

# The Watershed Assessment Context

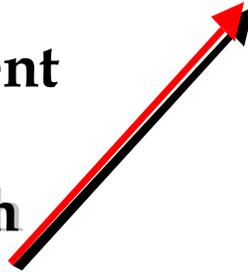
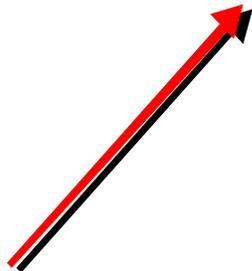
What Are  
Your  
Expectations  
(Reference  
Conditions)?



What Are Current  
Conditions?



How Do Current  
Conditions  
Compare with  
Reference  
Conditions?



Impairment



Restoration

High Quality



Protection

➤ ***Milestones in the Study Design and Data-to-Information Process:***

- Program and Study Design
- Monitoring and Recording
- Data Entry and Validation
- Data Summary
- Data Interpretation
- Data Presentation
- Action and/or Further Monitoring

# *Working through the Monitoring Study Design Process*



# Monitoring Study Design

*and Introduction to the Dickinson Creek Virtual Watershed*

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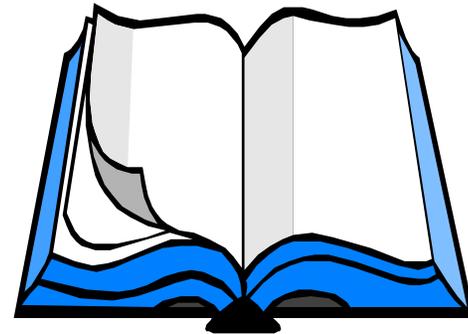
**Study Design**  
Process

# Study Design

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A study design is a written document that describes the choices you make about monitoring:

- Why?
- What?
- Where?
- When?
- Who?
- How?



# Do we really need a study design?

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**Preparing a study design is the most important step in organizing your monitoring effort because:**

- It forces you to focus on what you are trying to accomplish with your monitoring program;
- It helps you to select the most appropriate monitoring strategy to address the issues that are important to you and your community;
- It clearly documents your sampling and analysis methods and quality assurance procedures to anyone interested in your data; and
- It minimizes the impact of changing personnel on the continuity of your monitoring activities because anyone can read your study design and understand the project

# Step 1: What is already known about your watershed?

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Start out by collecting existing information on the conditions and issues in your watershed. Consider forming a technical committee to help with this step and the rest of the study design process.

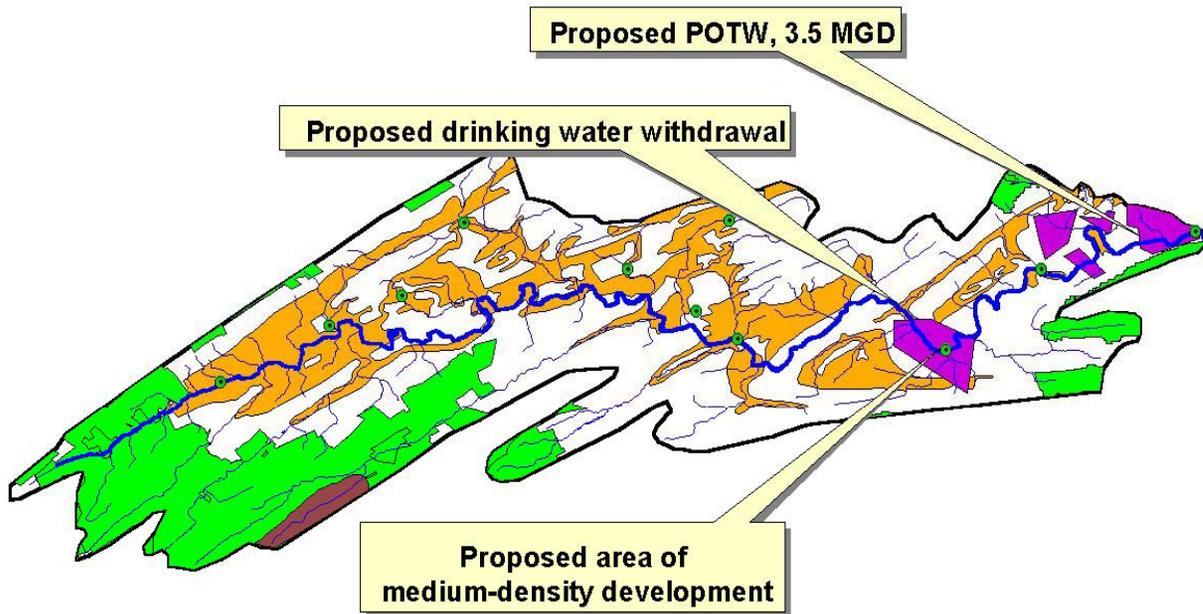
## Background on your watershed

- Physical information on the watershed (watershed area, tributaries, geology, etc.)
- Land use types, communities & municipalities
- Other monitoring reports or data available

