

STUDY DESIGN: DEVELOPING A MONITORING PROGRAM THAT DELIVERS RESULTS
NWQMC Conference 2019

A. One expectation for Today:

B. One Monitoring Question you have:

C. For that one Monitoring Question Complete the following:

Study Purpose	Data Uses or Decisions (Management Use or ?)	Data User	Information Product	Results Outcomes Impacts ROI

D. Eight Reasons Programs do not produce measurable results (in my experience):

1
2
3
4
5
6
7
8

E. Six Essential Building Blocks (5 if you don't work with VM):

1
2
3
4
5

F. Four Continuums to Align for each monitoring ? and create a data pathway/information blueprint

1. S_____ P_____
2. U_____
3. _S_____
4. R_____ S, O_____ S, I_____ S (ROI's)

G. Look at Study Purposes closer: Left Column

H. Look at Data Uses, Decisions or Management Uses closer: Top Row

I. Look At Users closer: matrix, more than one per purpose/use

Study Purpose(s)*		Data Uses, Decisions or Management Uses		
		I Education/ Community Inquiry	II Community or Agency Advocacy/ Planning	III Regulatory/ Legal
A. Condition and Trend Investigation 1. 2.		Assessment A-I 1.USER 2.	Assessment A-II 1. 2.	
B. Impact Investigation 1.	Non Point Source	Assessment B-I 1.	Assessment B-II 1.	Assessment B-III 1.
	Point Source	Assessment B-IV 1.	Assessment B-V 1.	Assessment B-VI 1.
C. Effectiveness Investigation 1. 2.		Assessment C-I 1.	Assessment C-II 1.	
D. Use Support Investigation 1. 2.		Assessment D-I 1.	Assessment D-II 1,	Assessment D-III 1.

J. Adjust above worksheet for these two continuums

K. List all users under each combination of purpose/use

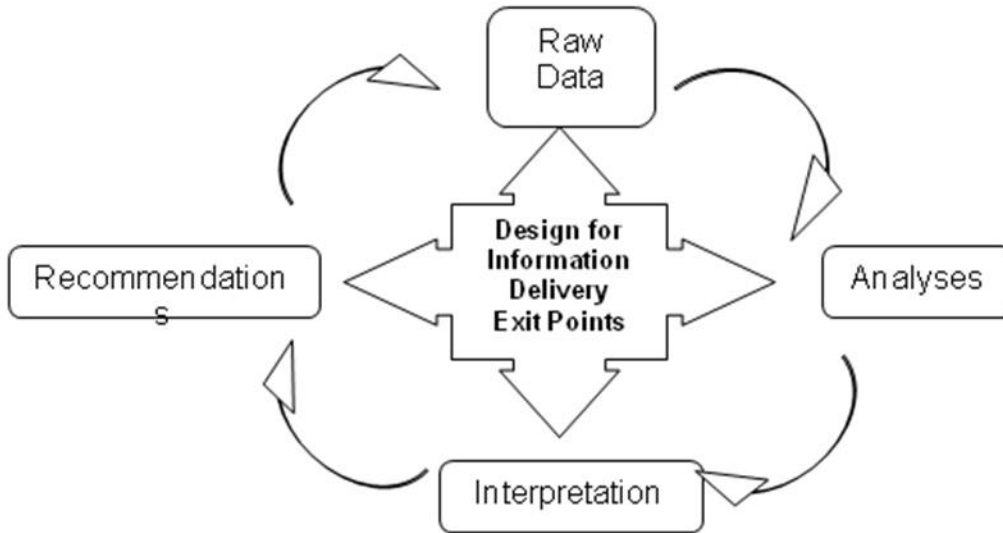
L. For each User above:

1. Determine information needs to make use/decision
2. Identify Information Products (deliver/communicate)
3. Evaluate

Worksheet Information needs of each Targeted Decision Maker

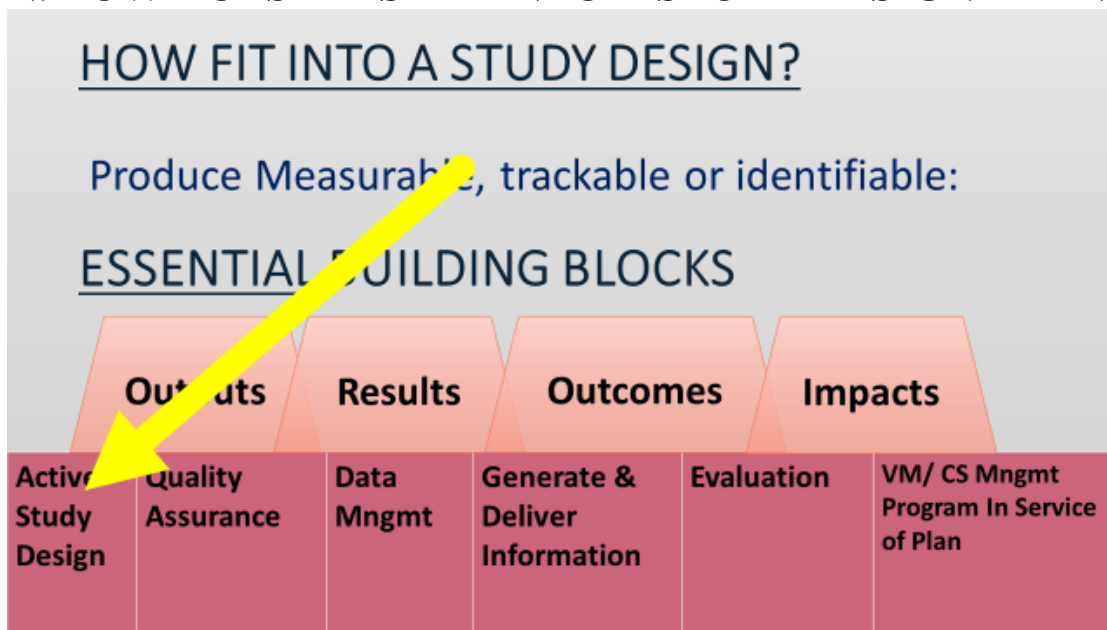
Assessment Type: ___		Use/Decision/Management:
Monitoring question: ___ of ___:		
Info Need:	User/Decision Maker ___:	User/Decision Maker ___:
Decision Make?		
Key processes, natural/political?		
Key Indicators needed, in what media?		
Where do they need it from (key locations, political, historical, etc.)?		
Benchmarks and references they use, criteria, metrics, indexes, statistics, etc.?		
What frequency/duration (length of record) does information need to be?		
How “good” does it have to be (peer reviewed, certain methods, etc.) be?		
Methods are they using, need you to use, field/lab		
What acceptance/performance criteria do they use?		
Information needs to be included besides data or information, meta data?		
Will you deliver, raw data, analyzed, interpreted, conclusions, recommendations, where will you exit?		
Do they need you to analyze, interpret, conclude or recommend		
Is the decision made? Process, formal, legal, rigorous, opportunities		
Do they need the information, format?		
Will it be delivered, mail, meeting, hearing, orally, etc.?		
Is the decision made?		
Do they need the data or information at what frequency?		
Will deliver the data and then evaluate if decision was made and role of information?		

