Source: julia-weihe-sicwNXxBy1M-unsplash

SEDIMENT MANAGEMENT

IN THE INTERNATIONAL ELBE RIVER BASIN

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Hamburg, 07.10.2021

Hamburg

THE ELBE

AN INTERNATIONAL RIVER

ELBE RIVER SOURCE

Source: ELSA

ELBE FALLS

Source: ELSA

BARRAGE NEAR USTI n.L.

Source: WGE

MEIßEN

Source: WGE

ORE MOUNTAINS

Source: ELSA

TANGERMÜNDE

Source: WGE

HAMBURG

Source: HU

ESTUARY INTO NORTH SEA

Source: ELSA

The Elbe – an international river

The Elbe:

Length: 1,091 km

Area: 148.268 km^2

Mean streamflow: 728 m^3/s (barrage Geesthacht)

Mean discharge: 5,4 l/s* km^2 (gauge: Neu Darchau)

Mean suspended sediment load: 650.000 t/a

(from inland into the tial Elbe)

Population: 25 Mio people (D, CZ)

Industry/ Mining: over centruies

Argiculture: 56% of the catchment

QUANTITY & HYDROMORPHOLOGY

sediment deficit, erosion; tidal upstream transport

QUALITY

ecological status; floodplain agriculture, dredging

Integrated Sediment Management Concept Elbe

1st Elbe management plan (2010-15)

Deficient hydromorphological conditions and contamination are supra-regional issues

Unbalanced sediment conditions and contaminated sediments among main reasons for failure WFD-objectives

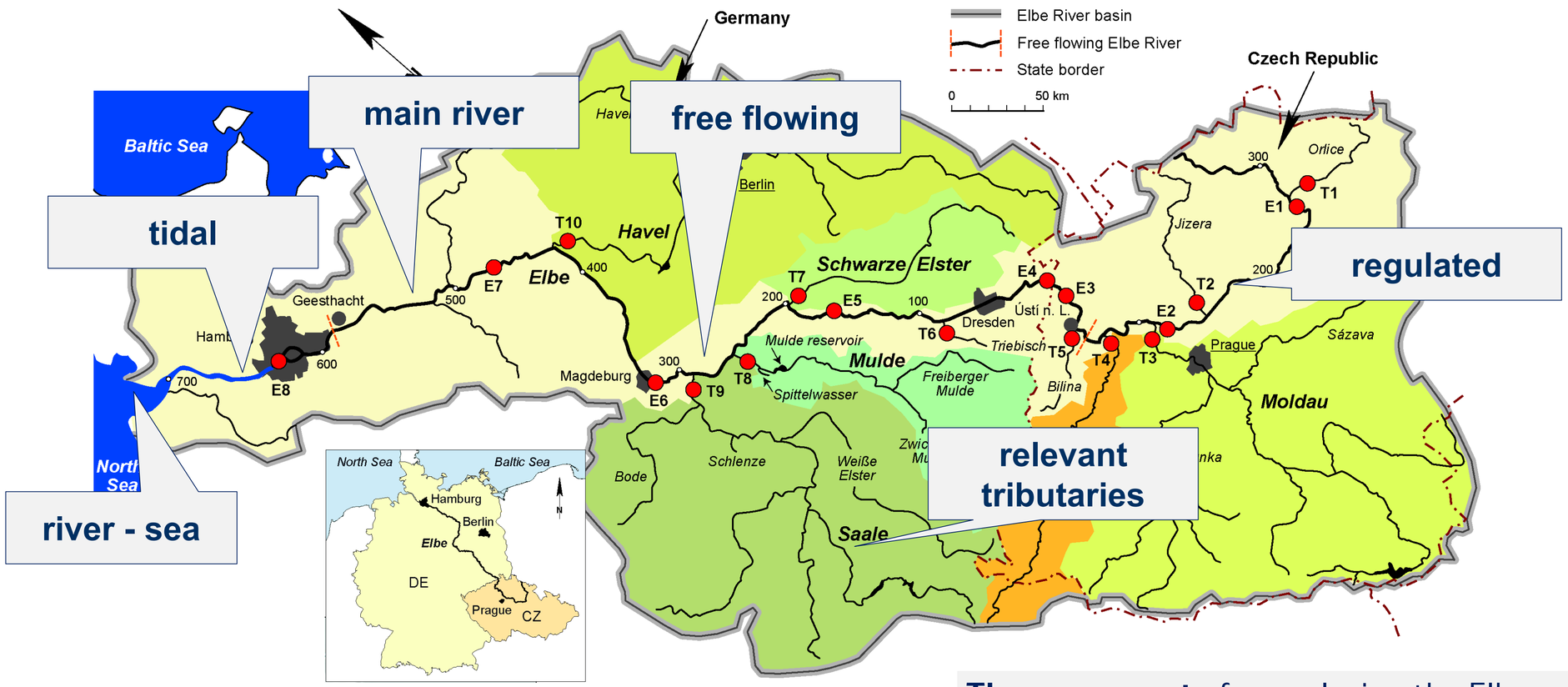
ICPER/ RBC Elbe (2009): Sediment management concept in preparation of the 2nd management cycle (2016-2021)

2014 published:

The Sediment Management Concept of the ICPER - Recommendations for a good sediment management practice in the Elbe

- It is **integral**: it combines spatial, functional (**quantity, hydromorphology, quality**) as well as environmental and use-oriented (navigation) sediment aspects in one concept

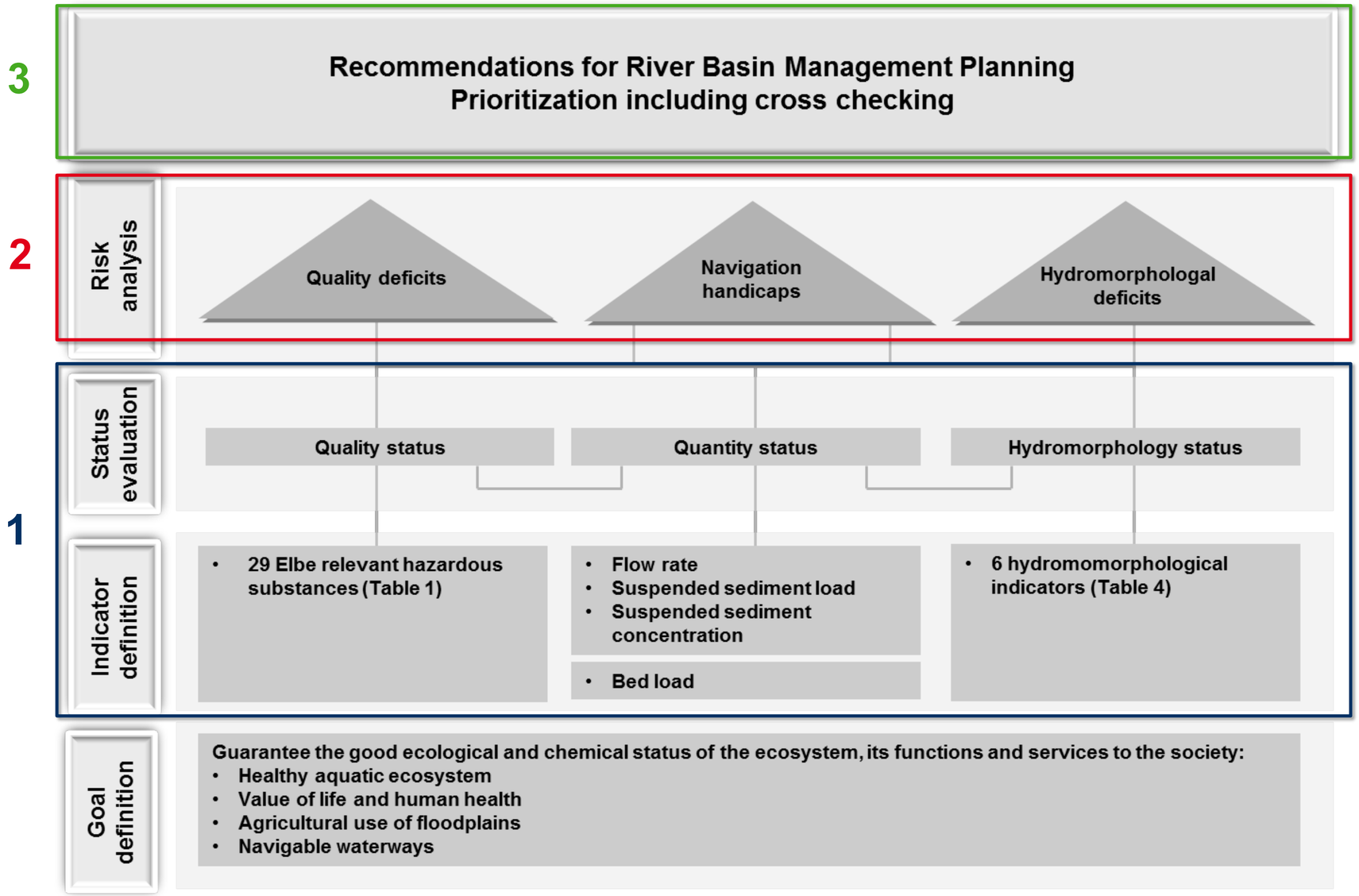
View on the system – the system components



