Imperial College London

SedNet

# *Sediment quality guidelines*

Dr Mark Scrimshaw

# Working Group 2
# Contaminant fate and behaviour

# Work Package 3
# Quality and impact assessment

# What is sediment?

- matrix of materials
- “end of the path” for many materials
- 4 main components
  - interstitial water
  - inorganic (e.g. minerals and shell fragments)
  - organic matter (1 - 5%)
  - anthropogenic materials

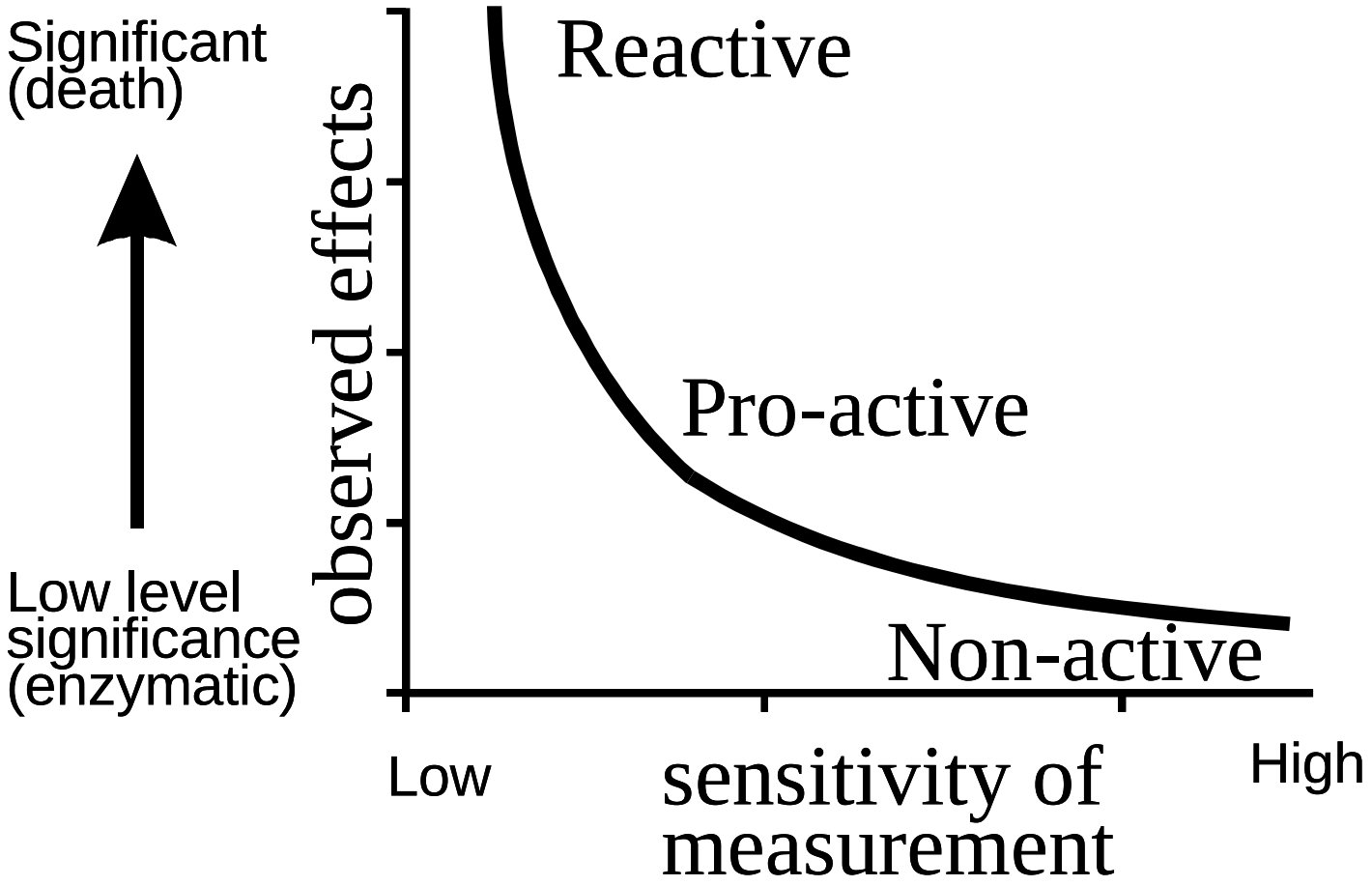
- we understand the sediment and its physical environment
- we understand what contaminants are present
- we understand the sources

