

Volunteer Monitoring: the Integrated Approach



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MAY 20, 2008

About ALLARM



- A project of the Environmental Studies Department at Dickinson College, Carlisle PA.
- Employs 12-14 Dickinson College students which oversee organizational programs.
 - Community Aquatic Research Laboratory
 - Environmental Education
 - Field and International Research
 - Public Education and Outreach
 - Stormwater Education Campaign



PA Volunteer Monitoring Movement



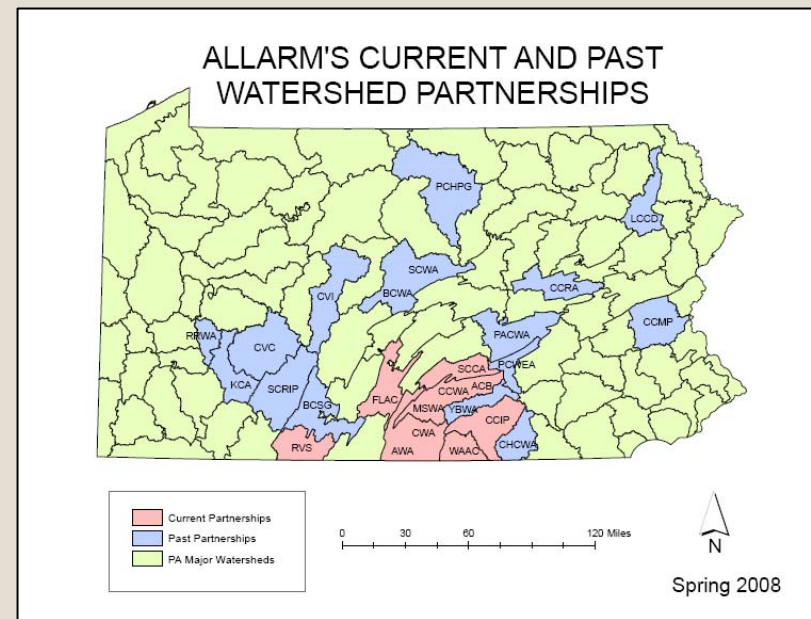
PA DEP

- Distributed \$650 million to water-related projects (2000-2005) via “Growing Greener” funds
- Formation of 125 watershed organizations (1999-2002)
- Over 400 organizations in existence today



ALLARM'S Technical Assistance

- 1 of 8 service providers supply technical and programmatic assistance to PA watershed groups (Consortium for Scientific Assistance to Watersheds)
- Workshops:
 - Study Design Development
 - Chemical Monitoring
 - Biological Monitoring
 - Physical Monitoring
 - Data to Information
 - Data Communication
 - Organizational Development



Community Participatory Research Model



Who defines the problem?	Who designs the study?	Who collects the samples?	Who analyzes the samples?	Who interprets the data?
Community	Community	Community	Community	Community



Science by the people

Biological Monitoring

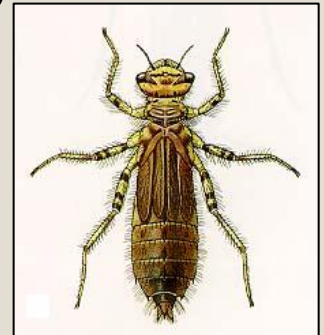
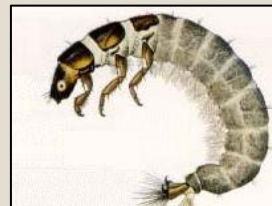


- **Bacteria**

- Determine if water body is suitable for human use
 - ✦ Drinking
 - ✦ Recreation

- **Macroinvertebrate**

- Assess cumulative impact of conditions over time
- Many macro protocols designed for volunteers
 - ✦ Environmental Alliance for Senior Involvement (EASI)
 - ✦ Virginia Save Our Streams



Chemical Monitoring



Parameters Measured by Volunteers:

- Alkalinity
- Conductivity
- Dissolved Oxygen
- Nitrate
- pH
- Phosphate
- Sulfate
- Temperature
- Total Dissolved Solids
- Turbidity



