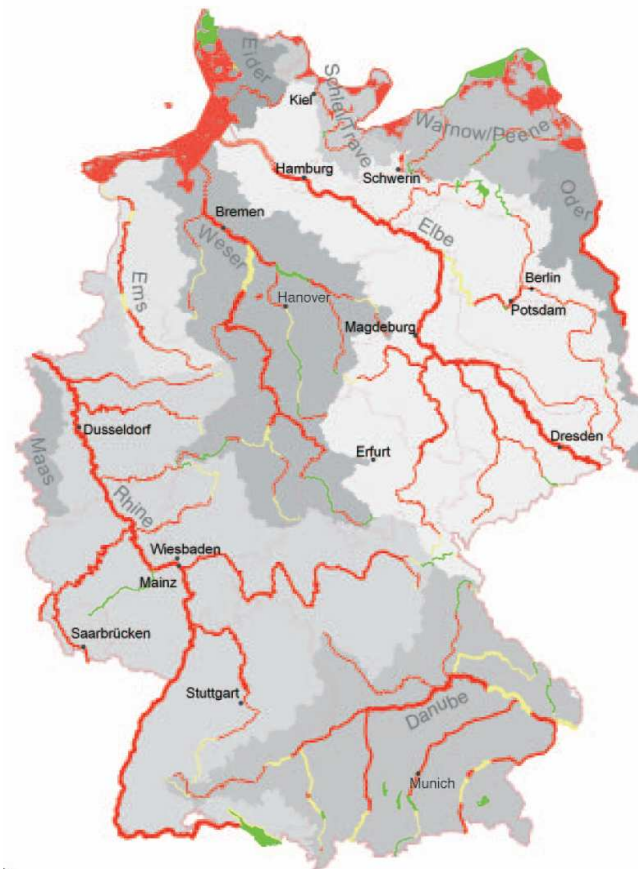
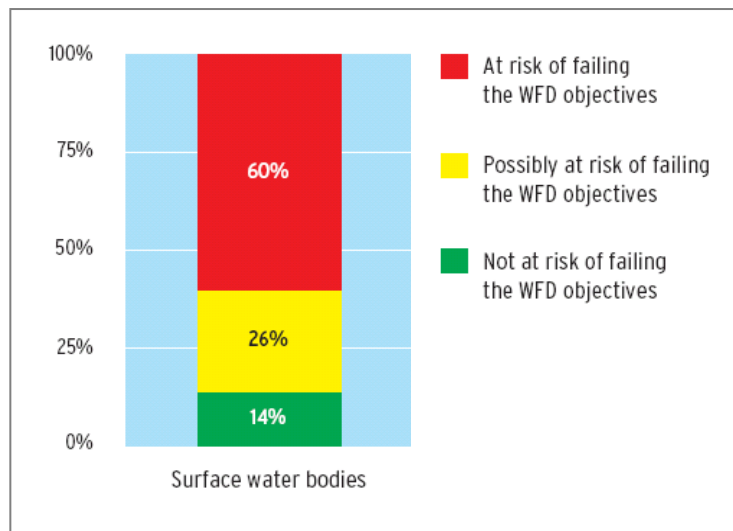




German methodology and results of the integrated risk assessment

Sandra Richter





In general

Starting point in Germany:

- Guidelines on the Community (CIS): „Guideline for the Analysis of Pressures and Impacts“
- Guidelines on Member state level by the LAWA (German Working Group of the Federal States on water issues)



Assessment of water bodies according to the following categories

- Water bodies that are likely to achieve good status (**not at risk** of failing to achieve the WFD objectives)

- Water bodies that may fail to achieve good status (**possibly at risk** of failing to achieve the WFD objectives).

- Water bodies that are unlikely to achieve good status (**at risk** of failing to achieve the WFD objectives).



