

RISK ASSESSMENT GUIDANCE ON CONTAMINATED SEDIMENT

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Photo: Henrik Bengtsson, SGI

OBJECTIVE AND TARGET GROUPS

Well-founded and transparent risk assessments to support remediation decisions.

Describes key concepts, assessment approaches, methodology.

Primarily a technical guidance – to support e.g. consultants and responsible parties that perform the assessment but also the reviewing authorities.



Photo: Ann-Sofie Wernersson, SGI

WHAT NEEDS TO BE ASSESSED?

Contaminant dispersal and load in general

Contaminant (dissolved) transport to water

Particle bound transport to sites downstreams

Contaminant uptake in food chain

Recontamination risks

Population effects in benthic organisms

Effects in fish, amphibians

Human health risks (fish, drinking water, swimming etc.)

Secondary poisoning of predators



Illustration: Thereze Ladekrans, SGI

HOLISTIC PERSPECTIVE

Sources and dispersal pathways

Catchment area, land use

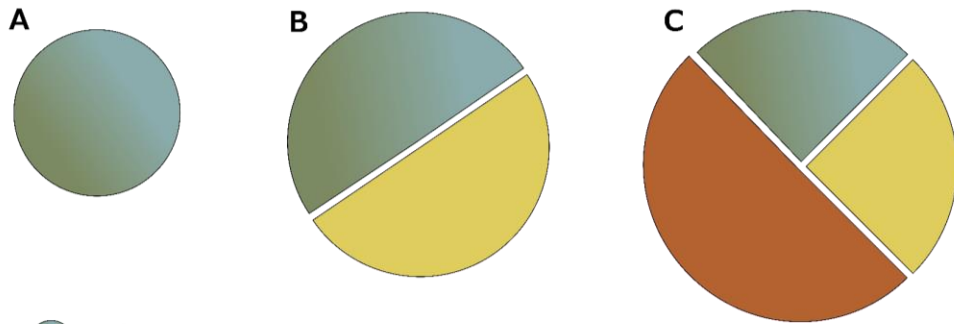
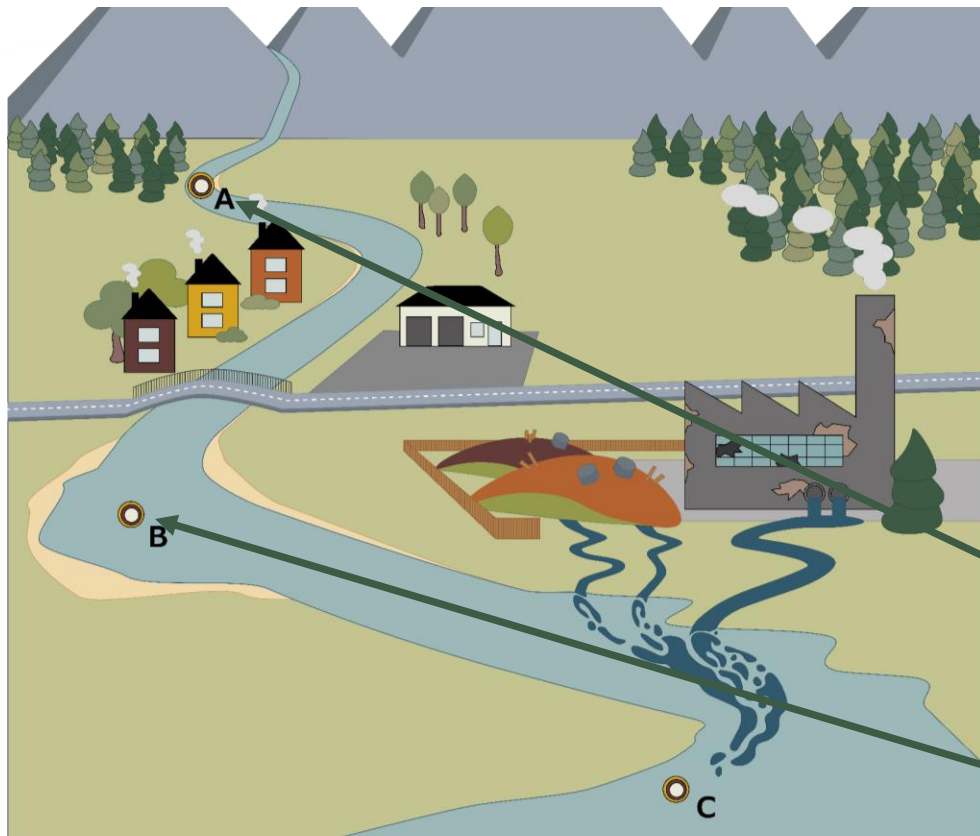
Water recipients