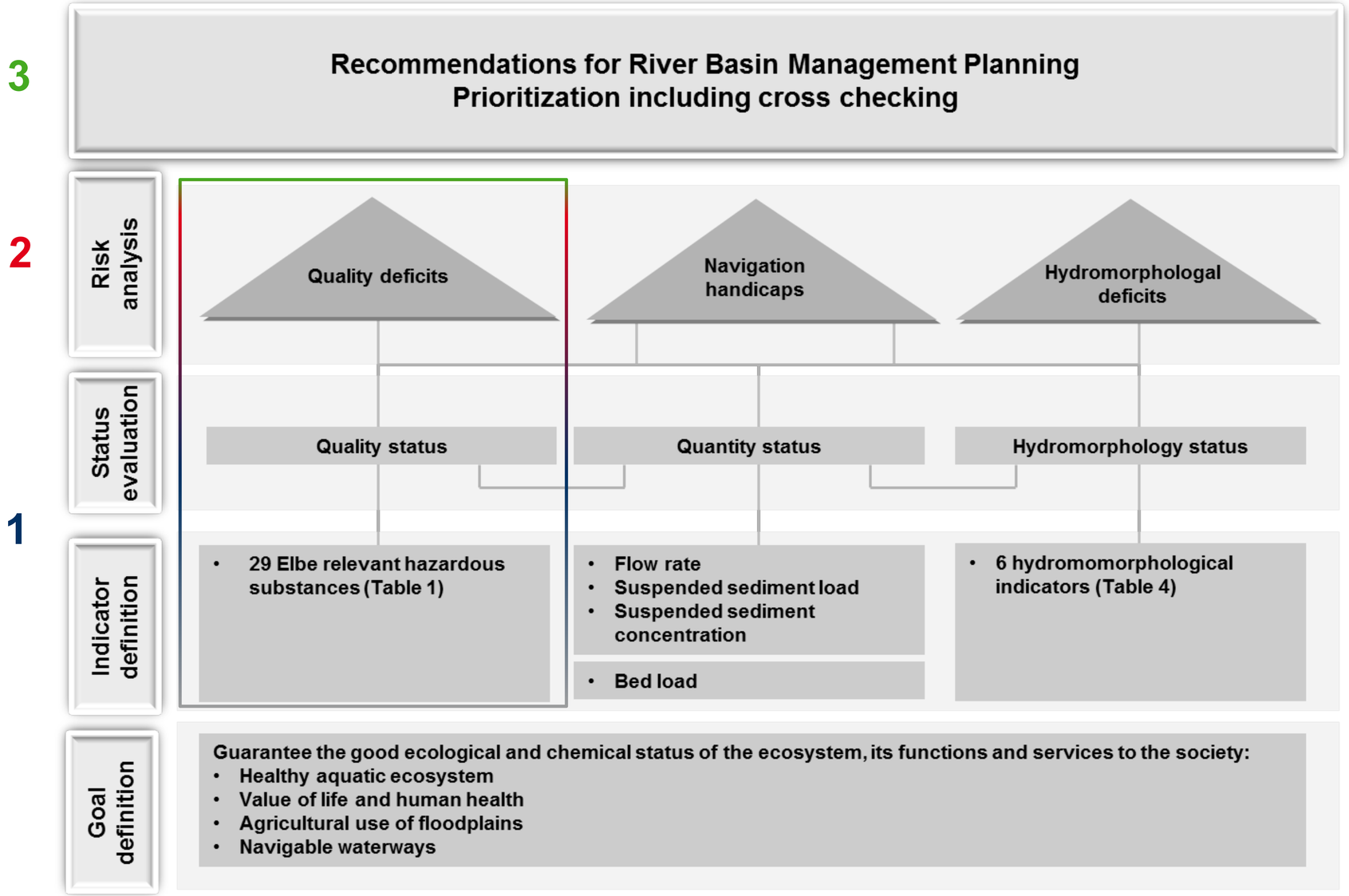
The components for analyzing the Elbe system in terms of sediment management are:

- The impounded inland reach (CZ)
- The free-flowing inland reach (CZ /DE)
- The tidal reach (DE)
- Reference monitoring sites
- Relevant tributaries