Integrated risk assessment

1. Compilation of relevant information for every water body
 - If available: biological data and data on specific pollutants
 - Lack of biological data, assessment methods not established
 - Use of criteria basing on existing information and measurements: supporting elements as water body morphology, river continuity, physico-chemical conditions
2. Parameter specific risk-assessment
3. Integrated risk-assessment on water body level



German parameters to assess the likelihood of achieving the objectives – different according to water category

Risk-assessment of rivers:

- Saprobic index (pressure on oxygen balance)
- Water body morphology

• River continuity

← Class II-III III

- General physico-chemical conditions
- Specific pollutants

Risk-assessment of lakes:

- Trophic status
- River bank morphology
- Specific pollutants

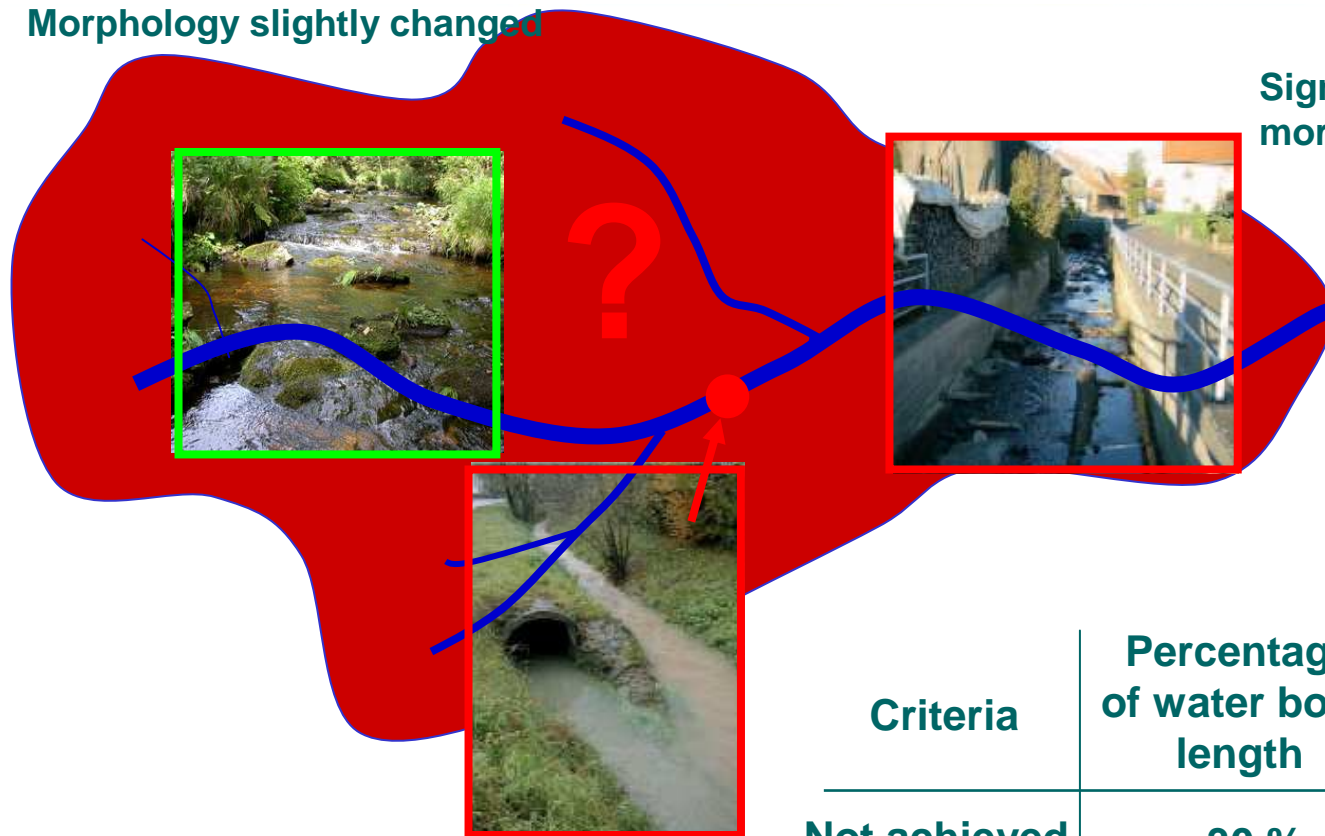
All categories of water: Pollutants to assess chemical status