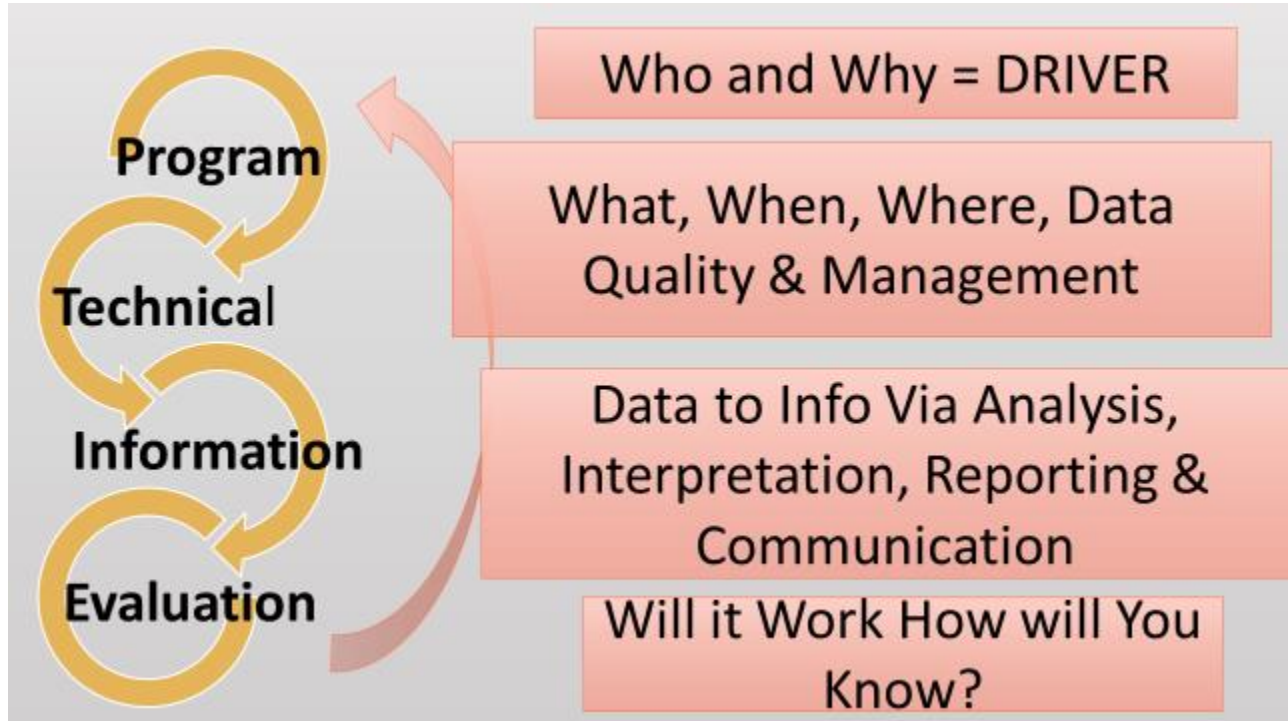
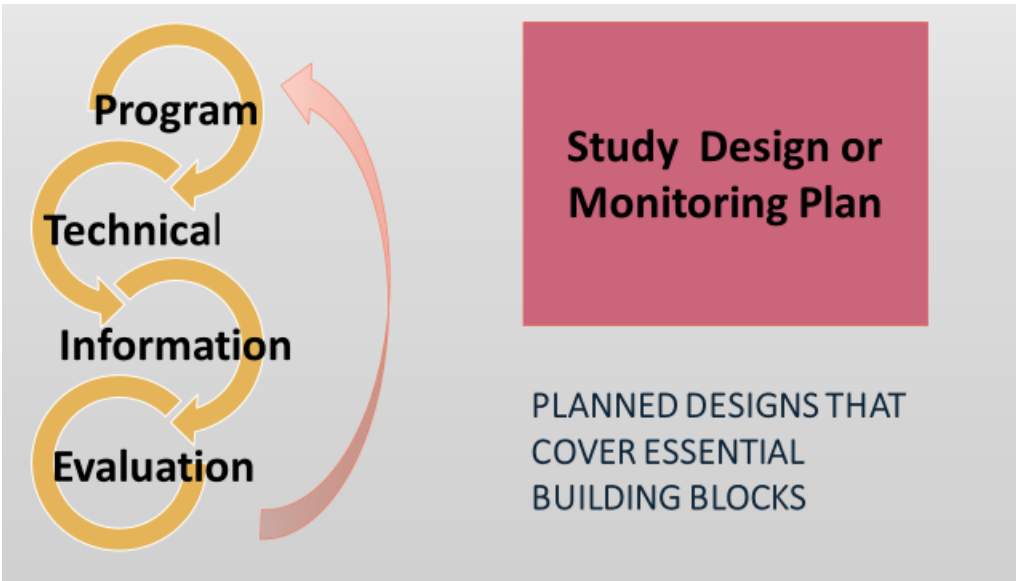
M. List Information Products will create to meet info needs for every user above:



That is how you align the four continuums and create a data pathway and information blue print for every monitoring question—connecting it to every ROI you desire.

