DISPROPORTIONATE OR UNAVOIDABLE

WHICH COSTS ARE REASONABLE?

Source: julia-weihe-sicwNXxBy1M-unsplash

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SedNet conference, 29.06.2021

Hamburg

THE ELBE

AN INTERNATIONAL RIVER

ELBE RIVER SOURCE

ELBE FALLS

BARRAGE NEAR USTI n.L.

MEIßEN

TANGERMÜNDE


HAMBURG

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

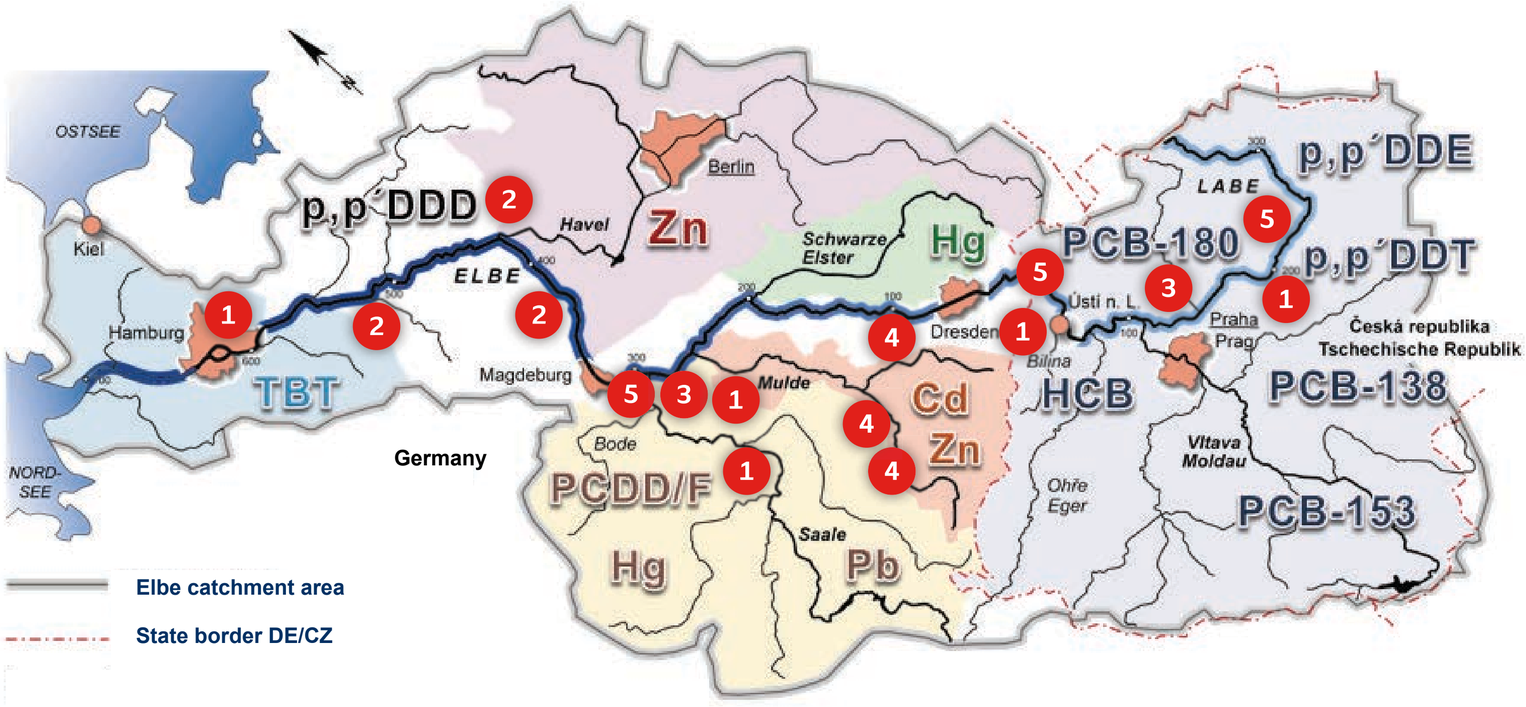
ICPER/ RBC Elbe (2009): Sediment management concept in preparation of the 2nd management cycle (2016-2021)

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

System view – Main pollution areas



1 Industry

2 Side structures

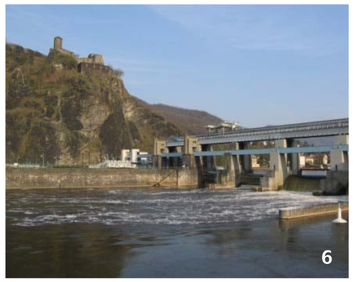
3 Major barrages

4 Old mining

5 Old sites

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

Agreed recommendations – Quality perspective



- 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

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?