Aggregation of results: Saprobic index and River morphology

Morphology slightly changed

Significantly changed morphology

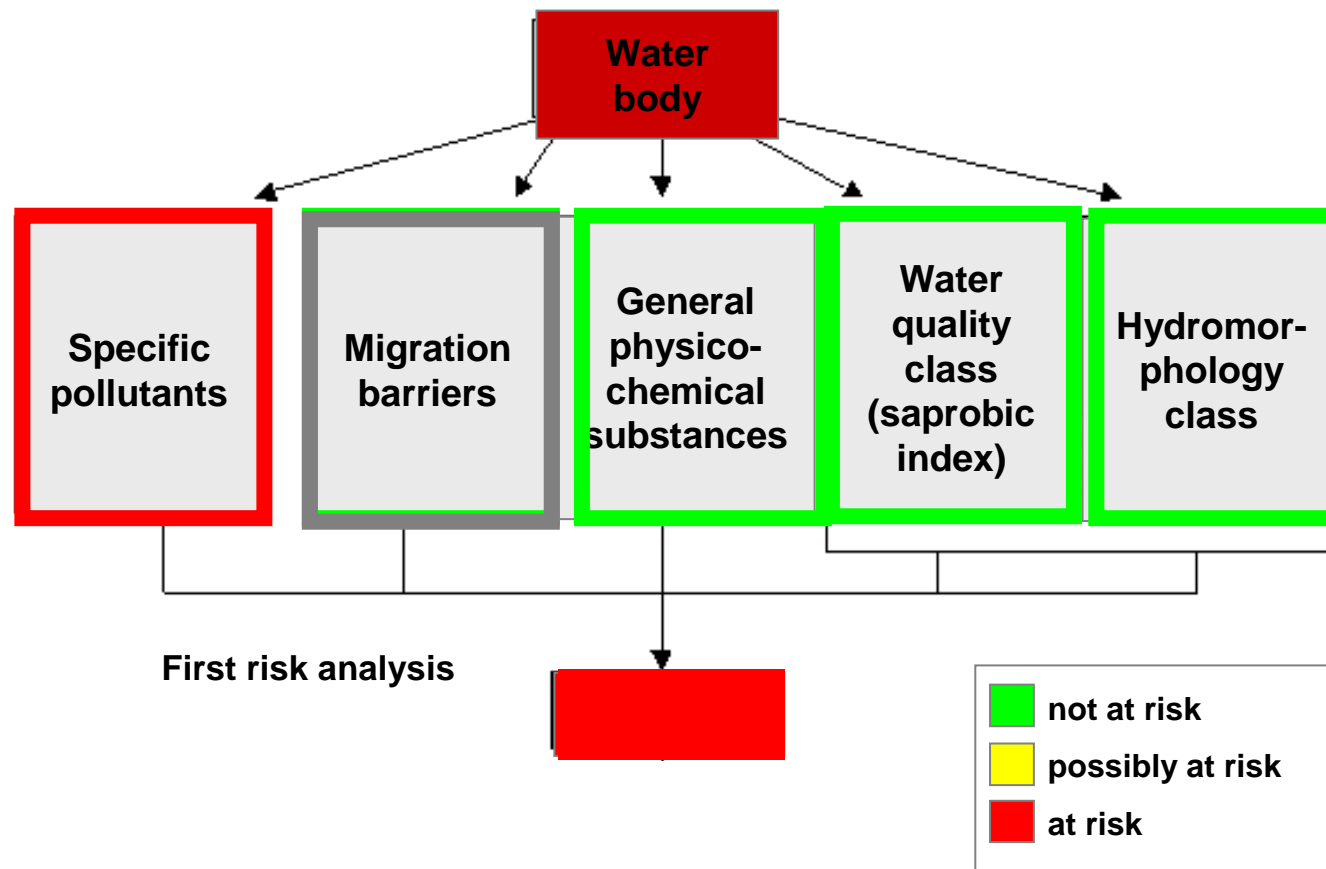


Saprobic status > class II

Criteria	Percentage of water body length	Likelihood of failing to achieve the objectives
Not achieved	< 30 %	not at risk
Not achieved	30 - 70 %	possibly at risk
Not achieved	> 70 %	at risk



