Targeting Critical Areas and Scheduling Implementation

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Treat the Right Problems with the Right Solutions in the Right Places

How do we get there?

Solving Water Problems

- Use biophysical measures to identify vulnerable locations within problem area.
- Assess salient behaviors in these locations to determine where disproportionality may be occurring.
- Gain understanding why inappropriate behaviors are occurring in these locations.
- Design intervention effort based on this understanding.

Objective

To remediate a significant amount of water quality degradation from nonpoint sources using existing policy, knowledge, and methods through the incorporation of the “human dimension” in a rigorous and scientifically valid fashion.

A Definition

The human dimension of water resource management can be defined as the effort to classify, explain, predict and influence salient behaviors proportionate to their impact on water quality and quantity.

Getting it right

- Critical areas
- Delivery System (who, what)
Critical Area Types

- Restoration:
- Protection:

Critical and Priority Areas

- Critical Areas (Red)
  - Need treatment to improve existing poor water quality
- Priority Areas (Yellow)
  - Need protection to protect relatively good water quality

Based upon:
- historic water quality data,
- current water quality data,
- confirmed sources,
- projected future development,
- and causes of impairment.

Salt Creek Headwaters

- Highest average E. coli concentration
- Highest average TSS concentration and loading rate
- High nutrient loading rates
- Low DO
- Poor habitat rating

Beauty Creek

- Lowest average E. coli concentration
- Lowest average TSS concentration and areal loading rate
- Relatively low nutrient concentrations
- Highest habitat rating

Approaches to NPS Pollution

1. Heterogeneity between agricultural systems is recognized along biophysical dimensions. Variation is examined on the dimensions of climate, hydrology, soils, biology, and prevailing agronomic techniques. The human element is assumed to be a constant relative to profit maximizing behavior. Aquatic system impacts are determined by the interaction between the biophysical characteristics and system-wide production techniques.

2. A social science perspective where the emphasis is on markets, institutions, economic behavior, culture, and technology adoption processes all of which are examined largely independent of the biophysical setting. Variation in attitudes, beliefs, institutional structures, and market processes are viewed as the primary determinant of agriculture's impact on aquatic systems while largely ignoring specific biophysical settings.
Approaches to NPS Pollution

Social Systems  Biophysical Systems

This is Unacceptable!

Water Quality Degradation

How to Address This Dilemma

1. Base planning efforts on the fact that land user behaviors vary significantly, even when engaging in the same type of land use.
2. Use biophysical models and science to determine what land user behaviors need to be assessed.
3. Focus on disproportionality in your initial efforts.

Disproportionality

Egregious behaviors in a well-buffered setting may have an insignificant impact on degradation processes.
“Normal” behaviors in a vulnerable setting may have a significant impact on degradation processes.

Disproportionality emerges out of scale-specific interactions between human and biophysical attributes.

Example of Diverse Biophysical Resources

Loading in the XYZ Watershed

The vulnerability of field #10 can nullify or negate the “conservation gains” from the other 9 fields.
Why Assess Behaviors?

Behavior relative to the environment varies significantly – from saint to sinner.

* If we want to **advance science**, then we need to assess the full spectrum.
* If we want to **manage programs**, then we need to assess receptive audiences within the program area.
* If we want to **solve water problems**, then we begin with those making disproportionate contributions.

Temporal Scales of Management

Variation in climate and hydrologic patterns induce changes in the spatial and temporal attributes of manure distribution decisions.

Same Behavior, Different Time

Inappropriate Appropriate

Temporal Scales of Management

Spatial and Temporal Attributes of Manure Distribution Decisions

Inappropriate Behaviors

What is the explanation for inappropriate behavior in vulnerable or susceptible biophysical settings?

1. Technological “leakage”
2. Tradition/Community norms
3. Market Rationality
4. Ignorance
5. Scale Incongruence
6. Others?

Karyn McDermaid, University of Illinois
Jeff Boeckler, Illinois Department of Natural Resources
2005
Identify key relationships

Fish and Aquatic Life
Degraded Habitat and Sedimentation
Stormwater Quality
Channel Scour
Streamflow Rates and Velocities

STORMWATER Volume

ISSUES: Volume, Peak Flow and Timing on Delivery of "Storm Water"

Basis of Management Approach

Hydrology-based Target

Degraded Habitat and Sedimentation
due to increased Streamflow Rates and Velocities
associated with excess STORMWATER Volume

Volume, Peak Flow and Timing on Delivery of "Storm Water"

Issues

The Remaining Problem: Stormwater

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Disproportionality

Any assessment in a water quality or quantity program needs to try and account for disproportionality as it should become the focus of any intervention effort that is intended to solve problems.

What Should be the Focus of NPS Control Efforts?

Focus on Solving Problems
Focus on Managing Programs
Delivery System
administrative goals driving
environmental protection

- Critical areas not being addressed – not going out to the critical area
- Partial treatment of problems – scope and BMPS
- Not all problems being addressed
- Landowner capacity not developed

Conclusion

We have the capacity and knowledge to address the “human dimension” of water problems in a robust and valid fashion.