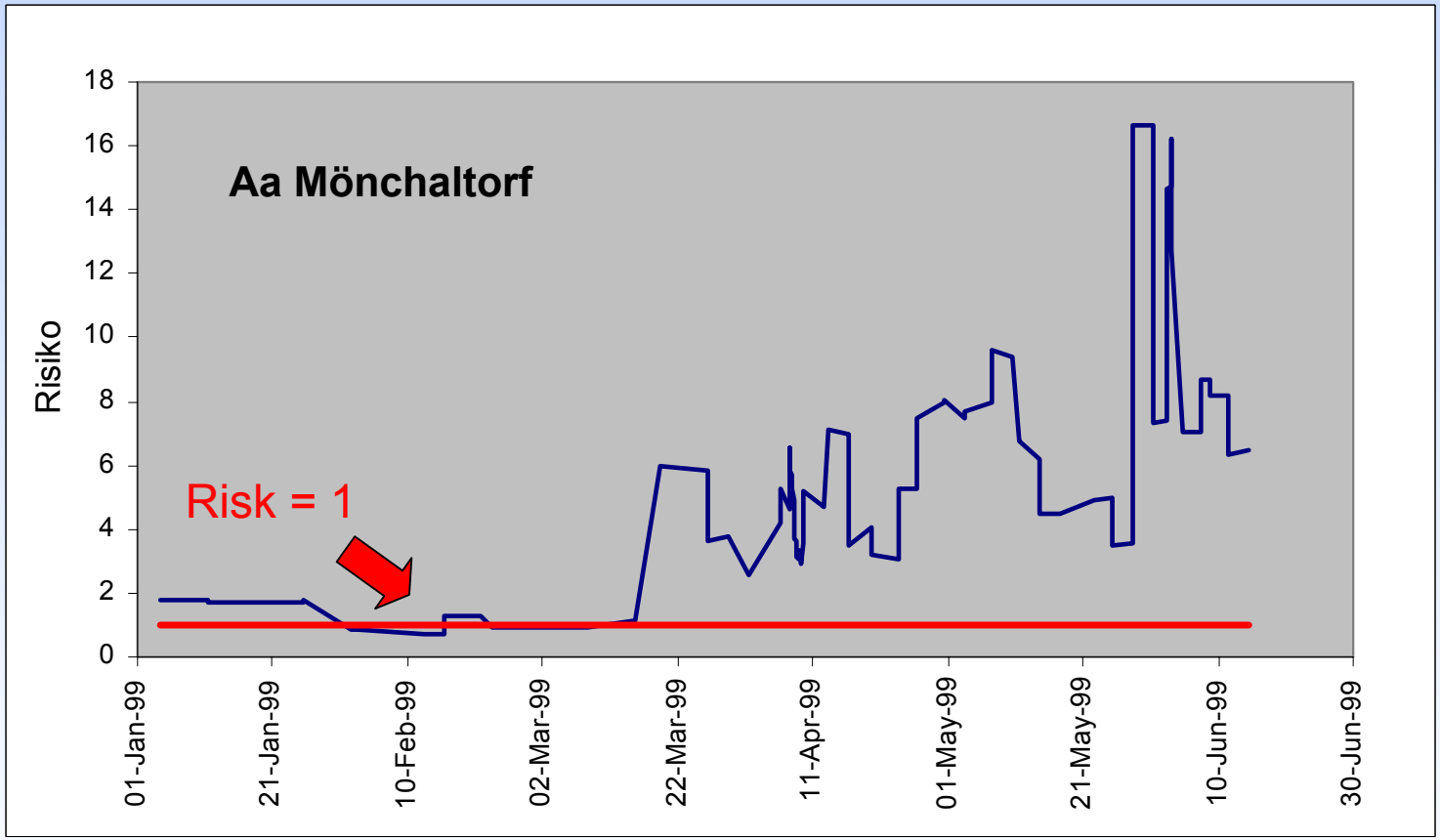
Risk assessment:
mixtures, same mode of action

No risk if:

$$\frac{\text{MEC 1}}{\text{PNEC 1}} + \frac{\text{MEC 2}}{\text{PNEC 2}} + \ldots + \frac{\text{MEC n}}{\text{PNEC n}} < 1$$