Integrated risk assessment of relevant parameters; „worst-case-scenario“





Example for the result of risk analysis in the German state Hessen

Lfd. Nr	Number of water body	Saprobic index	Morphology	Number of barriers	General physico-chemical conditions	Ergebnis Stufe III	Assessment of ecological status				Assessment of chemical status				Gesamtbeurteilung	
							Ergebnis Ökologischer Zustand - Biologie	Ergebnis Ökologischer Zustand - Chemie	Ergebnis Ökologischer Zustand - Ökologie	Ergebnis Ökologischer Zustand - Gesamt	PSM	Sonstige (Anteil)	Ergebnis	Ergebnis		
1	Neckar	+	0	100	2	+	+	+	+	+	+	+	+	+	+	+
2	Neckar	+	1	33	54	+	?	+	+	+	+	+	+	+	+	+
3	Main	+	0	2	3	+	+	+	+	+	+	+	+	+	+	+
4	Main	+	0	23	4	+	?	+	+	+	+	+	+	+	+	+
5	Main	+	0	10	3	+	+	+	+	+	+	+	+	+	+	+
6	Main	+	0	96		+	+	+	+	+	+	+	+	+	+	+
7	Main	+	0	25	25	+	?	+	+	+	+	+	+	+	+	+
8	Main	+	0	64	64	3	+	+	+	+	+	+	+	+	+	+
9	Main	+	0	100	100	+	+	+	+	+	+	+	+	+	+	+
10	Main	+	0	100	100	5	+	+	+	+	+	+	+	+	+	+
11	Mittelrhein	+	0	42	42	2	+	?	+	+	+	+	+	+	+	+
12	Fulda	+	0	26	26	3	+	+	+	+	+	+	+	+	+	+
13	Fulda	+	0	2	3	+	?	+	+	+	+	+	+	+	+	+
14	Fulda	+	0	3	4	+	?	+	+	+	+	+	+	+	+	+
15	Weser	+	0	19	19	1	+	+	+	+	+	+	+	+	+	+
16	Diemel	+	0	19	19		+	+	+	+	+	+	+	+	+	+
17	Diemel	+	0	67	67	5	+	+	+	+	+	+	+	+	+	+
18	Diemel	+	0	100	100		+	?	+	+	+	+	+	+	+	+
19	Diemel	+	0	100	100		+	+	+	+	+	+	+	+	+	+
20	Diemel	+	0	100	100		+	?	+	+	+	+	+	+	+	+
21	Diemel	+	0	71	71	1	+	+	+	+	+	+	+	+	+	+
22	Diemel	+	0	67	67		+	?	+	+	+	+	+	+	+	+
23	Diemel	+	0	100	100		+	?	+	+	+	+	+	+	+	+
24	Weser	+	0	100	100		+	+	+	+	+	+	+	+	+	+
25	Mittelrhein	+	0	100	100		+	+	+	+	+	+	+	+	+	+
26	Oberrhein	+	0	100	100		+	+	+	+	+	+	+	+	+	+
27	Oberrhein	+	0	100	100		+	+	+	+	+	+	+	+	+	+
28	Neckar	+	1	27	28	50	+	+	+	+	+	+	+	+	+	+
29	Neckar	+	0	?	59	2	+	+	+	+	+	+	+	+	+	+
30	Oberrhein	+	0	100	100		+	?	+	+	+	+	+	+	+	+
31	Oberrhein	?	36	100	100		+	?	+	+	+	+	+	+	+	+
32	Oberrhein	+	21	98	100		+	?	+	+	+	+	+	+	+	+
33	Oberrhein	+	0	?	52	30	+	?	+	+	+	+	+	+	+	+
34	Oberrhein	+	7	?	69	4	+	?	+	+	+	+	+	+	+	+
35	Oberrhein	+	27	100	100	2	+	+	+	+	+	+	+	+	+	+