Source: ELSA, Icon made by surang from www.flaticon.com

Requirement of the WFD?

Water Framework Directive

Art. 4 (5).
Member States may aim to achieve **less stringent environmental objectives** […] for specific bodies of water when they are so affected by human activity, […] or their natural condition is such **that the achievement** of these **objectives** would be infeasible or **disproportionately expensive**, […]

ANNEX III
Economic Analysis
The economic analysis shall contain enough information in sufficient detail (taking account of the costs associated with collection of the relevant data) in order to: …

Socio-economic approach to find and finance the most cost-effective combination of sediment remediation measures in the international Elbe river basin

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

Possible positive and negative effects

reduction of bioaccumulation of pollutants in the food chain

achieving WFD, MSFD, and Habitats Directive

damming

Source: sara-kurfess-E8AabnQITiQ-unsplash, tim-photoguy—_b5xwxvpIE-unsplash
Icon “thumbs up and down” made by pixel perfect from www.flaticon.com

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

Willingness to pay

Determination of the monetary individual appreciation (= maximum willingness to pay)

$$ZB^{D}_{2019} = ZB^{NL}_{2004} \text{ x } \left(\frac{GDP\ per\ capita\ in\ purchasing\ power\ standards,\quad D\ 2004}{GDP\ per\ capita\ in\ purchasing\ power\ standards,\quad NL\ 2004}\right)^{E}$$

x (1 + % Change in consumer price index D 2004-2019)

x (1 + % change BNE per capita D 2004-2019)^{E}

$$ZB^{D}_{2019} = 69{,}90 \text{ x } \left(\frac{43.541}{48.815}\right)^{0{,}4} \text{ x } \left(1 + \frac{105{,}3 - 84{,}9}{100}\right) x \left(1 + \frac{42.637 - 27.944}{27.944}\right)^{0{,}4}$$

$$ZB^{D}_{2019} = 95{,}20€$$

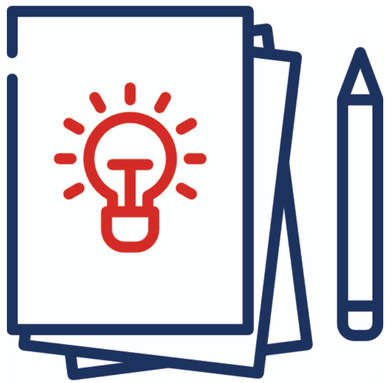
Environmental prices

Environmental Prices Handbook 2017
Methods and numbers for valuation of environmental impacts

CE Delft
Sander de Bruyn et al. 2018

Table 7 Environmental prices for key emissions to the soil (€ 2015 per kg emission)

pollutant	lower	central	upper
Cadmium	€ 24.3	€ 2,039	€ 6,248
Arsenic	€ 21.6	€ 69.3	€ 168
Lead	€ 0.107	€ 14.2	€ 43.6
Mercury	€ 864	€ 1,549	€ 2,959
Nickel	€ 0.0326	€ 0.342	€ 0.965



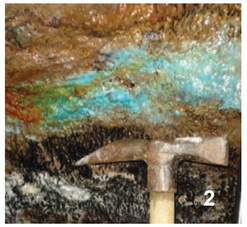
Creating environmental prices for emissions to sediment

Environmental Prices for reduced inorganic pollutant loads approx. 5 million € per year