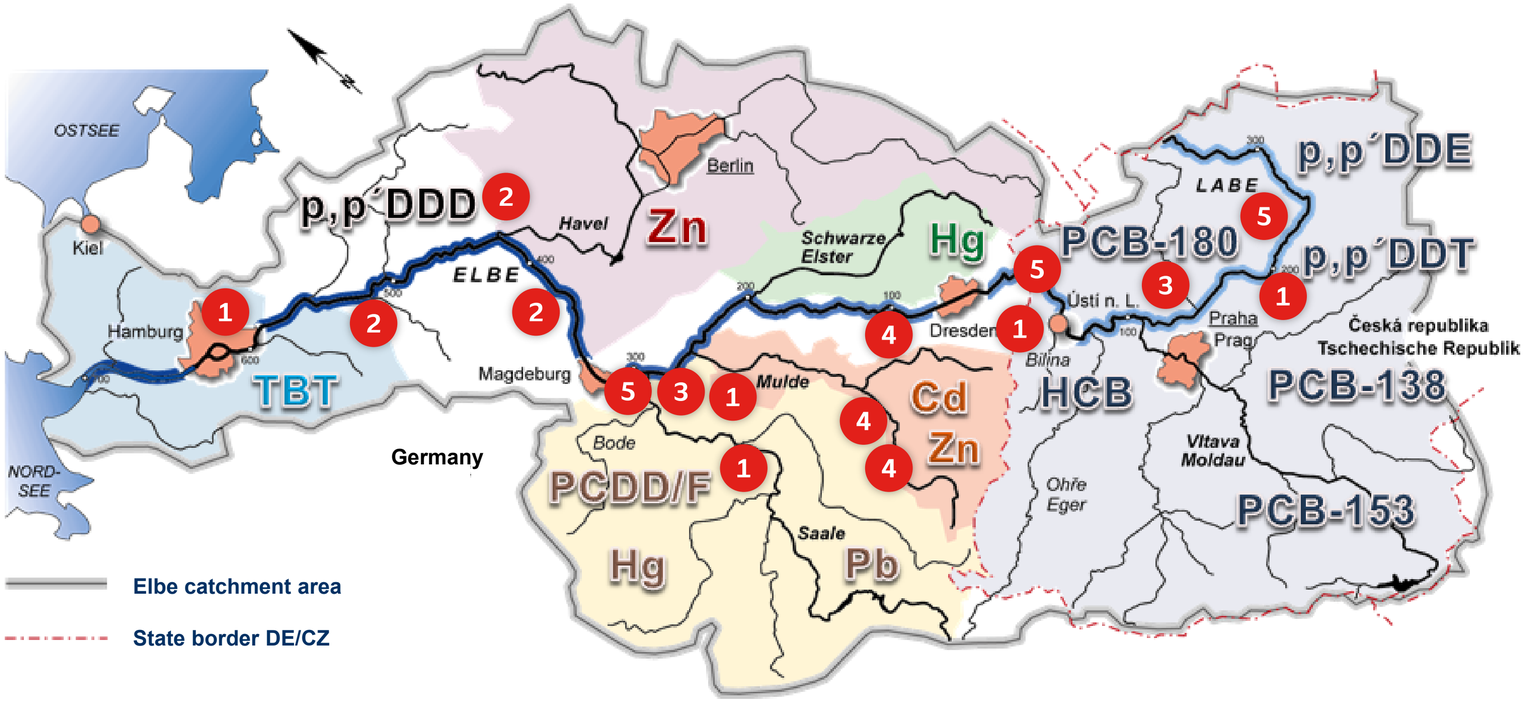
Conceptual set up – Overview



Aspect quality



System view – Main pollution areas



1 Industry

2 Side structures

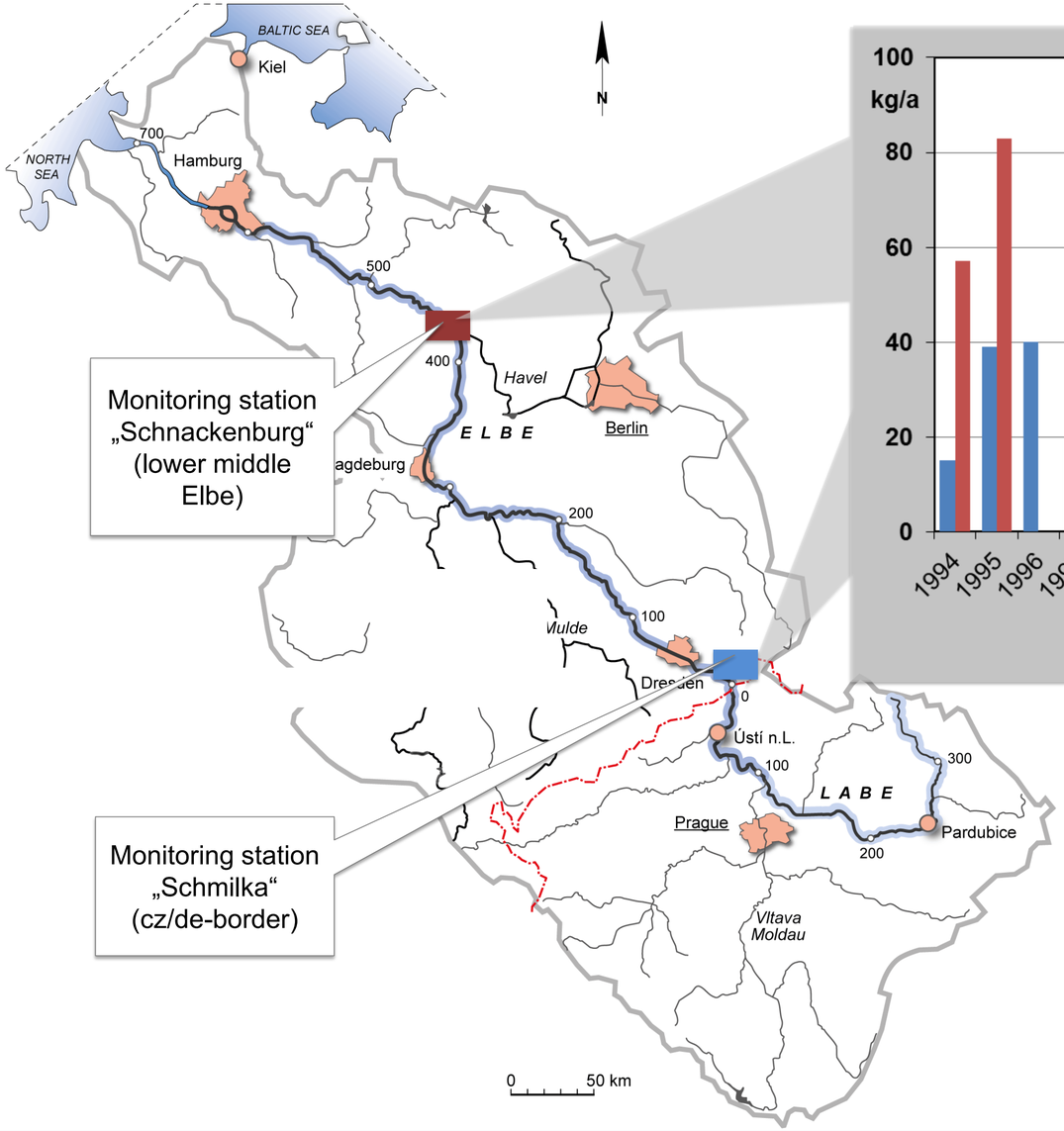
