RISK ASSESSMENT AS TOOL FOR POLICY MAKERS

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Objective

Illustration of how to make responses on the questions of decision maker to protect the environment by using risk assessment tools

A number of legislative efforts have been done on both international and national levels with relevance for chemical management and environmental protection

- EU directives
- Rio Conference
- UN/ECE conventions

National activities to develop hazard and risk assessment concepts, e.g in:

- Germany, The Netherlands, Denmark, UK, USA and others

One of the tools to be used in the decision making process in the field of water resources protection is a risk assessment

"Risk assessment is a scientific attempt to identify and estimate the true risks and is the resultant of the considerations of its components: hazard, exposure – effect relationship and risk estimation. The phases of exposure assessment can be called screening, confirmation and investigation and related to the level of detail of the data used." (UNEP,1996)

Some areas, where risk assessment could be used

- to make a list of priority substances for the area in concern
- to reduce the use of particularly hazardous chemicals
- to reduce exposure to toxic chemicals through the environment
- to reduce exposure to and minimize risks arising from inadequate disposal of chemicals
- to prevent accidents and to respond effectively to accidents when they occur
- to obtain better information on the current and potential impacts of chemicals on the environment and health
- to optimise monitoring programmes

Case study one

Priority settings of chemical substances related to sediments

Questions

- How does chemical behave in water and sediments?
- How long might the chemicals remain in the environmental medium?
- Which are the main chemicals jeopardizing water bodies?

Gross list of pollutants (more than 850 chemicals)

- substances used, imported or produced in high volumes- more than 1000 tones per year in the country and for pesticides more than 10 tons per year
- substances controlled by national legislation in waters, sediments and soils
- contaminants identified by governmental or international program or research surveys in sediments or surface waters
- hazardous substances/materials and wastes
- poisonous substances

Selection criteria were developed to make initial prioritisation as follows:

Sorption	Priority substances	High priority substances
Log P_{OW}	3.0 - 4.5	> 4.5
K_d ($l.kg^{-1}$)	100 – 1700	> 1700
S_W ($mg.l^{-1}$)		< 1
Degradation		
degrad. half life (days)	7 – 15	> 15
Toxicity		
Acute, aquatic species ($mg.l^{-1}$)		
	1 – 100	< 1