Ecosystems

Impacted area

Area use, water use

Ambient background
concentrations



● Rådande bakgrundshalt

● Verksamheter och aktiviteter uppströms

● Verksamhet som undersöks

Illustration Tereze Ladekrans, SGI

GUIDANCE ON BACKGROUND CONCENTRATIONS (SGI, 2024)

Terminology:

Natural background

Preindustrial background

Ambient background

Upstreams concentration

Methods

Assessment criteria

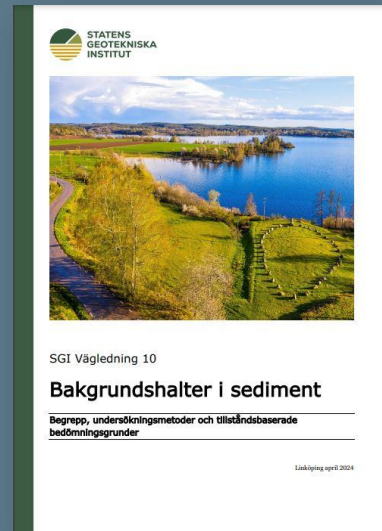




Illustration: Thereze Ladekrans, SGI

MAIN PRINCIPLES

Short- and long-term risks, also related to climate change and land uplift. Identify potential sudden events.

Water use and use of the area, also taking e.g. development plans into account.

Ecosystem services. Highlight risks related to consumption of fish and shellfish or drinking water, also where not currently relevant or planned.

Source? Assessment of amounts transported to other areas, water or biota. Stringent assessments for ubiquitous substances already present above effect levels.

Combined, direct and indirect exposures.

Impact on biodiversity? Potential for recovery (e.g. toxic)? Protected areas, endangered species



Önskat tillstånd i vattenmiljön enligt bestämmelser och miljömål

Underlag för formulering av övergripande åtgärds mål vid
riskbedömning av förorenade sedimentområden

Ann-Sofie Wernersson, Tobias Porsbring, Sofie Hermansson

April 2026

GENERAL REMEDIATION OBJECTIVES - EXAMPLES

- *There is no significant contaminant transport from the contaminated sediment site. The spread of dioxins and PFAS is non-existent or negligible.*
- *The aquatic ecosystem is healthy and resilient.*
- *Fishing can be conducted in the area and fish and seafood is safe to eat.*
- *The water can be used for drinking water production without additional treatment.*