**So what ?**

# An Objective-based Framework ?

- It is likely that many sites will have unique characteristics:
  - location, ecology, social and economic factors
- Principle we work to:
  - Safe Levels
  - Precautionary
  - Best Available Technology

# Sediment Quality Assessment



# Sediment Environmental Quality Standards

- WFD talks about sediments in relation to setting EQS
- EQS need to be developed for priority substances (where log$K_{OW}$ > 5 *or* > 3?)
- EQS *may* be set for water sediment or biota
- Basis for setting sediment EQS
  - Not yet developed
  - Complexity of derivation

# Setting values to EQS

- Putting a numerical value to an EQS
  - Suspended or bed sediments ?
- Receptors
  - Is data relevant
- Geographical range
- Degree of protection
  - PNEC or species sensitivity ?
- Uses
  - Is it mandatory or does failure trigger further study ?

# Relevance of sediment EQS

- First tier of a WoE based risk assessment ?
- Probable effect concentration

- Health status a better indicator ?
  - Base decisions on boserved effects

- only for limited, priority compounds

# Measures of Sediment Quality

- Sediment Toxicity (SEDTOX)
- Sediment Chemistry (SEDCHEM)
- Tissue Chemistry (TISCHEM)
- Pathology (PATHOL)
- Community Structure (COMMSTRU)

# (Biological) Indices

- Classification of sites according to ecological quality
  - AMBI proposed in Spain (marine benthos)
  - Belgian Biotic Index; RIVPACS in UK
- Integrative Index of (Sediment) Quality
  - High
  - Good
  - Moderate
  - Poor
  - Bad

# Weight of Evidence Approaches

- Take a holistic view and utilise reductionist data
- Combine a number of measures
  - Sediment chemistry
  - Community structure
  - Toxicity
  - biomagnification
- Whole is greater than the sum of the parts

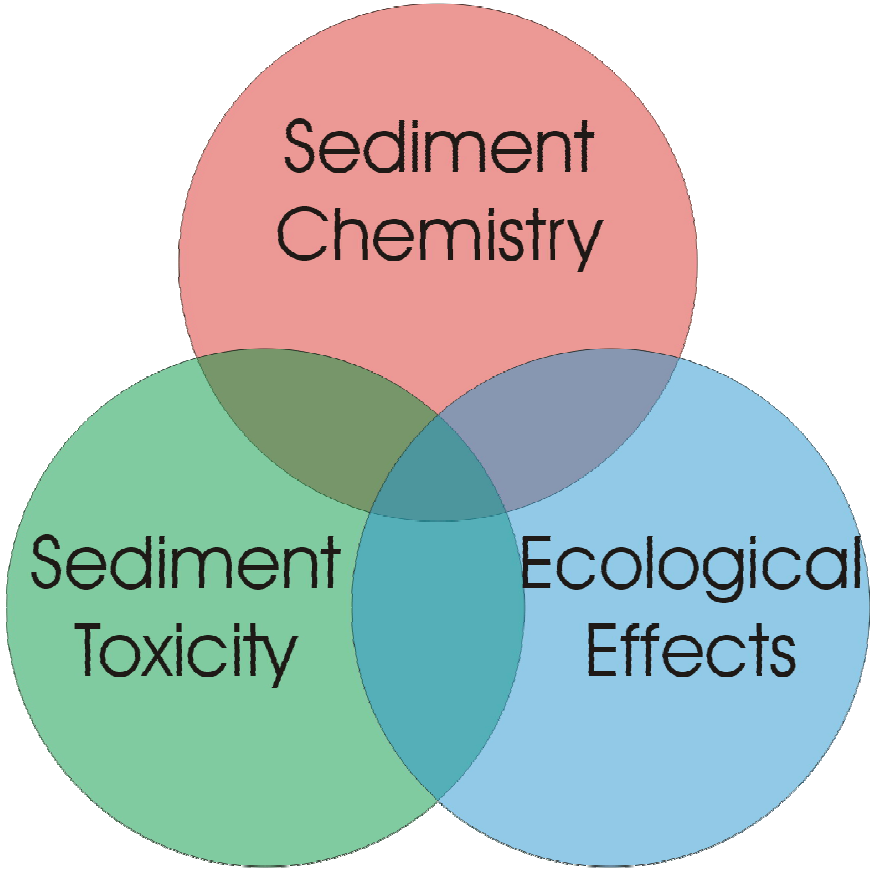
# Combining lines of evidence

- Differences in chemistry provide one line of evidence
- Differences in chemistry (exceeding an EQS) does not confirm effects
- Exceeding any EQS – what action ?