One out – all out

Lfd_Nr	Bearbeitungsgebiet (BAG)	Gewässer-güte		Gewässer-struktur		Ergebnis Stufe I (Güte + Struktur)	Anzahl der Querbauelemente (gleite, glatte Röhren, hohe Absturze)	N	P	Temp.	O ₂	Cl	NH ₄ -N	pH	Ergebnis Stufe II	Ergebnis Ökologischer Zustand - Biologie	TOC	AOX	SO ₄	Schwermetalle	PSM	Sonstige	Ergebnis Ökologischer Zustand - Chemie	Ergebnis Ökologischer Zustand	Schwermetalle	PSM	Sonstige (Anhang IX, X)	Ergebnis Chemischer Zustand	Gesamtbewertung
		Einstufung WRRL in % > II	Einstufung WRRL in % gefährdeter Abschnitte	Einstufung WRRL in % gefährdeter Abschnitte	Einstufung WRRL in % gefährdeter Abschnitte																								
		1.1.5.2.1.1				1.1.5.2.1.2	1.1.5.2.1.3							1.1.5.2.1.4	1.1.5.2.2					1.1.5.2.3									
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	3	3	3	3	3	3	3	3	3	3
1	Neckar	+	0	-	100	-	100	2	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	-
2	Neckar	+	1	?	33	?	34	54	+	?	+	+	+	+	?	?	+	+	+	+	+	+	+	?	+	+	+	+	?
3	Main	+	0	+	2	+	2	3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Main	+	0	+	23	+	23	4	+	?	+	+	+	+	?	?	+	+	+	+	+	+	+	?	+	+	+	+	?
5	Main	+	0	+	10	+	10	3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	Main	+	0	-	96	-	96		+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+	-
7	Main	+	0	+	25	+	25		+	?	+	+	+	+	?	?	+	+	+	+	+	+	+	?	?	+	+	?	?
8	Main	+	0	?	64	?	64	3	+	+	+	+	+	+	+	?	+	+	+	+	?	?	?	?	+	?	+	?	?