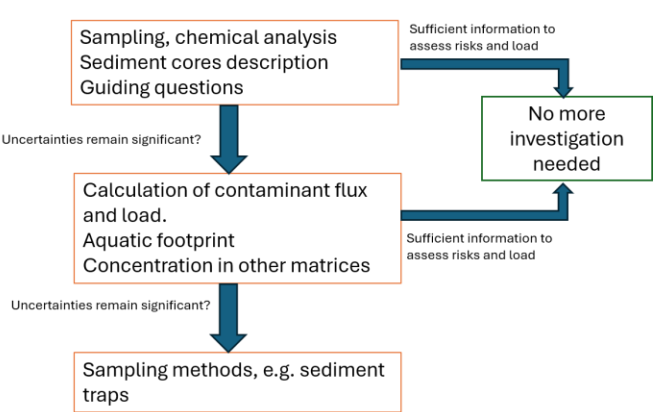
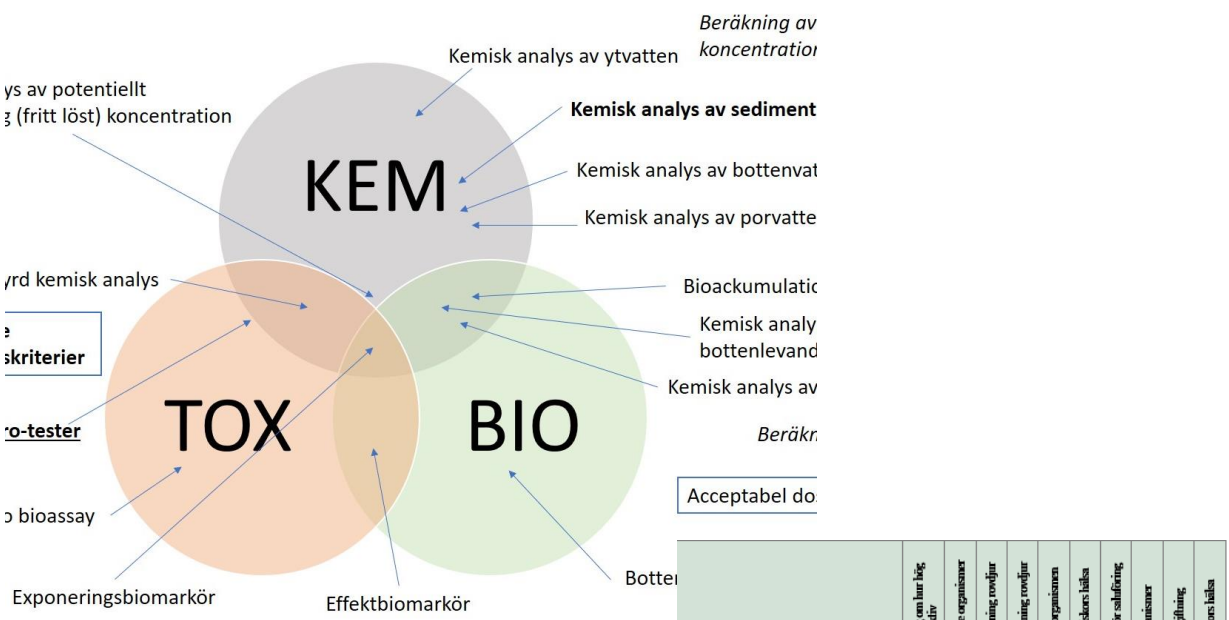
CONTAMINATED SEDIMENT SITES VS. WATER FRAMEWORK DIRECTIVE STATUS ASSESSMENTS

- Sweden has established EQSs also for sediment (HVMFS 2019:25).
- Needs to include an assessment of whether the contaminated sediment site may adversely affect the status of /downstream/ water bodies.
- Common basis: the protection of e.g. aquatic organisms in the short and long term. But contaminated site assessments may need to consider additional substances and deeper sediment layers.



PREDICTING THE FUTURE - DIFFERENT TIME SCALES ARE RELEVANT

- Exploration projects
- Ship traffic, dredging
- Sudden events (including accidents)
- Land uplift
- Climate change
- Drinking water
- Fishing
- Swimming



Bedömningsgrund/Matris och skyddsobjekt	Halt i sediment, gräsgårdar och hur hög halt i naturvårdsskikt	Halt i sediment, sedimentbunden organiska	Halt i sediment, sekundärförgiftning rovdjur	Halt i byttidjur, sekundärförgiftning rovdjur	Halt i vinnad, toadit för egen organismen	Halt i fisk eller skaldjur, människors hälsa	Halt i fisk eller skaldjur, gräs för saluföring	Halt i vatten, pelagiska organismer	Halt i vatten, sekundärförgiftning	Halt i dricksvatten, människors hälsa
SE, Bedömningsgrunder och gränsvärden vid statusklassificering (bilaga 2, 5 och 6 till HVMS 2019:25)		x		x		x		x		
EU, QS-värden (QSeed, QSpelar, QShb biota, QShb drickning water, QSeoc pore) i underlagsdokument till direktivet om prioriterade ämnen (EQS-dossiers).				x		x		x		
SE, Gränsvärden för bedömning av dricksvattenkvalitet (LIVSFS 2022:12)										x
EU, Gränsvärden för saluföring av livsmedel (EU 2023/915)							x			
CN, TEL och PEL-värden (CCME, 1999)		x								
NL, Environmental Risk Limits (ERL) (för sediment) (RIVM, 2015a,b)		x	x							
NO, Gränsvärden för klassificering av vatten, sediment og biota (Miljødirektoratet, 2020)		x						x		
Oregon, Sediment Screening Bioaccumulation Levels (SLV) (DEQ, 2007)			x	x						
CN, Tissue Residue Guidelines (TRG) (CCME, 1998)					x					
USA, Environmental Residue-Effects Database (ERED)					x					
SE, Tillståndsbaserade bedömningsgrunder för sediment (Johansson, 2017; SGI 2024b)	x									