3 Major barrages

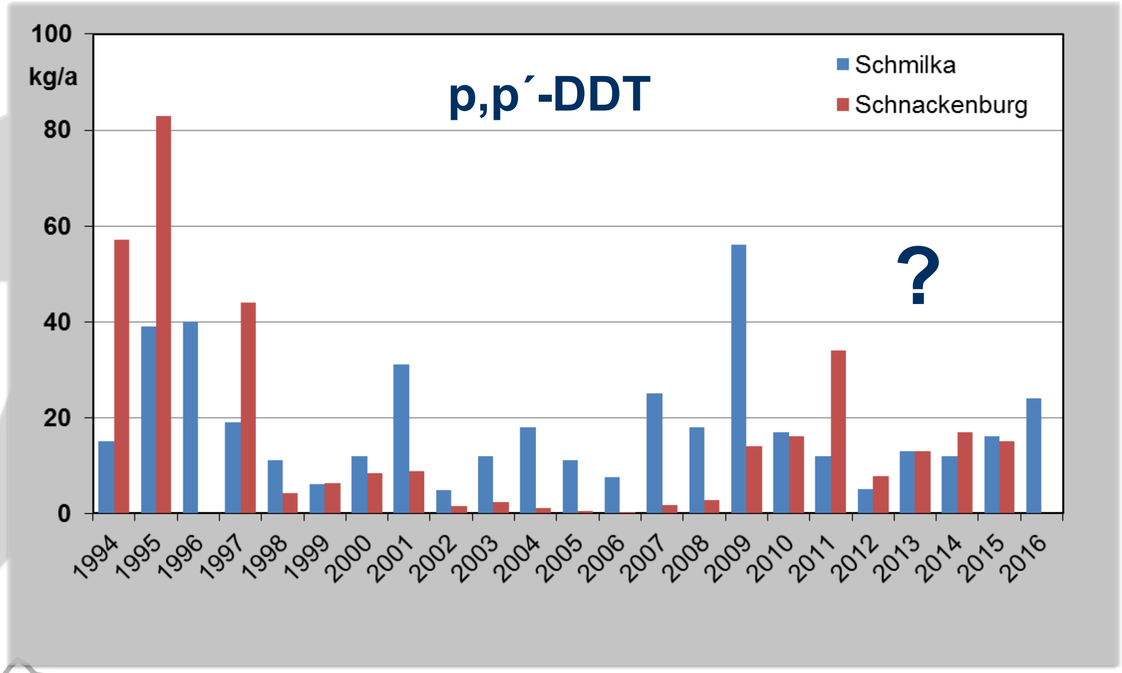
4 Old mining

5 Old sites

Sources: map: RBC Elbe, 1,2,3,5: ELSA, 4: J. Kugler

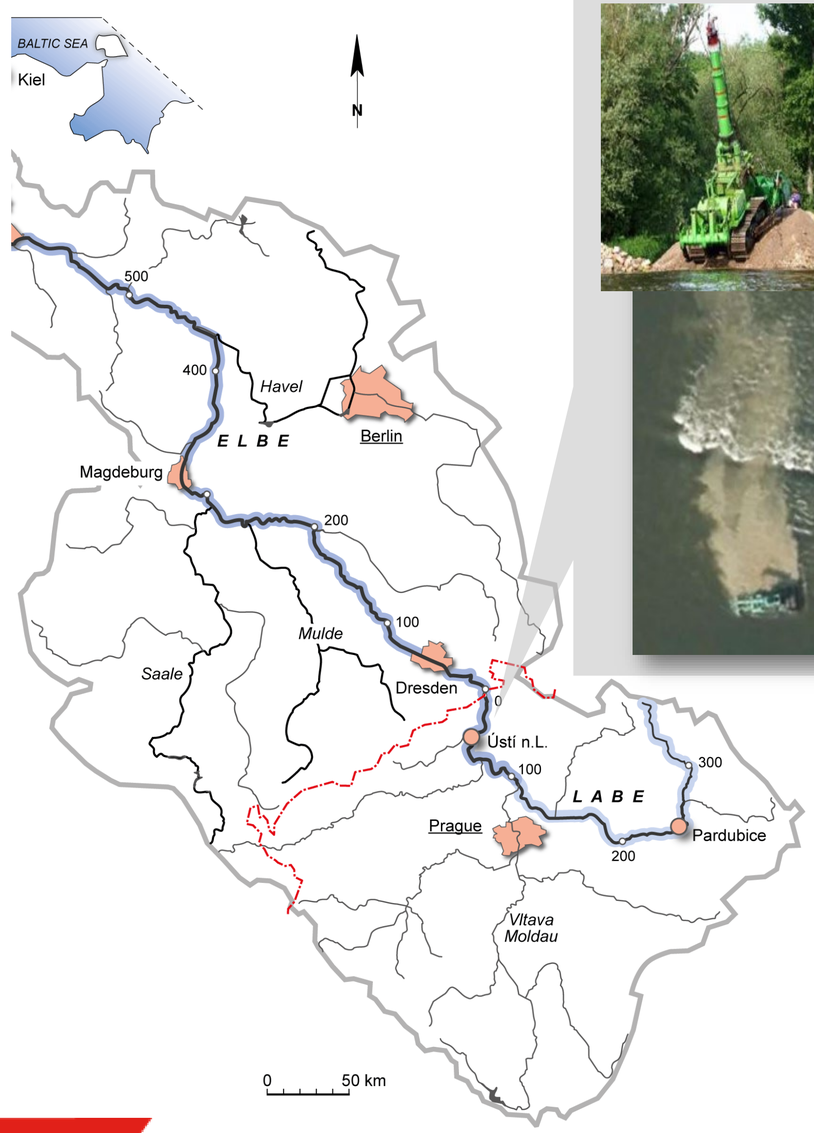
Self-solving problem?