N. HOW DOES THIS FIT INTO A STUDY DESIGN THEN?





***Design* a Study or Monitoring Program for Measurable, Trackable and Identifiable
Outputs, Outcomes, Impacts and Results**

***Plan* an Information Rich System (not Data Poor)**

Program Design – The Who and Why

- Step 1 - Share Watershed Vision and Desired Outcomes (Results)
- Step 2 - Who Involved / Vol Management Program
- Step 3 - Scope Inventory (Physical, Power and Information)
- Step 4 - Identify Monitoring Reason(s) and Data Use(s) (Assessment Type)
- Step 5 - Develop Monitoring Questions (Refinement of Monitoring Reason)
- Step 6 - Target Decision Makers and Information Needs (Refinement of Data Use)
- Step 7 - Budget, Capacity & Scalability Check, Summarize / Info Blue Print-Data Pathway

Technical Design – The What, When, Where, Data Quality and Management

- Step 8 - What will you monitor?
- Step 9 - When will you monitor?
- Step 10 - Where will you monitor?
- Step 11 - (W)how will you monitor to meet Data Quality Objectives?
- Step 12 - Management of Raw Data (Data Management Plan Part 1)
- Step 13- Who
- Step 14 - Budget, Capacity & Scalability Check, Summarize / Info Blue Print-Data Pathway

Information Design - Data To Info Via Analyses, Interpretation, Reporting and Communication

- Step 15 - Identify Information Products Needed by Targeted Decision Makers
- Step 16 - Data Summary and Analysis
- Step 17 - Interpretation, Conclusions and Recommendations
- Step 18 - Communication and Delivery
- Step 19 - Data Management to Generate Information (Data Management Plan Part 2)
- Step 20 - Who
- Step 21 - Budget, Capacity & Scalability Check, Summarize / Info Blue Print-Data Pathway