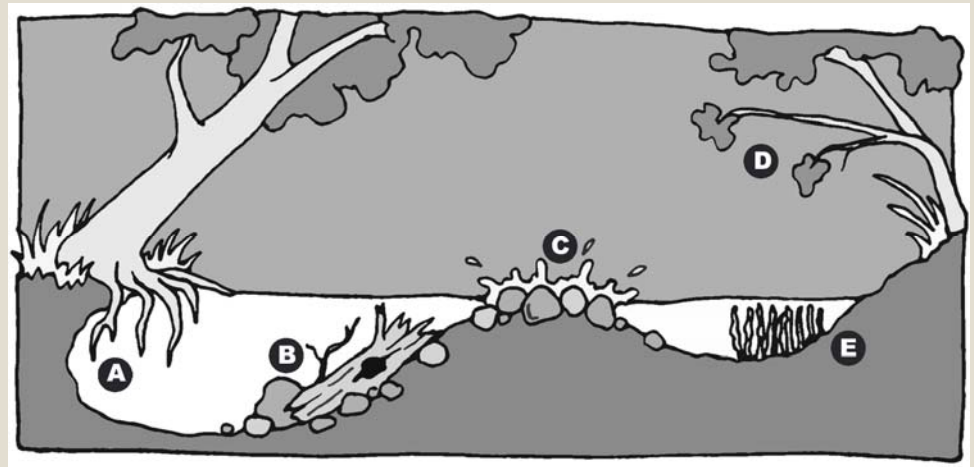
User-friendly field kits

Physical Monitoring



USDA Visual Assessment Protocol

- Channel Condition
- Bank Stability
- Riparian Zone
- Water Appearance
- Nutrient Enrichment
- Fish Barriers
- In-stream Fish Cover
- Embeddedness
- Insect/Invertebrate Habitat
- Canopy Cover
- Sewage
- Manure Presence



In-stream Fish Cover: Stream cross-section with types of in-stream fish cover; (A) deep pool, thick root mat, undercut banks; (B) logs/large woody debris, boulders/cobbles; (C) riffles, cobbles; (D) overhanging vegetation; (E) dense aquatic plant bed.

Quality Assurance/Quality Control



- Quality Assurance – set of procedures that documents how a project will ensure that the data collected meet the project requirements
- Quality Control – ensures that the data collected by volunteer monitors is of known quality
 - Chemical monitoring
 - ✦ Replicates
 - ✦ Standards
 - ✦ CARL
 - Macroinvertebrate monitoring



Benefits and Drawbacks



	Macro Monitoring	Chemical Monitoring	Physical Monitoring
Positive	<ul style="list-style-type: none">• Cumulative impact of conditions over time• Methods designed for volunteers	<ul style="list-style-type: none">• May give clues to source of impairment• User-friendly field kits	<ul style="list-style-type: none">• Cumulative impact of conditions over time• Easy-to-use protocols• Free
Negative	<ul style="list-style-type: none">• Impacts result from WQ and habitat• ID requires training• Good reference sites are needed• Indicate impact but not source	<ul style="list-style-type: none">• Snapshot of stream conditions• Equipment may be expensive	<ul style="list-style-type: none">• Lack of QC• Perception driven

Case Study #1 (SCCA)



- Shermans Creek Conservation Association has monitored biological, chemical, and physical indicators for seven years.
- Quality assurance/quality control plan.
- PA DEP requested and used volunteer data in reviewing a stream upgrade proposal from WWF to EV.



Data Analysis and Interpretation



The importance and relevance of holistic monitoring becomes especially apparent during the data analysis and interpretation phase.

- Shortcomings of individual approaches
- Gaps in collected data
- Local knowledge
- Barriers in volunteer assessment



Conclusion



By integrating biological, chemical, and physical aspects into a monitoring program:

- Monitors become better familiar with stream properties and complexity of system.
- Data become more credible when results from multiple approaches are consistent.
- Impacts can be better assessed by using multiple techniques.
- Restrictions using volunteer protocols are lessened.
- Capture as much data as possible.

Any Questions?

