


Water Quality Associated with Urban Runoff: Sources, Emerging Issues and Management Approaches

Martha Sutula and Eric Stein
Biogeochemistry and Biology Departments
Southern California Coastal Water Research Project



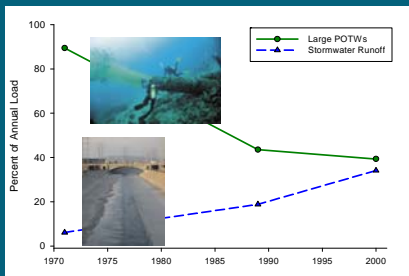
Today's Talk

- Take home messages from 20 yrs of SCCWRP stormwater research
 - Wet weather = storm
 - Dry weather = non-storm
- Emerging issues
- Thoughts on management approaches



Increased Focus on Stormwater, As Point Sources Are Reduced

Annual Load Total Combined Metals to the SCB



Year	Large POTWs (%)	Stormwater Runoff (%)
1970	~90	~5
1980	~55	~10
1990	~45	~20
2000	~40	~35

Challenges of Managing Storm Water

- Difficult to understand and predict all the factors that influence storm water
 - Highly variable
 - Many sources and influencing factors
- Effective management requires tools to increase our understanding
 - Monitoring
 - Source characterization and identification
 - Model development
 - BMP siting and design

Potential Sources

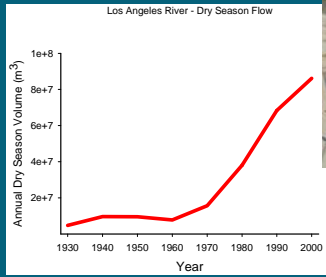
- Anthropogenic
 - Land uses
 - Aerial deposition
 - Mobil sources
- Natural
 - Background



Main Messages on Wet Weather Runoff

- Main sources vary by constituent
 - Metals → industrial
 - PAHs → aerial deposition
 - Bacteria → recreation and agriculture
 - Nutrients → agriculture and residential
- Natural areas contribute low background levels, but may be substantial for some constituents
 - Atmospheric sources may play role
- Important to understand factors driving variability
 - Affects strategy for managing stormwater as a resource

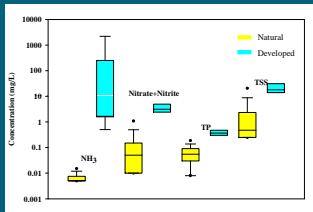
What About Dry Weather Runoff?



- Region has on average 345 dry days per year

Main Messages on Dry Weather Runoff

- Can be as major load, particularly during dry years
- Less successful in linking to specific land uses
- Again, natural loadings can be substantial for some constituents



Dry Weather Concentrations of Nutrients— Natural Versus Developed

Emerging Management Issues

- Biological quality of streams
- Hydromodification
- Contaminants of emerging concern
- Recycled water
- Nutrient overenrichment

Effects of Watershed Urbanization Go Beyond Water Quality

- Water quality/toxicity
- Physical structure
- Habitat condition
- Water quantity/hydrodynamics



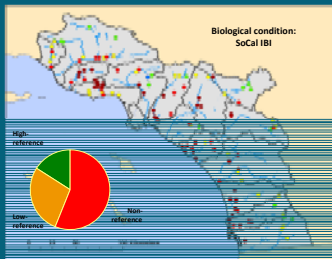
Increased Focus on Biological Endpoints in Assessing Effects of Urban Runoff

- SWRCB working on development of biocriteria for streams, eventually estuaries
- Benthic invertebrates first, but over time, other lines of evidence may be included
 - Stream algae
 - Overall habitat condition



Early Messages From Stream Bioassessment

- Large percentage of stream miles with measureable effects in region
- Lowest invertebrate IBI scores near urban and ag lands
- Nutrients, physical habitat disturbance are top stressors



Effect of Increased Impervious Cover- Hydromodification



- Infrastructure damage
- Instream habitat loss
- Coastal erosion

SCCWRP is Developing Modeling Tools To Support Management of Hydromodification

1. Which streams are at the greatest risk of effects of hydromodification? ➡ *Screening Tool*
2. What are the anticipated effects in terms of increased erosion, sedimentation, or habitat loss, associated with increases in impervious cover? ➡ *Modeling Tools*
3. What are some potential management measures that could be implemented to offset hydromodification effects? ➡ *Management Tools*

What Can We Do?

Adverse effects of hydromodification and urban runoff must be addressed at watershed scale

General Concepts

- Minimize runoff
- Maximize infiltration
- Avoid building in floodplains
- Education

Approaches

- Better Site Planning
- On-site control of runoff
- Biotechnical stream stabilization
- Stream restoration

These General Principles Will Improve Physical and Biological Condition and Ameliorate Water Quality

THANK YOU



For more information contact:

Eric Stein: erics@sccwrp.org

Martha Sutula: marthas@sccwrp.org