Risk assessment: mixtures

Atrazine, Isoproturon, Simazine, Terbuthylazine, Diuron



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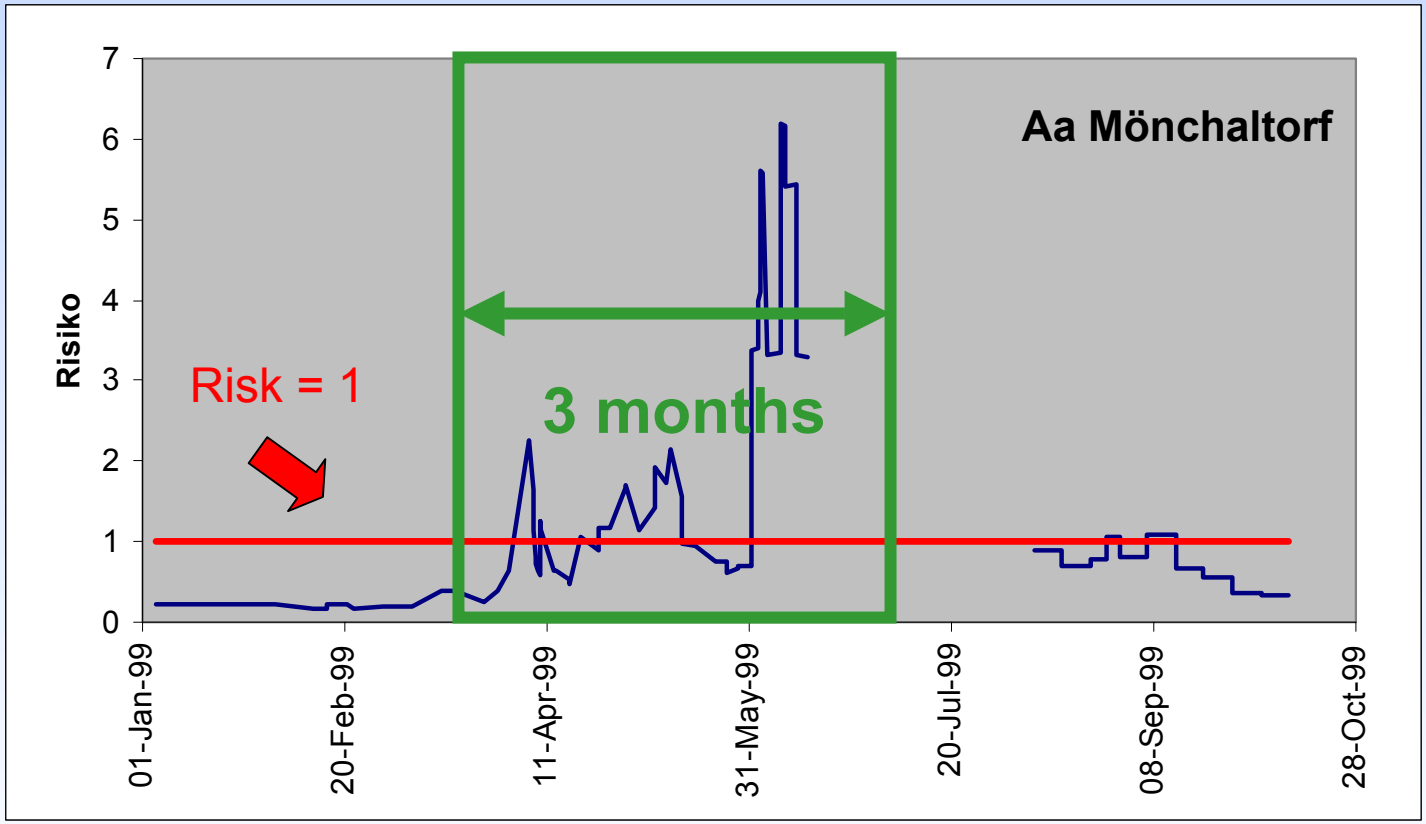

Summary

- "Seasonal" risk for certain pesticides during and after the application period
  - Risk assessment of short-term peaks?
    i.e. in small rivers
- " Constant" risk for certain pesticides from other sources than agriculture (urban source)
- Pesticides occur in mixture in surface water and can act "together" on organisms
  - High risk in spring / early summer (herbicides)