ENVIRONMENTAL SCIENCE, STEWARDSHIP AND YOU – PERFECT TOGETHER

NJDEP 8th Annual Volunteer Monitoring Summit

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Edison, NJ

EPA IS 40!

- Mission: EPA's mission is to protect human health and the environment.
- Strategic Plan: EPA's Strategic Plan identifies the measurable environmental and human health outcomes the public can expect from EPA and describes how we intend to achieve those results.
- Clean Air Act, Clean Water Act, Safe Drinking Water Act

EPA AND THE CITIZEN SCIENTIST – A BRIEF HISTORY

- Citizen science is a term used for projects or ongoing program of scientific work in which individual volunteers or networks of volunteers, many of whom may have no specific scientific training, perform or manage research-related tasks such as observation, measurement or computation.

  [http://en.wikipedia.org/wiki/Citizen_science]

- Additional usages of the terms: "the engagement of nonscientists in true decision-making about policy issues that have technical or scientific components; and the engagement of research scientists in the democratic and policy process."

  Bruce V. Lewenstein/Cornell University

- EPA's Volunteer Monitoring program started 1988, through the HQ estuary/coastal program's support of the very first volunteer conference (1989) and the first issue of the Volunteer Monitor newsletter. Today the program resides in the Office of Water's watershed group. Early in the 90s the regions started appointing regional volunteer monitoring coordinators.

STRONG SUPPORT BY THE EPA

- Numerous Web sites
- Guidance documents
  - Volunteer Lake Monitoring: A Methods Manual
  - Volunteer Estuary Monitoring: A Methods Manual
  - Volunteer Stream Monitoring: A Methods Manual
  - The Volunteer Monitor's Guide to Quality Assurance
- Project Plan Guidance
- Volunteer Monitor Newsletter (electronic)
- National Directory of Volunteer Programs
- Volunteer Monitoring List serve (~300 program coordinators)
- Region 2 Web Site and Guidance for Educators and Citizen Scientists
- Workshops

VOLUNTEERING – THE GREAT AMERICAN PASSION

- 44% of Americans volunteered in 2003
  - 39% scheduled (weekly, biweekly)
  - 41% sporadic, one-time
- 3.5 hours per week
- Comparable to:
  - 9 million fulltime employees
  - $239 billion in total value
  - $17.19 hourly wage

www.IndependentSector.org

Pioneering Programs

- National Weather Service (1890)
- National Audubon Society (1900)
- National Marine Fisheries Service (1954)
- Stream Monitoring - (Maryland - 1969)
- Lakes - (ME, MN, MI, NH) (1971-1978)
- Estuaries - RI, Chesapeake Bay (1985)
- New York State Citizens Statewide Lake Assessment Program (CSLAP, 1986)

Courtesy of and adapted from Linda T. Green/CSREES

ENVIRONMENTAL SCIENCE: TOWARD A SUSTAINABLE FUTURE

"What will it take to move our civilization toward a long-term sustainable relationship with the natural world?"

[Wright, R.T., Pearson/Prentice Hall, Ninth Edition]

- **ENVIRONMENTAL STEWARDSHIP**

Simply put, stewardship is the concept of responsibly managing all of our resources for the benefit of present and future generations of people, plants, and animals.

http://www.umich.edu/~urel/stewardship/whatis/

ENVIRONMENTAL STEWARDSHIP

The big question is:

“How do I/we become environmental stewards, or how do I/we become better environmental stewards?”

Stay tuned…

ENVIRONMENTAL SCIENCE - HOW DOES IT TIE INTO STEWARDSHIP?

What exactly **IS** environmental science?

- Environmental science the scientific study of human interactions with the environment. http://wiki.answers.com/
- Environmental Science is the study of environmental systems. It interprets the impact of human actions on terrestrial and aquatic ecosystems, and develops strategies for restoring ecosystems. It also helps planners develop and construct buildings, transportation corridors, and utilities that protect water resources and reflect efficient and beneficial land use. http://answers.yahoo.com/

Science & Stewardship: Friend or Foe?

- **Effective stewardship requires sound science – methods, data and information.**

MODUS OPERANDI: EPA

- What does EPA Region 2 do?

  - Our Regional Administrator is Judith A. Enck. She was appointed Regional Administrator of Region 2 by President Barack Obama on November 5, 2009.

  - In cooperation with state and regional authorities in New Jersey, New York, Puerto Rico, the U.S. Virgin Islands and eight federally recognized Indian Nations, Region 2 administers federal programs governing air and water pollution, industrial discharges, toxic substances, pesticides, protection of streams, lakes and the ocean, solid and hazardous wastes, the cleanup of chemical spills and abandoned hazardous waste sites, and much more.