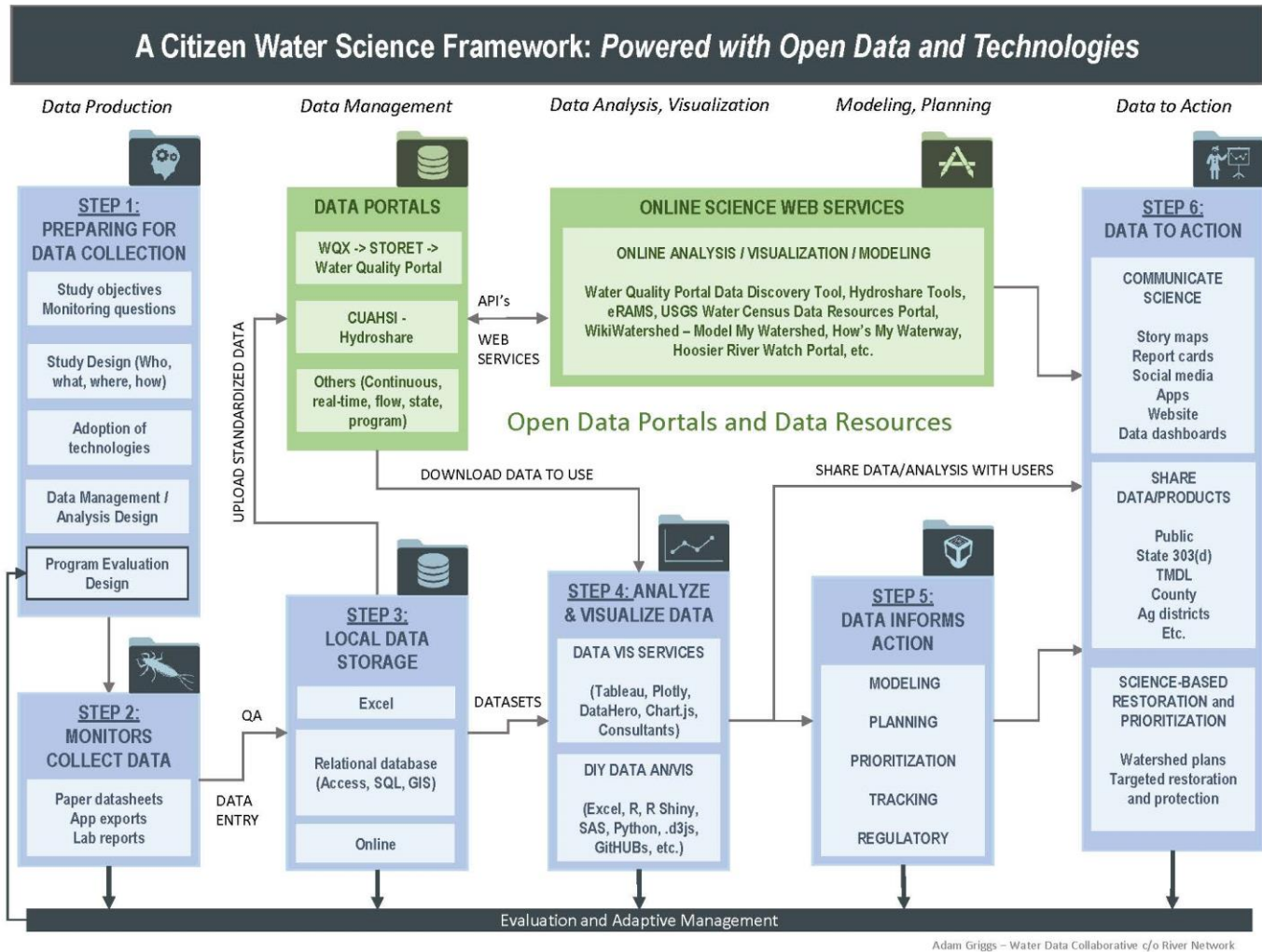
Evaluation Design - Will it Work and How Will You Know

- Step 22 - Final Plan, including budget, Capacity & Scalability, Info Blue Print-Data Pathway
- Step 23 - How Answer Monitoring Questions?
- Step 24 - Evaluation of Effectiveness (of Plan and Implementation)
- Step 25 - How Capture, Document & Share Success, Changes & Story
- Step 26 - Documentation and Communication of Plan

O. QUESTIONS TO CONSIDER:

- Do you have a QAPP or SOP?
- What is your data readiness, in Camp 1, 2 or 3
- Do you publish; share data beyond original use- have a forever song?
- What information products do you have, how align with information needs of users identified?
- Data management plan for both raw data and information products?
- Evaluation of program AND results?

P. Planning vs Implementation – The plan is step 1 below or Program Design, step 2 & 3 are implementation of Technical Design, All the remaining boxes are implementation of Information Design and last bottom bar returning to Step 1 is Evaluation Design.



Above from: www.WaterDataCollaborative.org

Whose focus is primarily implementation of Information Design but recognizes Program and Technical Design are precursors. Check out what they are planning for you, including a National Service Training Center.