# Interpretation of data

- Understand relationships
  - relationship between sediment and tissue concentration
- Needs to be treated with caution
  - do not need bioaccumulation to observe effects
  - toxicity test and endpoints may be non-specific

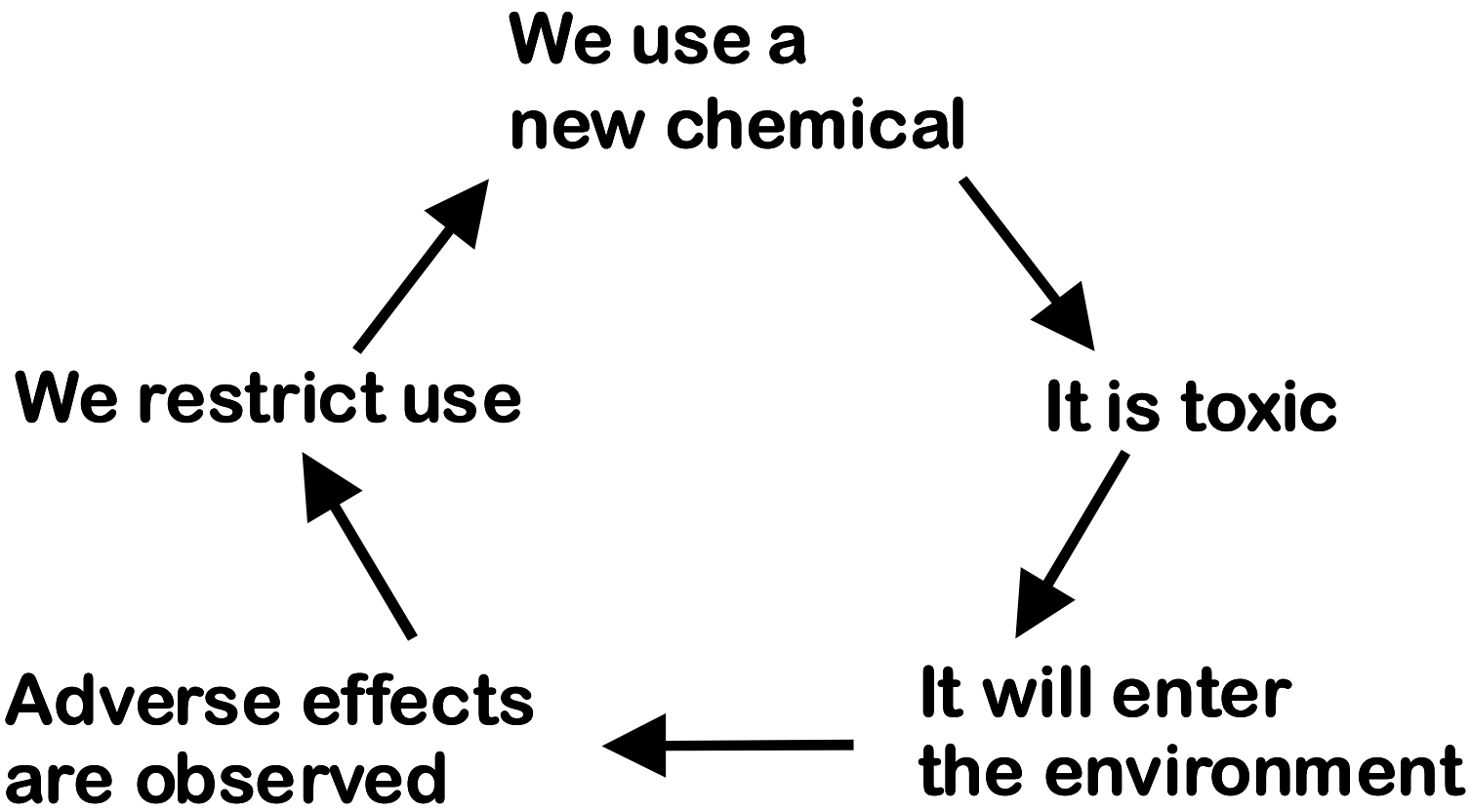
# Ideals and Reality



# Regulation of inputs

- Biocidal Products Directive
- Criteria used for evaluation
  - toxicity
  - persistence
  - availability

# Trapped in a cycle… ?



# Trapped in a cycle… ?

**Life**
**Cycle**
**Analysis ?**

# Improving quality = cost

- Proposed UK programme to reduce discharge of EDCs
- Water industry AMP 4 settlement
  - "Demonstration program"
  - Monitoring across a range of unit treatment processes
  - Installation of tertiary treatment (GAC ?) at two full scale works