MODIFIED TRIAD APPROACH

Chemical analyses and assessment criteria for different contact matrices

In vitro assays and biomarkers

Bioavailability

Bioaccumulation and secondary poisoning assessment

Human health risks

Dispersal risks



Sekundärförgiftning vid förorenad mark och sediment

En genomgång av andra länders vägledningar för riskbedömning

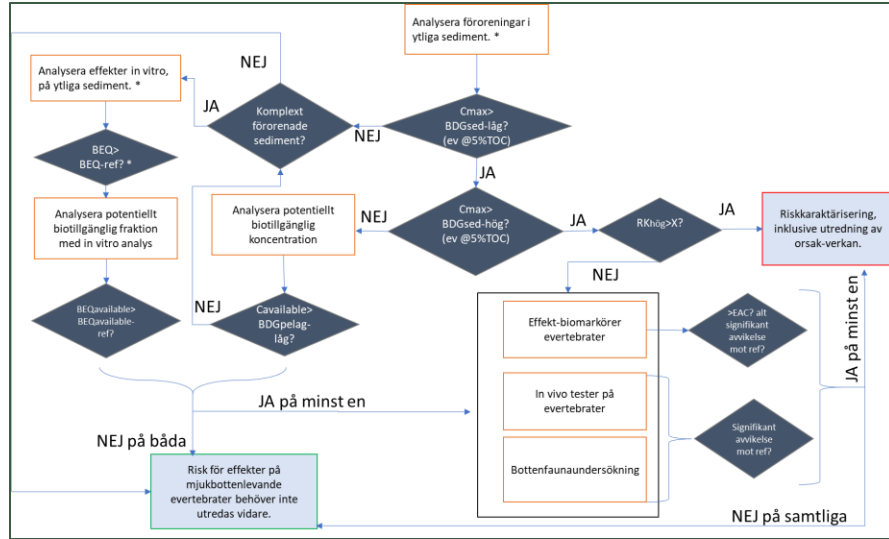
Ann-Sofie Wernersson och Michael Pettersson