particulate annual load

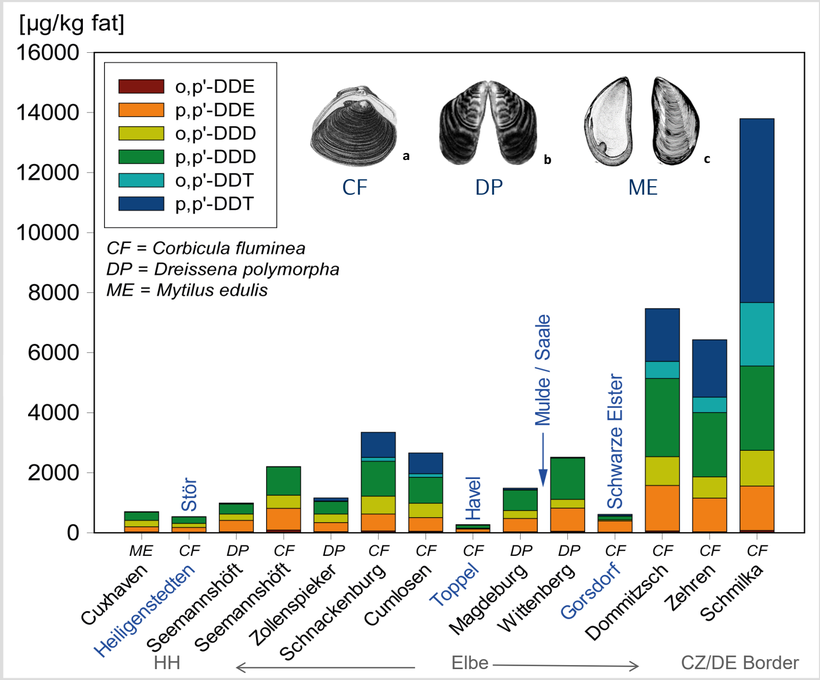
Recent pollution sources and effects



Dredging in the Czech Elbe,
use of the underwater bulldozer “Komatsu”

Development of DDx-concentrations in mussels in the Elbe in 2016

pool samples [n= 8 to 20 individuals]



source: 1: Seznam.cz, 2: Zidek et al. 2012, 3: Federal Institute of Hydrology (BfG) In: Biota status report of RBC Elbe (2017), a: mussel-project b: WGE c: FAO, US

System view – Main pollution areas

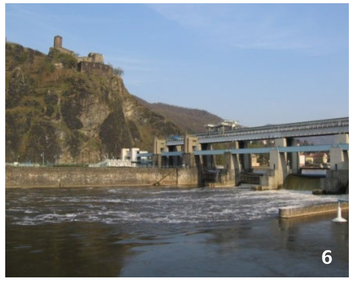
1

2

3

4

5


6

- Reduction/restoration of point sources,
- reduction/restoration of historical contaminations,
- removal of historical sediment deposits sensitive to remobilization,
- management of fine sediments in the river combined with the optimization of maintenance strategies,
- reduction of contaminated fine sediments emitted from urban areas, and
- utilisation and management of contamination sinks.

Sources: 1: Prange, 2-4 & 6: ELSA, 5: LHW

2nd Progress report 2020

Knowledge
23

- Case studies and research
- ELSA Project: case studies and financial support
- Stakeholder involvement