Barb Horn, barb.horn@state.co.us, For workbook or workshop offerings

NWQMC 2019

Resources for Citizen Science Efforts

Volunteer Environmental Monitoring-

- Water Data Collaborative, www.waterdatacollaborative.org
- USA Volunteer Water Monitoring Network (<http://blog.uvm.edu/kstepenu/>)
- Alliance for Aquatic Resource Monitoring (<https://www.dickinson.edu/allarm>)
- Colorado River Watch (<https://coloradoriverwatch.org/>)
- US EPA - Monitoring and Assessing Water Quality - Volunteer Monitoring (<http://water.epa.gov/type/rs/monitoring/index.cfm#methods>)
- Great American Secchi Dip-in (<http://www.secchidipin.org/>)
- Guidance Compendium for Watershed Monitoring and Assessment - Clean Water Team Citizen Monitoring Program (California SWAMP) (http://www.swrcb.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml)
- Citizen Science Association (<http://citizenscienceassociation.org/>)
- Citizen Science Alliance - internet-based citizen science (<http://www.citizensciencealliance.org/>)
- CitSci.org (<https://www.citsci.org>)
- Citizen Science Association (<https://www.citizenscience.org/>)
- Citizen Science Central (<http://www.birds.cornell.edu/citscikit>)
- SciStarter – Science we can do together (<http://scistarter.com/>)
- Water Reporter (<https://www.waterreporter.org/>)
- Swim Guide (<https://www.theswimguide.org/>)
- River Network, www.rivernetnetwork.org
- Water Keepers Alliance www.waterkeeper.org

Educational Resources-

- Macroinvertebrate online reference library (<http://macroinvertebrates.org/>)
- Understanding Lake Ecology - Water on the Web (University of Minnesota) (<http://www.waterontheweb.org/under/lakeecology/>)
- The Water Cycle (United States Geological Survey (USGS) in 49 languages) (<http://water.usgs.gov/edu/watercycle.html>)
- Water Resources Glossary (University of Arizona Cooperative Extension) (<http://ag.arizona.edu/waterquality/YouthActivityPages/Glossary.html>)

Federal Government Resources-

- Environmental Protection Agencies (<https://www.epa.gov/nps/nonpoint-source-volunteer-monitoring>)
- Water Quality Portal (<https://www.waterqualitydata.us/>)
- How's My Waterway (<https://www.epa.gov/waterdata/hows-my-waterway>)
- National Environmental Methods Index (<https://www.nemi.gov/home/>)
- Aquatic Nuisance Species Task Force (<http://www.anstaskforce.gov/default.php>)
- National Climatic Data Center (NCDC) (<http://www.ncdc.noaa.gov/>)
- World Water Monitoring Challenge (<http://www.worldwatermonitoringday.org/>)

- National Oceanic and Atmospheric Administration (NOAA) (<http://www.noaa.gov/>)
- National Water Quality Monitoring Council (NWQMC) (<http://acwi.gov/monitoring/>)
- Natural Resource Conservation Service (NRCS) , , has VM Program FAQ's, map of groups around country, success stories, National Environmental Methods Index and other resources, (<http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/>)
- United States Geologic Survey (USGS) (<http://www.usgs.gov/water/>)
- United States Environmental Protection Agency (USEPA) Office of Water (<http://water.epa.gov/>)
- USEPA American Indian Environmental Office Tribal Portal (<http://www.epa.gov/indian/>)

Learning Objectives:

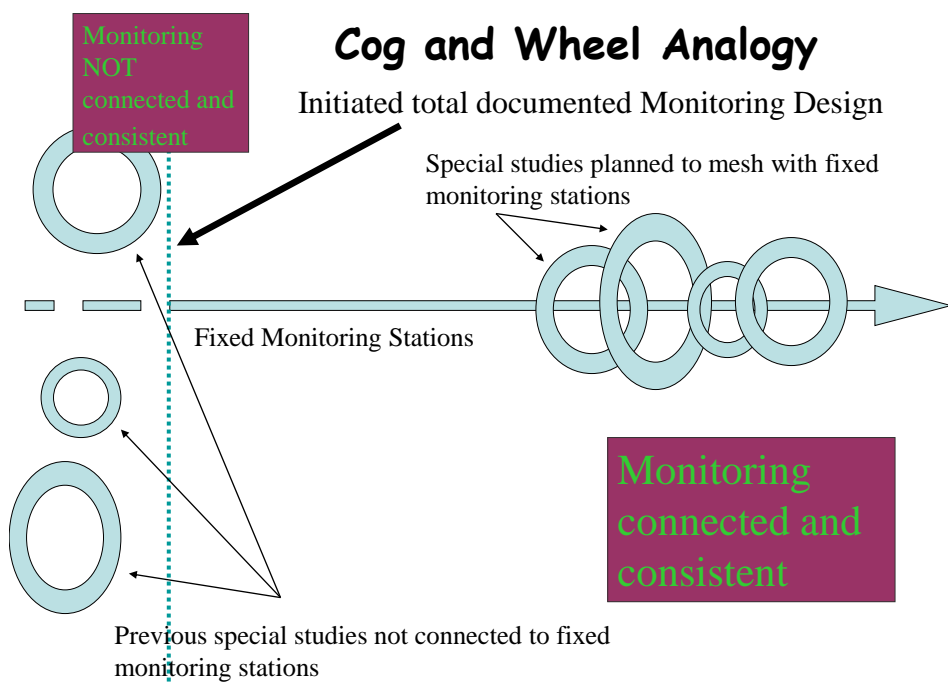
1. How to align monitoring purpose, management uses, data users, information needs and products to produce ROI.
2. Role of Study Design to go from asking Monitoring ? to measurable results, outcome, impacts (ROI)
3. Four Key Designs Areas
4. Role of data management and information products in ROI.
5. Role of Program AND ROI evaluation
6. Role of VM in Implementation and key elements of VM Program Management

