

# Integrated Sediment Quality Assessment

## A Fact Sheet from the Southern California Coastal Water Research Project



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### Why Do We Care About Sediment Quality?

Many pollutants bind to particles that are washed into rivers and storm drains, then settle out as sediment in slower moving coastal waters. As a result, contaminants tend to accumulate in sediments, providing sentinel information about environmental conditions. These contaminants can remain in sediment for long periods and serve as a major source of exposure for aquatic life and humans who consume seafood.



Southern California regional monitoring studies have found the highest contamination levels in coastal embayments (e.g., harbors, estuaries, and marinas) where sources include past or current on-site activities and sediment deposited by rivers and drainage channels.



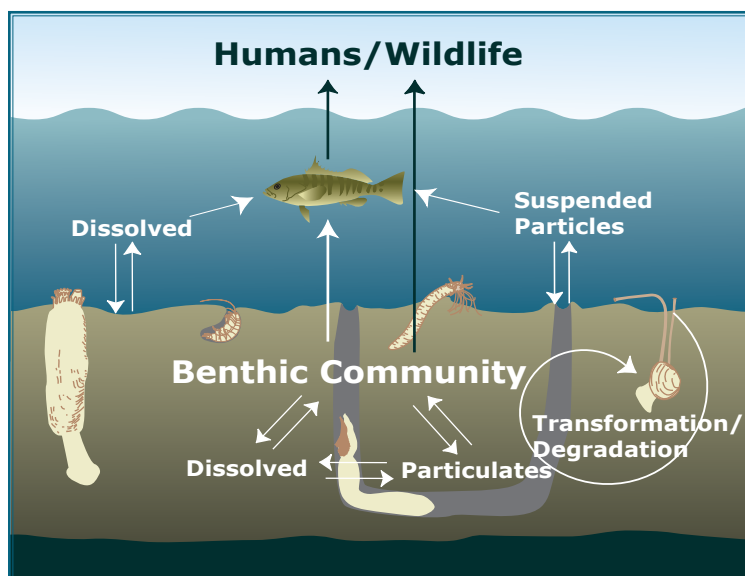
### Interpreting Sediment Quality Is Challenging

Sediment contamination does not always pose a threat to aquatic life. To evaluate the



potential for environmental impacts, scientists need to determine not only the quantity of contaminants present, but also whether they are accessible to living organisms. If contaminants are tightly bound to sediment particles, they pose little risk to aquatic life. On the other hand, some contaminants can be ingested along with sediment particles or released into adjacent water where they are more accessible to the animals living in the sediment (aka the benthic community).

### Sediment Contaminant Transfer



Sediment contaminants enter the food web via release into overlying water, direct contact, and sediment ingestion by benthic organisms. Concentrations in tissue increase with each step up the food web, posing the greatest risk to top-level predators.

## Multiple Lines of Evidence Improve Sediment Quality Assessment

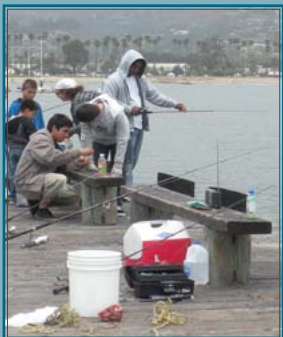
Sediment chemistry analysis alone does not accurately indicate the potential for pollutant impacts owing to variability in the contaminants' biological availability. To evaluate sediment quality, scientists must consider multiple types of evidence. For example, three lines of evidence are often used to assess impacts on aquatic organisms: sediment chemistry, toxicity, and benthic community condition. Each line of evidence has some limitations, but when used in combination they produce a more robust sediment quality assessment.

Sediment Quality Indicator	Benefits	Limitations
Sediment Chemistry	Quantifies individual contaminant concentrations	Does not consider bioavailability; cannot measure all contaminants or assess combined effects
Toxicity	Integrates all contaminant effects on survival, growth, or reproduction of aquatic test organisms	Lab conditions/test species may not fully reflect field conditions; does not identify the cause of toxicity
Benthic Community Condition	Integrates all contaminant effects on the resident benthic community species	Time-intensive; also affected by non-contaminant factors, such as oxygen availability or physical disturbance



## Assessing Risk to Humans

Because contaminants such as mercury, DDT, and PCBs accumulate in tissue, sediment contamination affects not only sediment-dwelling organisms, but also birds, marine mammals, and people who consume seafood. Quantifying this indirect risk adds complexity to sediment quality assessment. In addition to measuring sediment and seafood contaminant concentrations, scientists use models to predict contaminant movement through the food web, based on feeding habits and movement patterns of fish. Risk also depends on individual sensitivity and the amount and type of seafood a person consumes.



## Regulatory Application: Sediment Quality Objectives (SQOs)

While many environmental monitoring programs include sediment quality assessment, California's Sediment Quality Objectives (SQOs) for bays and estuaries represent the first statewide regulatory application of this approach. SCCWRP and its partners have developed many of the assessment tools for implementing this policy based on the multiple lines of evidence approach. These tools are available on SCCWRP's website.