Based on this approach 124 chemicalls were selected

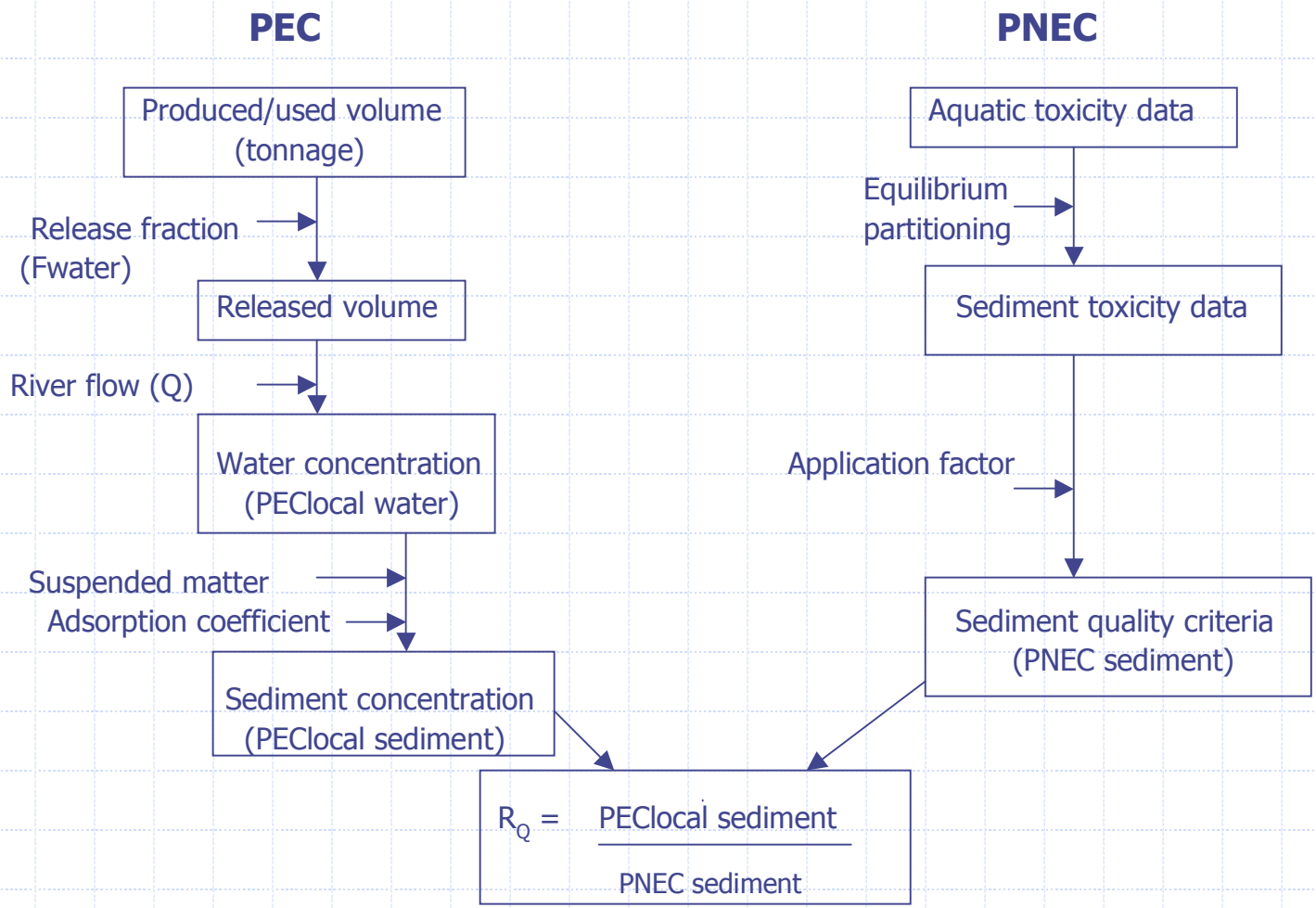
Generic risk assessment

The approach is based on the comparison of the estimated

- Predicted Environmental Concentration (PEC)
- Predicted No-Effect Concentration (PNEC)

thus establishing *Risk Quotient* (R_Q)

Scheme of the Generic Risk Assessment was used as follows:



List of Priority Substances with $R_Q > 1$

CAS	Chemical Name	R_Q
72-43-5	Methoxychlor	343-724
9016-45-9	NPEO	219
61789-80-8	DHTDMAC	54.5
117-81-7	Di(2-Ethylhexyl)phthalate	33
84-74-2	Dibutyl phthalate	25
52315-07-8	Cypermethrin	25
60168-88-9	Fenarimol	20-150
101-72-4	N-Isopropyl-N´-phenyl-p-phenylenediamine	8.8
100-41-4	Ethylbenzene	4.9
51218-45-2	Metolachlor	4.8
95-33-0	N-Cyclohexyl-2-benzothiazolesulfen	5
115-29-7	Endosulfan	4.0-4.5
35367-38-5	Diflubenzuron	3.3
1582-09-8	Trifluralin	2.9-6.0
68085-85-8	Cyhalothrin	2.3
135-88-6	N-Phenyl-2-naphthylamine	1.7
40487-42-1	Pendimethalin	1.6-3.2
51630-58-1	Fenvalerate	1.0
42576-02-3	Bifenox	0.5-30
2312-35-8	Propargite	0.8-3.0
608-73-1	HCH isomers	0.5-1.5
42874-03-3	Oxyfluorfen	0.1-1.4
8008-20-6	Petroleum (Kerosene)	0.016-16
58-89-9	Lindane (Gamma-HCH)	< 3
72-20-8	Endrin	< 1.2

Case study two

Potential accident risk spots

Questions

- What is a list of potential accidental hot spots?
- What are the chemicals of main concern regarding accidental release?

ICPE approach

Suitable tool for the analysis of industrial sites with accidental pollution risk

This approach is based on a combination of water-endangering potential expressed in terms of *Water Hazard Classes* with the quantity of hazardous substances

A potential risk of an installation was expressed by using so-called *Water Pollution Index,* which is a a combination of WHC and respective quantities of hazardous substances handled and stored in the installation

Results:

- in the territory of Slovak Republic 136 potential accidents risk spots were given on the list
- 57 of them were selected to be on the priority list

- such approach was able only to give an indication of the potential hazard
- actual risks arising from the hazardous sites depend on the safety measures that have been applied in each installation

Conclusions

Based on the results from the case studies, where risk assessment was used following can be concluded:

- risk assessment as a tool can assist in the decision making process in water sector:
  - to set up the list of priority substances
  - to identify the potential accident risk spots in the river basin
  - to set up the priority for safety measures in the potential accident risk spots to avoid accidents by hazardous substances in the water courses

- risk assessment can play an active role in the water quality monitoring program development via media and chemical substances selections to be analysed
- it is hoped that risk assessment will be fully incorporated into the integrated chemicals management.