Avoidance

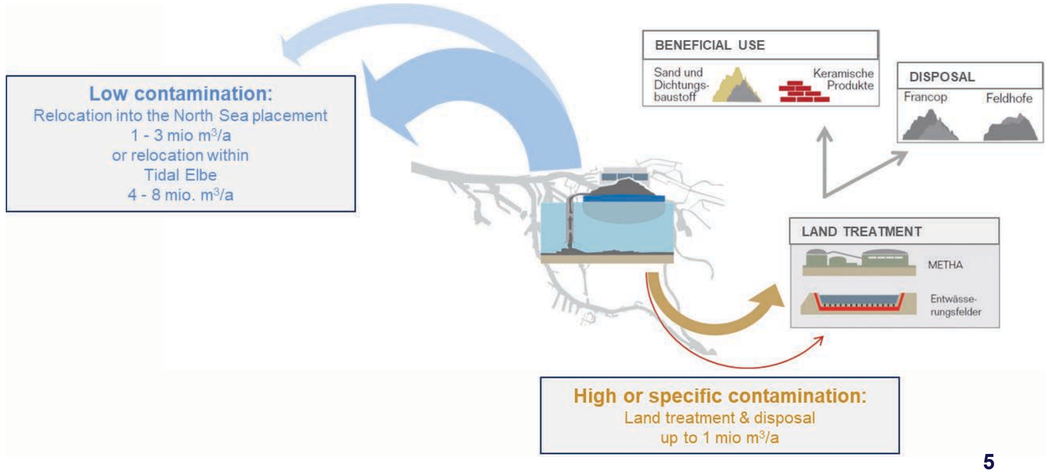
Cost of acting vs. Cost of inaction

Risk minimization of contaminated sites



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

Dredged material management in the Port of Hamburg



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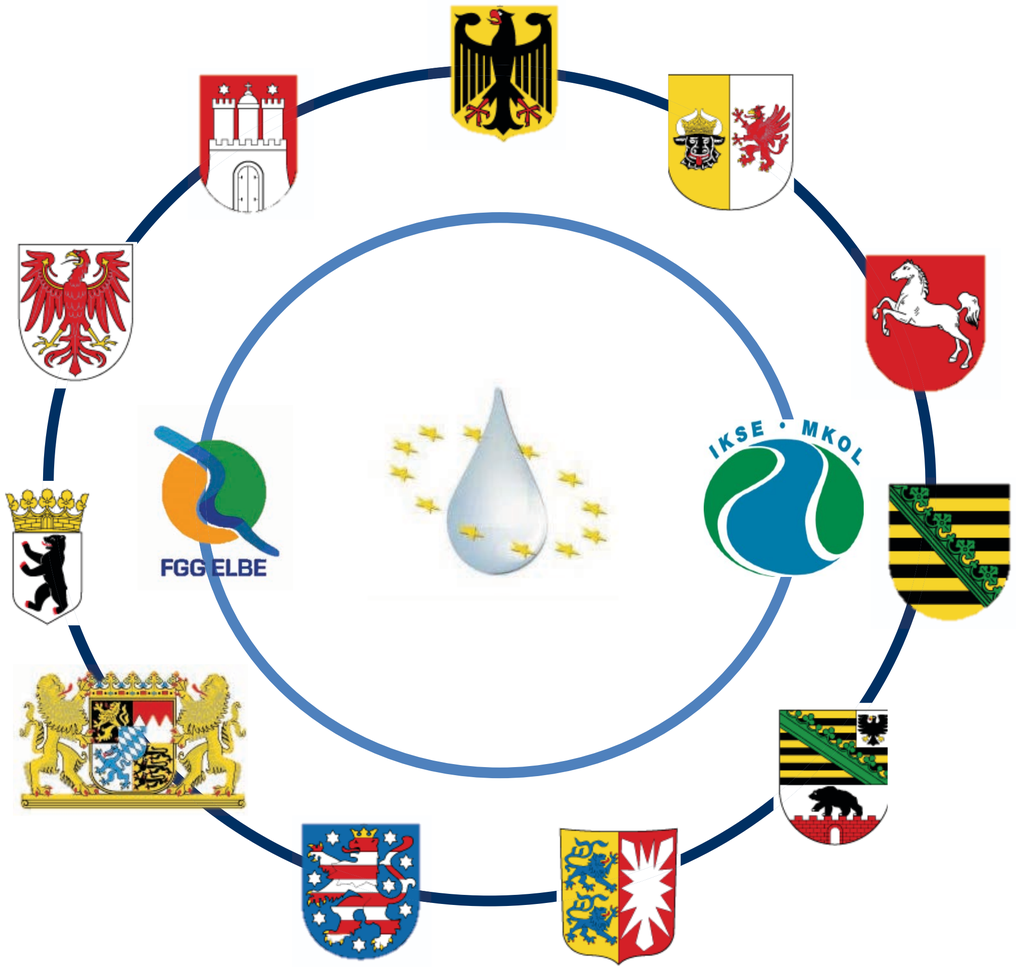
Re-invest?

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

Sources: 1, 2, 3: ELSA; 4: Kugler; 5: HPA

From thinking to acting



THANK YOU FOR YOUR ATTENTION!

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