Monitoring
4

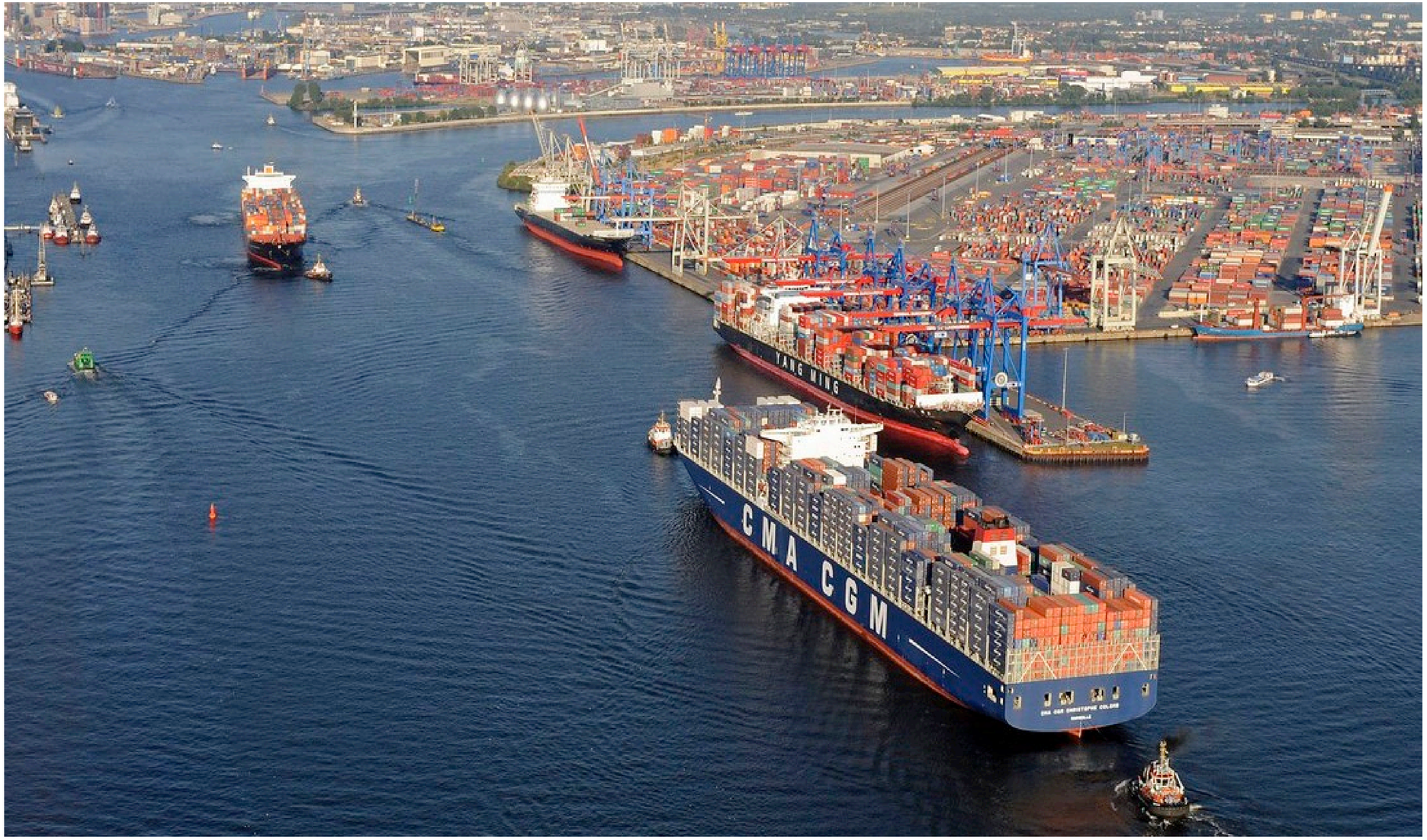
- Extreme event monitoring:
  flood and low water, extreme pollution situations (e.g. accidents)

Practical status
40

- Improvement of sediment continuity or removal of old contaminated sediments

Sources: 1: HAW (Heise); 2: HPA, 3: UFZ (Künzelmann); 4: HU (Blohm); 5: ELSA; 6: Tauw

Economic meets environmental interests



source: HPA

Review of the implementation status – Challenges & needs

- **Challenges:** What does complicate the implementation?

Complexity of the system …	Principle of proportionality in management planning	High, unevenly distributed costs …
Detailed risk analyses and expensive feasibility studies	Lack of clear political commitment … Insufficient consultation and cooperation	Lack of (basin-wide accepted) socio-economic approaches

- **Needs:** What do we need to encourage implementation?
  "Be well informed – Manage adaptively – Take a participatory approach"

System knowledge	Reduce the responsibility ripple	Prioritization & efficient combination of measures
Comprehensive stakeholder involvement in decision-making	WFD and beyond: Political impulse „pro sediment"	Solidarity approach „river basin bugdet"

DISPROPORTIONATE OR UNAVOIDABLE

WHICH COSTS ARE REASONABLE?

Cost-benefit analysis

… for the selection of cost-effective combinations of measures and the determination of cost disproportionality of measures in the context of pollutant/sediment management in the Elbe catchment…

Source: lawrence-hookham-cxvWMAea9h0-unsplash

Monetization of benefits and damages

Processes for monetization:

- Willingness to pay
- Environmental prices
- Accounting of avoidance costs

Source: Icon “balance” made by Freepik from www.flaticon.com

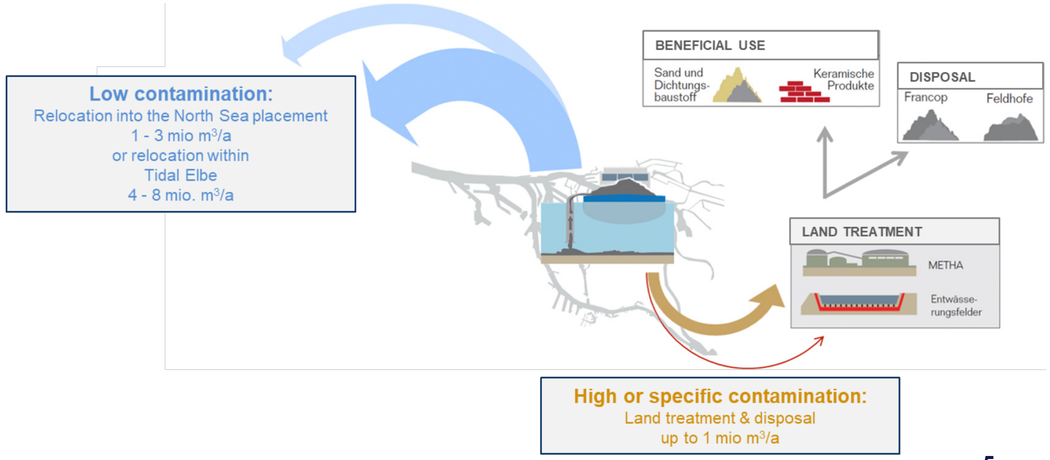
Avoidance

Cost of acting vs. Cost of inaction

Risk minimization of contaminated sites

- Remediation of contaminated sites in the former ore mining area
- Period 2012 to 2035
- 5 to 10 million euros

Dredged material management in the Port of Hamburg



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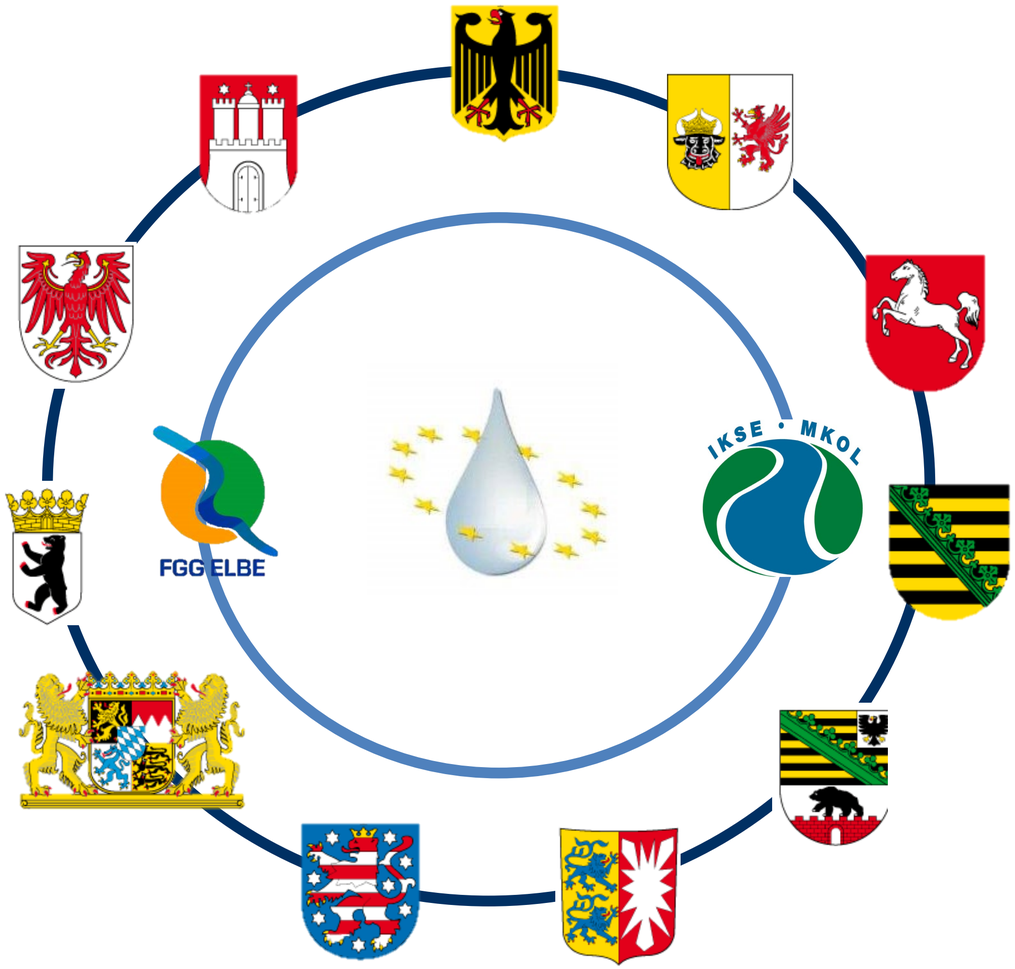
Re-invest?

- Regular river maintenance
  total cost: ~ 75 Mio. € per year!
- Land treatment:
  1/5 of volume, but 3/4 of cost!

Sourcses: sources: 1, 2, 3: ELSA; 4: Kugler; 5: HPA

From thinking to acting



SEDIMENTS. SMALL PARTICLES, BIG ISSUE!

THANK YOU FOR YOUR ATTENTION!

Source: S. Heise

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