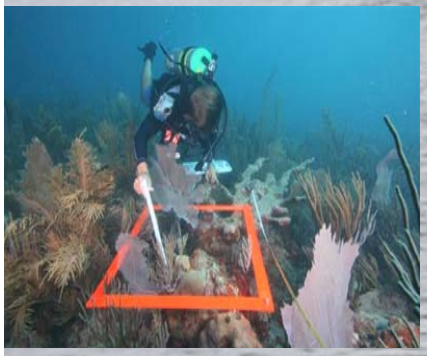
  - Regional staff numbers about 900 and the annual budget is approximately $700 million.

  - Program offices in New York City and the Edison, NJ Environmental Center; San Juan, PR and St. Thomas, USVI; Long Island Sound Office, Stamford, CT (in cooperation with Region 1).

MODUS OPERANDI: EPA

- Division of Science and Environmental Assessment (DESA)
  - **Director: Deborah A. Szaro**
  - **What We Do:** DESA supports the Agency's regional and national compliance monitoring and ambient monitoring programs. The division sets priorities and identifies the resources needed to collect and evaluate environmental samples and analyze the resulting data. It directs special studies, investigations and surveys to support regional enforcement actions or define environmental quality problems in our region. The Senior Science Officer enhances the region's focus on strong science and its connections with academia.
  - **Monitoring and Assessment (MAB):** MAB provides field investigations, sampling, inspections, auditing and quality assurance support for all programs in Region 2 except for Superfund.
    - **Regional Volunteer Monitoring Support**

MODUS OPERANDI: EPA



MODUS OPERANDI: THE CITIZEN SCIENTIST

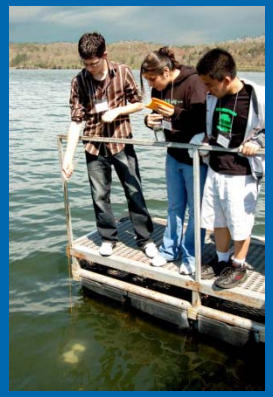
MY NJ VOLUNTEER MONITORING ORGANIZATION (MNJVMO)

- **Mission:** MNJVMO exists to promote environmental awareness and encourage the growth and exchange of instructional resources within the scientific, commercial, and educational communities.

- **Strategic Plan**

- **Carrying out the mission**

MODUS OPERANDI: THE CITIZEN SCIENTIST



ENVIRONMENTAL SCIENCE and STEWARDSHIP

- Effective stewardship requires sound science.
  - Scientific methods, data and information
  - Education
  - Hands-on experience
  - Grasp of the Bigger Picture

EPA vis-à-vis THE CITIZEN SCIENTIST

- Do they do things differently?
  - Volunteers typically use kits or send samples to professional laboratories.
  - Sampling and analytical methods used are generally comparable to those used by professionals.

The OSV *Bold*

EPA vis-à-vis THE CITIZEN SCIENTIST

Monitoring cherry tree blooming cycles in Washington, DC

EPA vis-à-vis THE CITIZEN SCIENTIST

Does it make a difference?

NOT AT ALL!!!

WHY NOT, do you ask?

EPA vis-à-vis THE CITIZEN SCIENTIST

Because:

Methods and equipment may not be the same.

But:

The approach must always the same, regardless of who does it!

EPA vis-à-vis THE CITIZEN SCIENTIST

Secchi Disk: Water Clarity (Depth in m or ft)

Multi-Parameter Probe : Turbidity (NTU)

Turbidity Kit (NTU)

Turbidity Tube : Water Clarity (Depth in cm or in)

EPA vis-à-vis THE CITIZEN SCIENTIST

- We’re all pieces of the same puzzle!
- **Our main objective is to contribute to environmental stewardship.**
- How can we achieve this?

DATA

and

INFORMATION

DATA VS. INFORMATION

- What came first: data or information?
- Does one exist without the other?
- How do we know what we want or need?
- What do we do with data and information?
- Who uses data and information?
- Does it ever end?

Let’s take a closer look …

DATA

Main Entry: **da·ta**
Pronunciation: 'dAt-&, 'dat-, 'dät-
Function: *noun plural but singular or plural in construction*
: factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation <the *data* is plentiful and easily available —H. A. Gleason, Jr.> <comprehensive *data* on the incidence of Lyme disease>

Source: *Merriam-Webster's Medical Dictionary, © 2002 Merriam-Webster, Inc.*

INFORMATION

in·for·ma·tion
noun

Knowledge derived from study, experience, or instruction.