Example of unique assessment types. Monitoring is iterative and progressive, with changing information needs that require changes in study design and monitoring.

Data Use / Purpose(s)*		Data User (s) *		
		I Education/ Community Inquiry	II Community or Agency Advocacy/ Planning	III Regulatory/ Legal
A. Condition and Trend Investigation		Assessment A-I General background information	Assessment A-II Watershed Management Planning; 305(b) report	N/A
B. Impact Investigation	Non Point Source	Assessment B-I Educate community or students about pollution impacts	Assessment B-II Identify impacts for remediation	Assessment B-III CWA Violations
	Point Source	Assessment B-IV Educate community or students about pollution impacts	Assessment B-V Identify impacts for remediation	Assessment B-VI CWA Violations
C. Effectiveness Investigation		Assessment C-I Educate students about effectiveness of BMPs, restoration projects	Assessment C-II Evaluation of effectiveness of BMPs, restoration projects	
D. Use Support Investigation		Assessment D-I Community or student education about use impacts	Assessment D-II Watershed Management Planning; 303(d) report	Assessment D-III CWA violations

Worksheet 6.3.a Information Blue Print - Data Pathway Fact Sheet for each monitoring question per Assessment Type

Assessment Type:	Purpose:	Use(s)/ Decision(s):
Monitoring Question: ____ of ____:		
Information Blueprint #	Your response	
1. Watershed Vision and Desired Outcomes this is design to help		
2. Scoping Inventory needs related to Assessment Type		
3. Existing data or monitoring efforts that are of quality to use here		
4. Targeted Decision Makers		
5. Technical info needed by Decision Makers (what, where, when, how, raw data mngt):		
6. DQO's and Qa/Qc needed		
7. Decision makers needs for analyses (summaries, illustrations, metrics, indexes, statistics, etc.)		
8. Decision Maker Benchmarks		
9. Decision makers needs for interpretation, conclusion or recommendations (assessment protocol, criteria, method, process, statistical hypothesis):		
10. Communication & Delivery needs of Decision-maker, organization/others		
11. <i>Monitoring question</i> is met when "XYX.....":		
12. Monitoring System Product:		
13. Evaluation Date		
14. Assumptions and External Factors		
15. Definitions for ambiguous terms:		
16. Ball Park Estimate of \$		

STEP 7

Routine Evaluation Questions to ask of your monitoring program in ADDITION to changing information needs of targeted decision makers?

1. New methods, QA/QC, protocols, technologies
2. Policies, regulations, standards
3. Issues, threats
4. Assets
5. Resources
6. Opportunities
7. Assumptions
8. 8. Limitations
9. 9. Values
10. 10. Organizational, structural, functional
11. 11. Partnerships, Collaborations
12. 12. Powershifts
13. 13. Socio-economic
14. 14. Other?