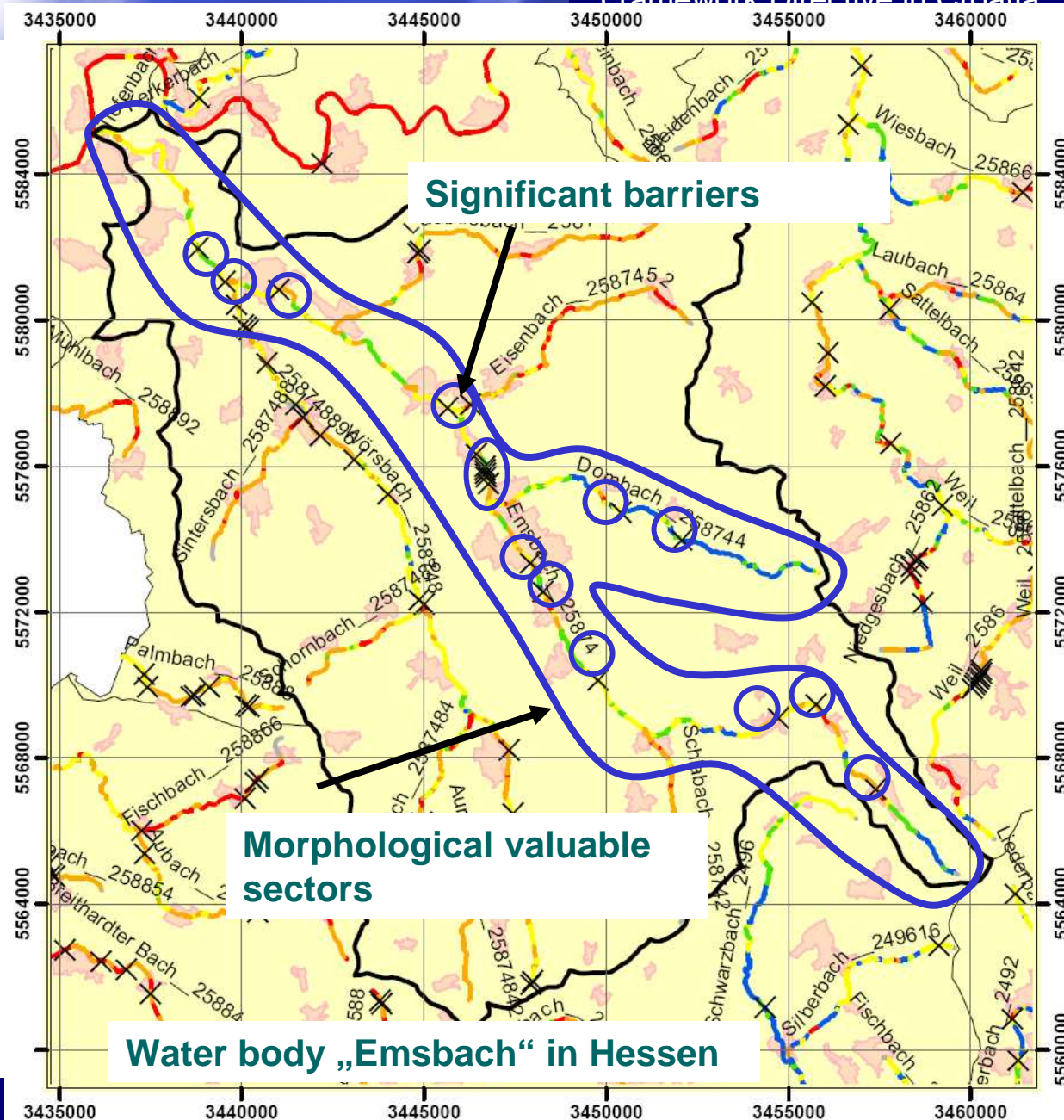
Phosphorous concentration



River continuity in Hessen:

Morphological valuable sectors as well as main migration waters

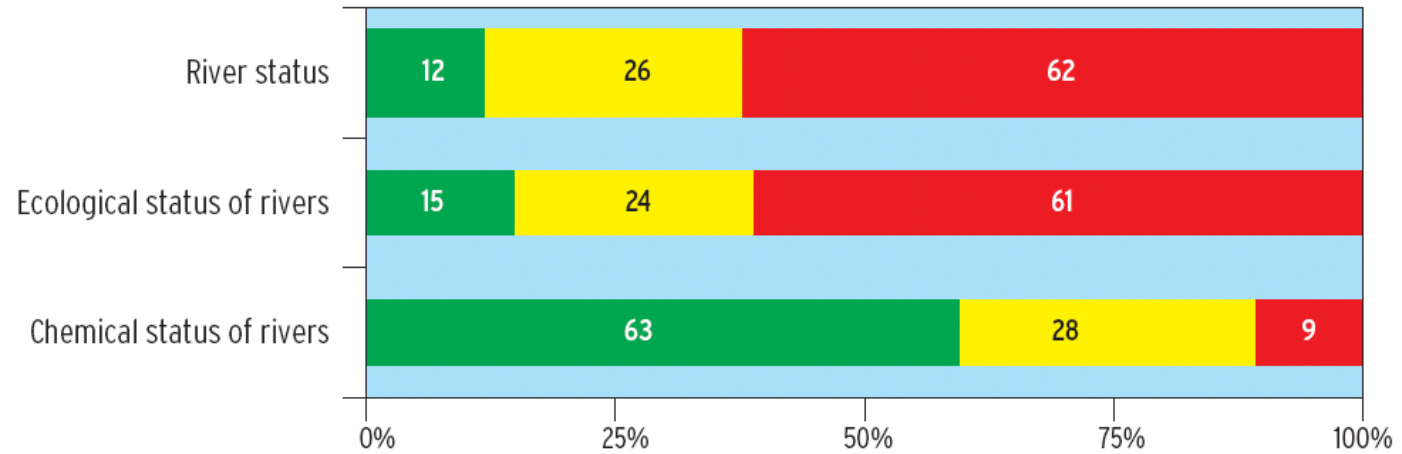
- 2650 physical barriers in Hessen



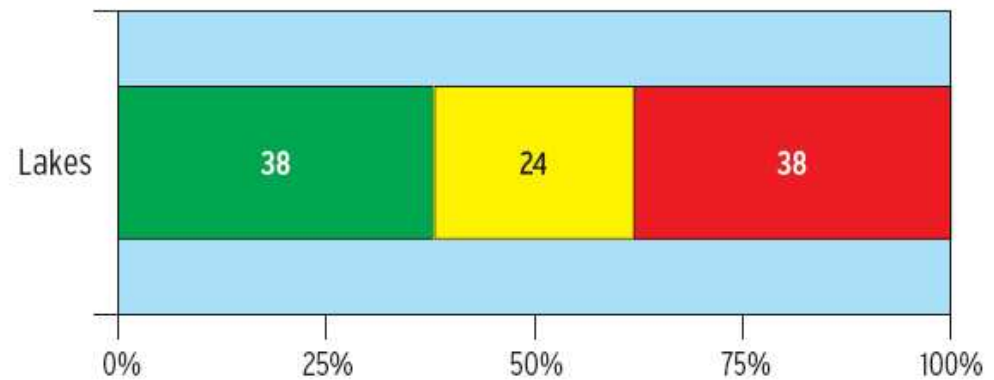


Assessment results for rivers and lakes in Germany

Result for 9.000 river water bodies resp. 130.000 km

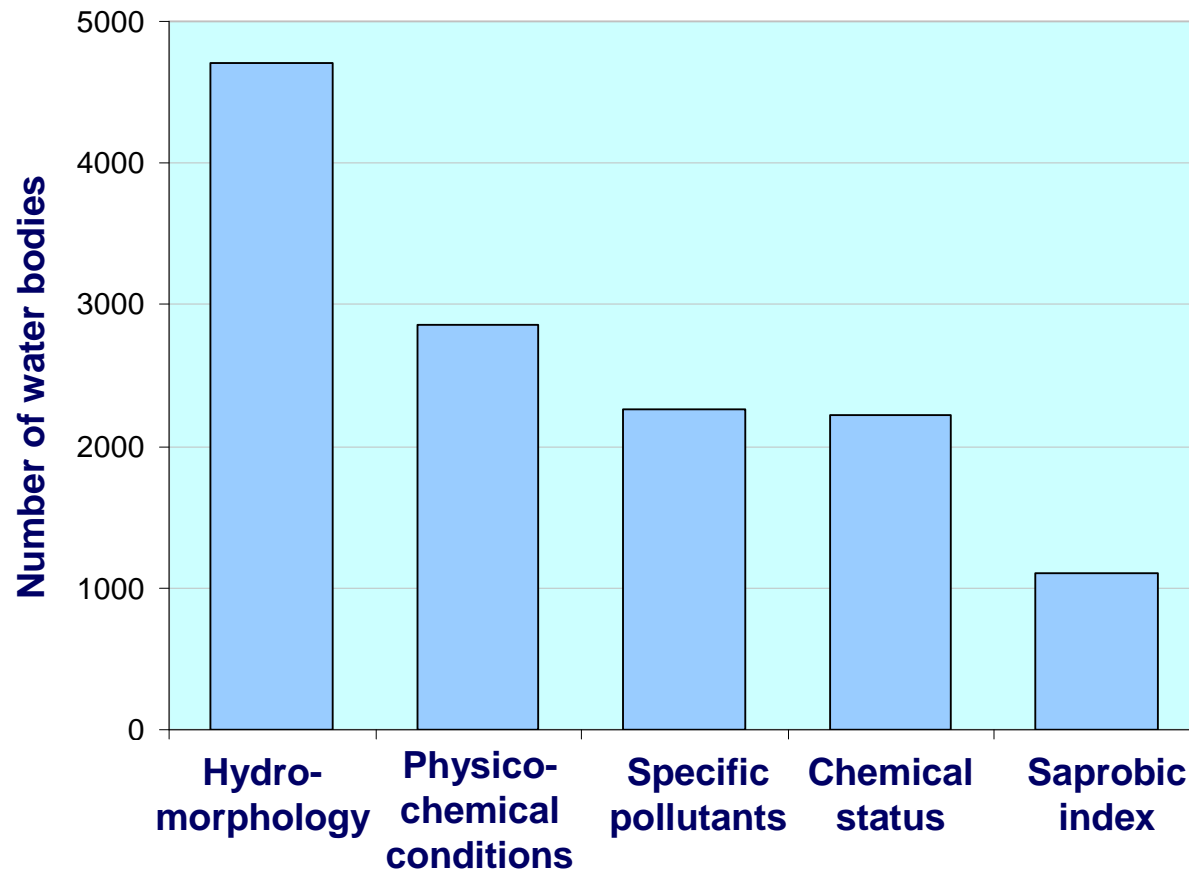


Result for 800 lake water bodies including dams and artificial water bodies





Causes for failing the objectives of German river water bodies





Conclusions of the integrated risk-analysis in Germany

- Besides existing guidelines: in-site and expert knowledge are essential basics for all parts of the inventory taking
- Different data sources and different criteria: generalisation necessary
- Suitable documentation to assure usability
- Results from monitoring in Germany: 30/70-rule suited, eutrophication problem, result of first risk-assessment rather to positive than „real“ ecological status
- No assessment based only on single quality or supporting elements i
- in case of insufficient data: water body „possibly at risk“