Estimation of risk factor bounded up with water ecosystem pollution

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Risk

- Risk –possibility of hazard realization, or expected value of damage due to, for example, pollution of water.
- Risk can NOT be measurement by technical methods
- in a qualitative sense risk is characterized by adverse consequences nature
- in a quantitatively sense risk is characterized by probability of their beginnings

Risk - quantitatively

in a quantitatively sense risk can be shown:

- P, Pi probability of adverse consequences Z, Zi, that can be put into money (sum damage) or publik permissible risk without money dimension.
- As a publik permissible risk can be used MPL (maximum permissible load) of different toxic substances



Risk factor – has dimension and can be show by:

sk=Exposition * Toxic

- Exposition volume of contaminant for one biological target
- Risk management decision about contaminant using or putting a veto upon it, limitation its production, preparation of special corresponding documentation

Risk factor

- Pw characteristic of hydrolyze
 volume (speed) (Pw=1 for quick type
 an Pw=2 for slow)
- BA bioaccumulation factor, corresponds to contaminant bioconcentration Bcf in a hydrobiont
- Cf contaminant concentration in hydrobiont
- Cw contaminant concentration in water

- R risk factor
- E exposition factor, from 04 to 25Cw
- EFw factor of effectiveness impact of contaminant
- Ew factor of water exposition
 - U method of chemical using (U=5 for "close" - indoors and U=1 for "open")
 - BA=2 for Bcf<100;</p>
 - BA=4 for 100<Bcf<1000;</p>
 - BA=8 for 1000<Bcf<10000;
 - BA=16 for Bcf>10000.

Toxic

- Toxic potential risk of contaminant, its possibility to damage.
- for toxic estimation there are some standard tests, for lethal (fatal) dose of 50% fish destruction.
- In Europe there are 9 tests and three of them for water:
 - LC50 during 96 hours for fish;
 - LC50 during 48 hours for water flea;
 - EC50 inhibition of algea growth
 - LC50 depend on water conductivity and species diversity
- Sum of tests results EFw.
 - $R \rightarrow Sy$, maxR=1, minR=0 (Isidorov, 1997).

LC50 for:

- Cu 0,02-1,0;
- Zn 0,5-5,0;
- Pb 0,5-10,0;
- Cd 0,5-105,0;
- Cr 3,5-118,0;
- Ni 5.0-100,0;
- Fe 1,4-133,0 mg/l
- Conclution about risk by risk factor volume:
 - Sy≥0,55 high risk
 - 0,3≤Sy <0,55 potencial
 - Sy<0,3 –without risk

Your work

- Calculate risk correspond to contaminant "X" in water availability
- Calculate risk correspond to contaminant "Y" in water availability
- Normalized a risk factor (R) by the equation if risk increases account of "X" increasing
- Calculate risk factor for natural water object (LC50 for fish – as was above noticed)



Data. What are the "X" and "Y" contaminant?

Cw concentration
Cw min concentration
Cw max concentration
U method
Pw hydrolize speed
Cf
Bcf=Cf/Cw
LC50 for fish
LC50 for flea
EC50 of algea inhibition

	contaminant
30	mkg/l
0,1	mkg/l
100	mkg/l
	open
	slow
	Cf=Cw*20 times
20	in 20 times
4	mg/l
50	mkg/l
20	mkg/l

"Y" contaminant

50 mkg/l
 10 mkg/l
 100 mkg/l
 100 open
 very slow
 Cf=Cw*100 times
 100 in 100 times
 2 mg/l
 40 mkg/l
 20 mkg/l