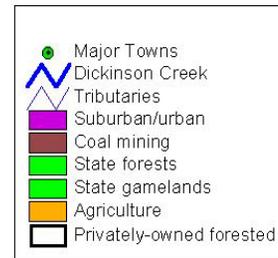


## Known or potential issues, threats, or concerns

## LAND USE IN THE WATERSHED



5 0 5 10 Miles

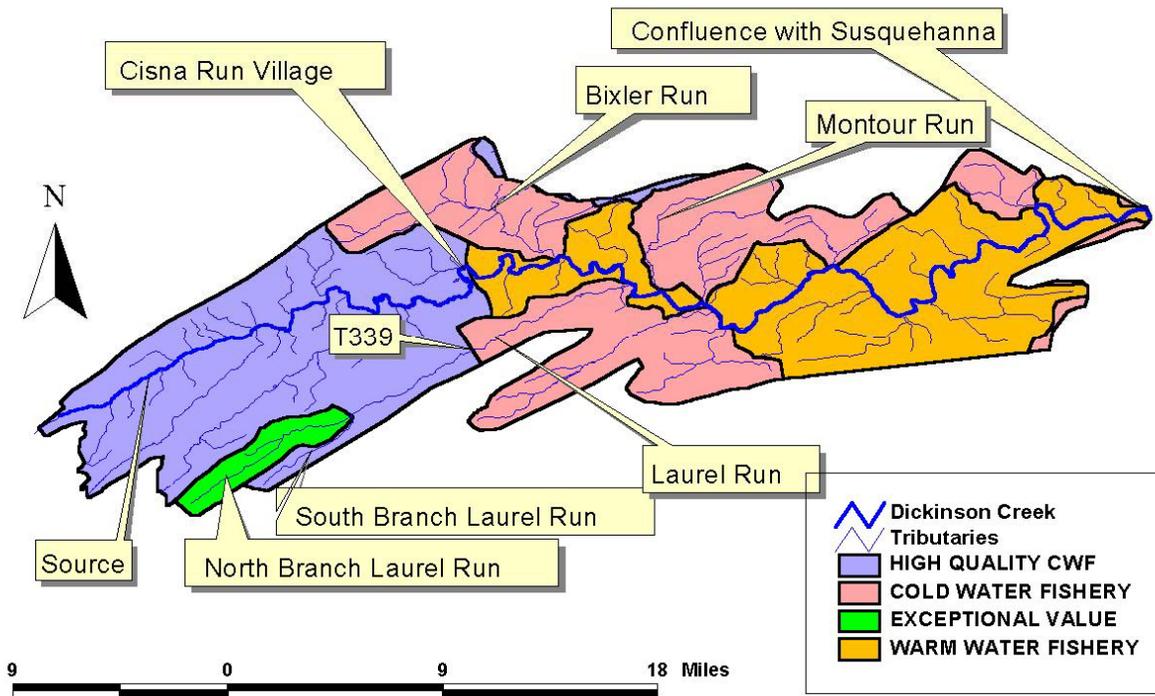


## Dickinson Creek

- 244 square-mile watershed
- Historic mining and logging practices
- 29 historic mills in watershed
- Dominated by agriculture & public and private forests
- CAFO's moving in
- Increased development pressure as farms are sold

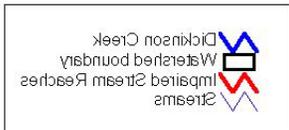
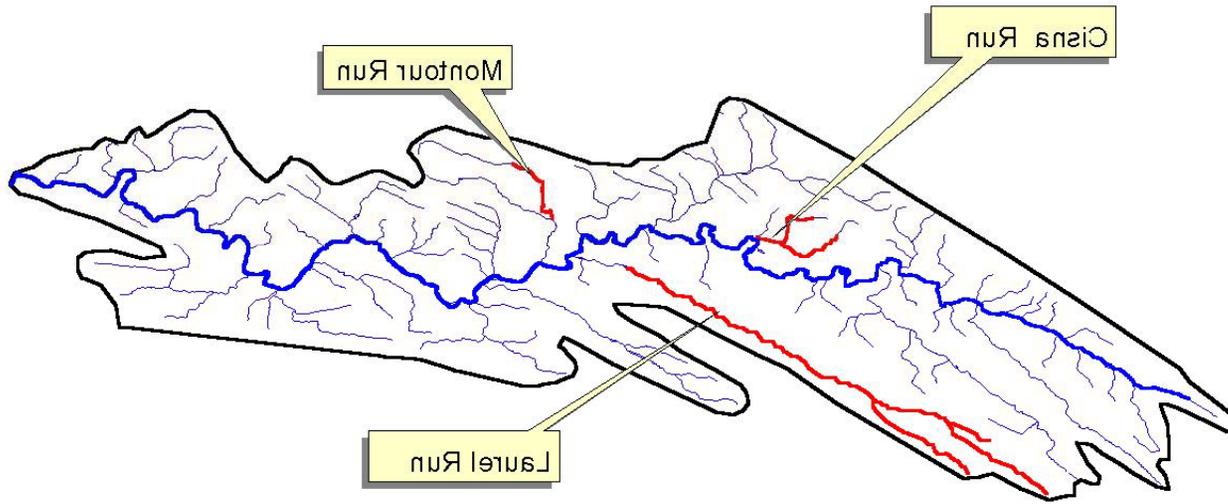
## Water Uses:

### DESIGNATED USES



- Carved up into many designated uses (Chapter 93)
- Popular for recreation – swimming, fishing, kayaking
- Numerous point-source discharges, primarily small sewage package plants
- Proposed drinking water withdrawal
- Proposed STP near Duncannon

# IMPAIRED STREAMS 303(b) LIST



## Impaired Waters:

- 1999 DEP Study - Meeting Water Quality Designations with some exceptions:
- Montour Run – impacted by poor grazing practices
- Laurel Run – impacted by AMD and acid rain
- Cisna Run - agriculture

## Step 2: Why are you monitoring?

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It is important that your group reaches a consensus about the purpose of your monitoring program. Identify questions that if answered, could provide information to influence decision-makers and your group's targeted data users. Then, determine how monitoring can help answer these questions and achieve your groups' goals.



### *Examples:*

- Is the water quality meeting or exceeding state standards?
- How are failing septic systems affecting water quality?
- How will proposed development affect water quality?
- Is the local quarry operation in compliance?

# Step 3: How will you use the Data Collected?

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Match your monitoring purpose to your data users.

Potential Data Users

- *Watershed group & volunteer monitors*
- *Municipalities*
- *State agencies for use in the 305(b) report and enforcement of 303(d) list*



**The CVMP Study Design Manual suggests four broad purposes for monitoring in PA:**

Purpose A: Community Education and Awareness

Purpose B: Baseline Data Collection

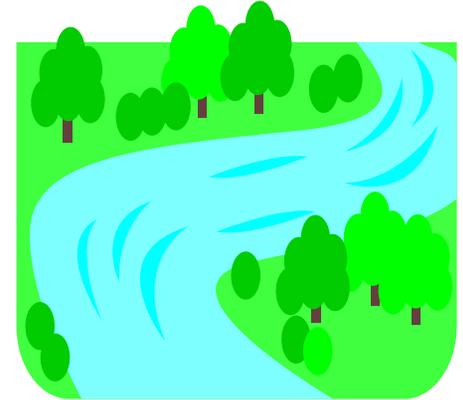
Purpose C: Community and/or Watershed Level Assessment

Purpose D: State and Federal Agency Assessment

# Step 4: What will you monitor?

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Streams are complex systems of inter-related physical, chemical, and biological characteristics.



## Watershed Indicators

- **Biological** – fish, insects, bacteria, plants
- **Physical** – temperature, turbidity, clarity, flow, land use, stream gradient, instream cover, riparian habitat
- **Chemical** – dissolved oxygen, pH, nitrate, phosphates

## Practical Considerations

- Do you have the human & financial resources to measure it?
- How difficult is it to monitor?
- Does it help you understand a major component of the ecosystem?
- Is it understandable and explainable to the target

# Step 5: How will you monitor?

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Determining how you will monitor involves making choices as to the appropriate sampling methods that meet your data quality objectives.

**What sampling and analysis methods will you use?**



*Examples:*

- Accuracy & Precision – LaMotte/HACH kits vs. lab analysis
- Grab samples, integrated samples, direct measurement samples
- Qualitative net collection or semi-quantitative net collection
- Maximum holding times, reporting units, transport to lab

# Step 6: Where will you monitor?

Consider safety & accessibility, potential water quality impacts, reference locations, stream designated uses.