Uppdragsgivare: Statens Geotekniska Institut

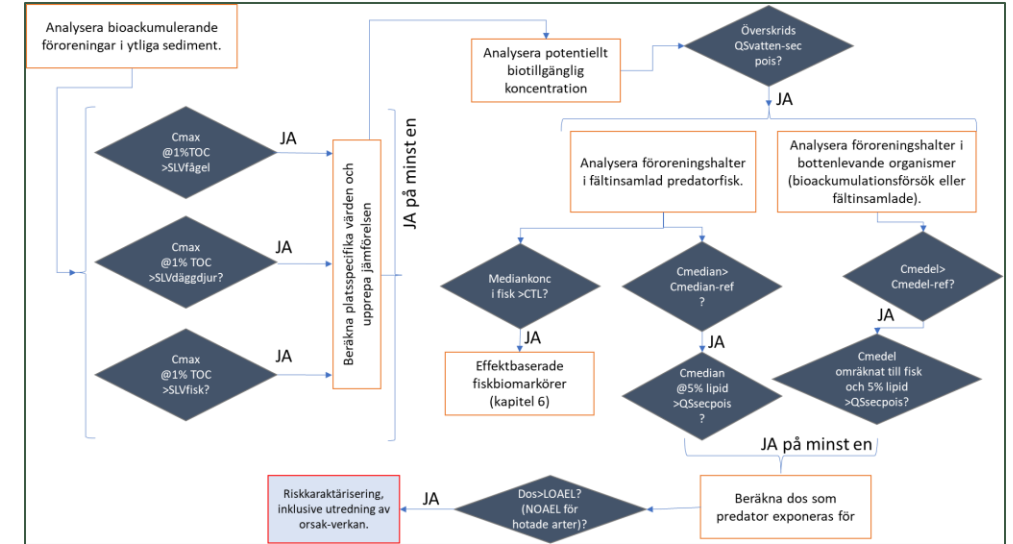
November 2023

STEPWISE, SEPARATE EFFECTS ASSESSMENTS

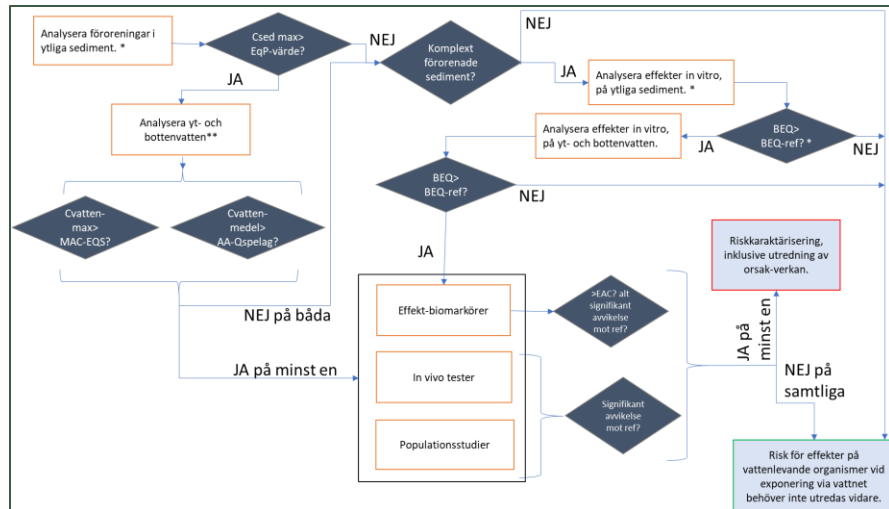
BENTHIC INVERTEBRATES



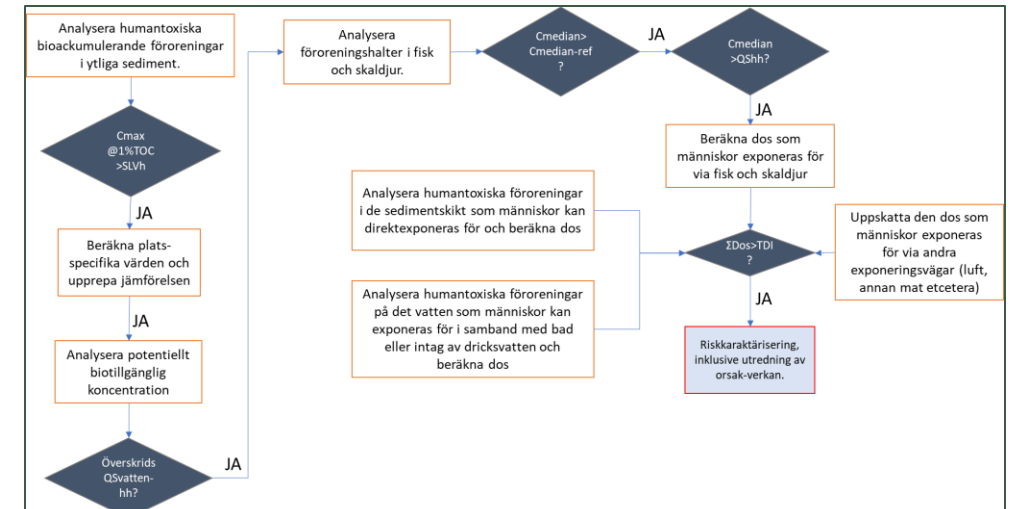
SECONDARY POISONING OF PREDATORS



PELAGIC ORGANISMS



HEALTH RISKS



AMONG THE CONTENTS

GENERAL GUIDANCE

- Main guiding principles for sediment risk assessment
- Risk assessment vs WFD status classification
- General guidance on the assessment of future risks, including suggested time scales
- What should generally be known about the area
- Conceptual models
- General remediation objectives
- Exposure and effects assessment - guiding questions and general flow charts

TECHNICAL GUIDANCE

- Sediment characterisation and vertical distribution
- Identification of critical receptors and exposure pathways
- Sampling methods
- Stepwise approach to assess contaminant transport and load
- Stepwise approach to assess aquatic effects
- Stepwise approach to assess secondary poisoning
- Stepwise approach to assess human health risks

ANNEXES

- Climate change and its impact on contaminated sediment sites
- Ecosystem services provided by benthic communities
- Equations for contaminant flux and load calculations
- Assessment criteria
- In vitro assays
- Biomarkers
- In vivo assays
- Potential bioavailability
- Materials and objects, e.g. fiber sediments

A scenic sunset over a body of water, likely a fjord or harbor. The sun is low on the horizon, casting a warm orange glow across the sky and reflecting on the water. In the foreground, numerous sailboats are moored in a harbor. The background shows distant islands and a calm sea.

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THANKS!

**Also to the SESAM-network, public consultations respondents,
research networks...**

...and to Norway for inspiration!

QUESTIONS?