ARE DATA AND INFORMATION ONE AND THE SAME?

DATA

- Numbers, characters, images or other types of recording.
- Can be assessed by a human or by another device, such as a computer.
- Have no meaning on their own.
- Example:

  45678.90

  Do you know what this is?

  Does it tell you anything?

  Do you know where it's coming from?

  Do you know what to do with it?

- So, why do we need data?

Adapted from wikipedia.org

INFORMATION

- Generated from data through a processing system.
- Takes on meaning through perceived patterns.
- Enhances knowledge.
- Allows decision making.
- Example:

  -> "I just received an e-mail from my bank, that my balance increased to $45,678.90." This is information.

  -> "This can't be right, I don't earn that much in one year." This is knowledge.

  -> "I have to talk to them, and correct the situation." This is a decision based on data, information and knowledge.

- So, why do we need information?

THE ANSWERS TO THE QUESTIONS:

- Because data makes information possible.
- Because information increases knowledge.
- Because, armed with knowledge, we can make decisions on the state of the environment, craft legislation to protect the resources, and attempt to solve environmental problems.
- Because, without data, information and knowledge, we cannot be environmental stewards.

It all starts with acquiring data.

We want **good data**! Or, do we?

DO WE NEED GOOD DATA?

- Actually, **NO!**

- You can collect perfect data. But remember, data on its own has no meaning.

  Suppose that you decide to stand for two hours in front of Macy's in NYC and count the number of people wearing Nike sneakers. So far, so good. But what does this mean, what do you do with it, and who needs it? Shouldn't you also have been counting all people wearing sneakers, and everybody else too? And what about people in other areas and on other days? Why? Why not?

- So, we need **useful data**. Because useful data will yield **useful information** and **useful knowledge**, thus allowing **useful decision-making**.

GETTING DATA

- Where do we get data?
  - a. From direct measurements – data we collect ourselves, monitoring.
  - b. From other sources – historic data, published data, secondary data.
- Regardless of their source, someone can use the data to make something happen.
- You can influence someone in a position of power to act.
- IF YOU HAVE BELIEVABLE OR CREDIBLE (USEFUL) DATA!
- Believable data = data you can trust.
- Data you can trust is the first step in getting information that you can trust
- If not: GIGO = Garbage In, Garbage Out. Useless data are worse than no data!

HOW DO WE GET BELIEVABLE DATA?

Credibility doesn't mean having the most exacting techniques. It means delivering on your promises, no matter how small or large they are.

-Meg Kerr

RI River Rescue

QUALITY ASSURANCE (QA)

The most important factor determining the level of quality is the cost of being wrong!!!

WHY QUALITY ASSURANCE?

- **Quality** makes your work **acceptable.**
- **Acceptability** means that **others can use your work.**

- Quality Assurance is the answer to the questions you must ask before setting out to collect your own data and/or use someone else's:

  - **Why am I doing this?**
  - **Where and what type of data do I need to collect/use?**
  - **How am going to do this?**
  - **With what am I going to do this?**
  - **How will I know that my data are believable and useful?**

TYING THE ANSWERS TOGETHER:

- **You need a PLAN!** A Quality Assurance Project Plan. (QAPP)
- It can be as simple or as complicated as your project.
- **BUT:** you need to answer all the questions,
- **AND:** you need to **DOCUMENT, DOCUMENT, DOCUMENT!**
- **IMPORTANT: include both time and $$$ for QAPP development in your work plan and budget.**

WHAT NOW?

- You did your work, followed the plan, made sure that the data are believable. Are you done?
- Who will use your believable data? And how will they know that they even exist?
- You have to sell your data: write the **REPORT** and turn the data into useful **INFORMATION.**
- How do you turn data into information?
- Hint: it means more work for you – you have to **PROCESS** your data, or find someone to do it reliably for you.

GENERATING INFORMATION FROM DATA

- Take a good look at your data set and documentation (plan, methods, etc.).
- Compare with data from other sources, if they exist and are reliable.
- Compare with standards or guidelines for the type of data you've collected.
- Analyze your data to see how close they are to the standards or guidelines.
- Assess your data and determine if you have enough information.
- Draw one or more conclusions.
- **Make sure that your data and information get to the right people.**
- **Be prepared to defend your data and information.**

“It is in the marriage of credible data and increased stewardship behavior that the true potential and vitality of citizen monitoring begins to emerge.”

-Steven Hubbell, Colorado River Watch

QUESTIONS?