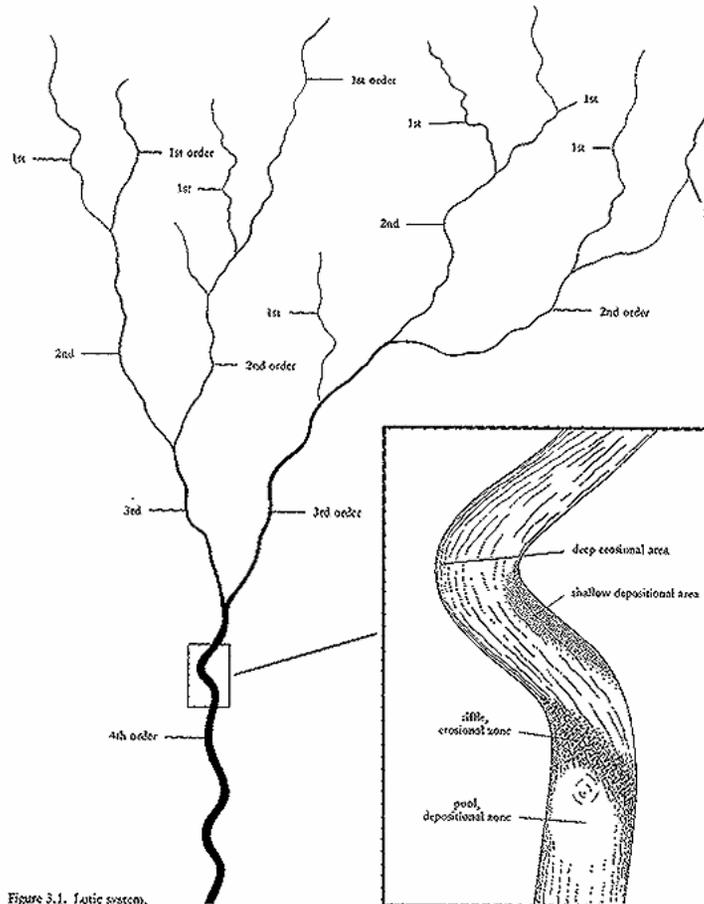
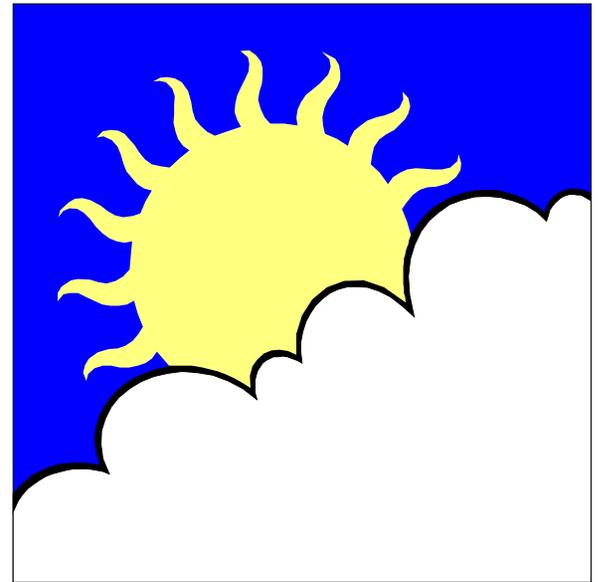


Figure 3.1. Lotic system, depicting stream orders and lotic zonation.

# Step 7: When will you monitor?

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- What time of year?
- What time of day?
- Special Weather Conditions – storm events, drought, etc.
- Frequency of sampling? – consider resources and data requirements



# Step 8: What are Your Quality Assurance Measures?

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**Quality control management includes most aspects of your monitoring program:**

**Organization and Planning:** Training requirements of volunteers?

**Sampling and Analysis:** How will you care for and calibrate your monitoring equipment?

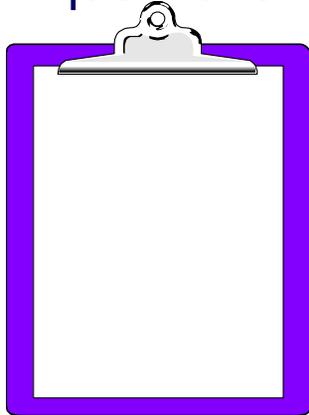
**Data management:** How will you ensure that the data are properly recorded in the field and in a database?

**Documentation, documentation, documentation!** Manuals, study design, datasheets, equipment and supplies records

# Step 9: How will you manage & present the data?

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Dealing with data involves converting raw data into useful information that sheds light on the answers to your monitoring questions.



# Step 10: What Are the Tasks and Who Will Do Them?

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## Major Monitoring Tasks

Find a lab

Quality assurance

Purchase equipment

Analyze your results

Recruit and organize volunteers

Report your results

Train field and lab volunteers

Present your results

Monitoring  
**design**

**Evaluate your study**

**Develop written job descriptions for positions to accomplish various tasks**