

# COMMUNITY BASED PARTICIPATORY HEALTH RESEARCH TO IMPROVE WATER QUALITY ON A MAJOR WATER SOURCE IN SOUTHWESTERN PA



UNIVERSITY OF PITTSBURGH • GRADUATE SCHOOL OF  
**PUBLIC HEALTH**

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# Presenter Disclosures

Charles Christen

- (1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

# Background



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- ◆ In recent years, community based participatory research (CBPR) has enjoyed success in bridging the gap between science and the needs and concerns of those with whom research activity is conducted. (Sloane, et al, 2003; Minkler et al, 2006)
- ◆
- ◆ Participatory research through partnerships between scientists and citizens provides an approach to natural resources management which recognizes the complexity of issues and the need to produce options suited to the end users (Brown, 1985; Finn, 1994).
- ◆ Recently participatory research has been promoted and used internationally to
  - ◆ **Involve local communities in data collection and monitoring** (Roba and Oba, 2008; Inmuong et al., 2001),
  - ◆ **Natural resources management research** (Johnson et al., 2003),
  - ◆ **The effective use of natural resources** (Fleeger and Becker, 2008; Sultana and Abeyasekera, 2008). (Garci and Brown, 2009). and Jacqueline A. Ashby, (2003)
  - ◆ **Measuring the impact of user participation in agricultural and natural resource management research**, C.E. Roa Garci a a, S. Brown (2009)

# Nine Principles of CBPR

- Recognizes community as a unit of identify.
- Builds on strengths and resources within the community.
- Facilitates a collaborative, equitable partnership in all phases of the research, involving an empowering process that attends to social inequalities.
- Fosters co-learning and capacity building among all partners.
- Integrates and achieves a balance between knowledge generation and intervention for mutual benefit of all partners..
- Focuses on the local relevance of public health problems and ecologic perspectives that recognize and attend to the multiple determinants of health
- Involves systems development using a cyclical and iterative process
- Disseminates results to all partners and involves them in the dissemination process
- Involves a long-term process and commitment to sustainability

# Southwestern PA

- ◆ Southwestern Pennsylvania is a water rich area
- ◆ Water in this area is affected by legacy as well as ongoing industrial pollution.
- ◆ Much has been done over the last fifty years to improve water quality in this region yet many problems still exist.
- ◆ Results of the Allegheny River Stewardship Project reveal that perceptions differ about the water quality of local rivers.
- ◆ This perception has also allowed the combined sewer overflow and sanitary sewer overflow, a major water quality issue in Allegheny County, the most populated area in Southwestern PA, to go relatively unnoticed by the general public, as well as river dredging and unauthorized discharges



# Two Different Perspectives of the Allegheny River



# THE ALLEGHENY RIVER STEWARDSHIP PROJECT (ARSP)

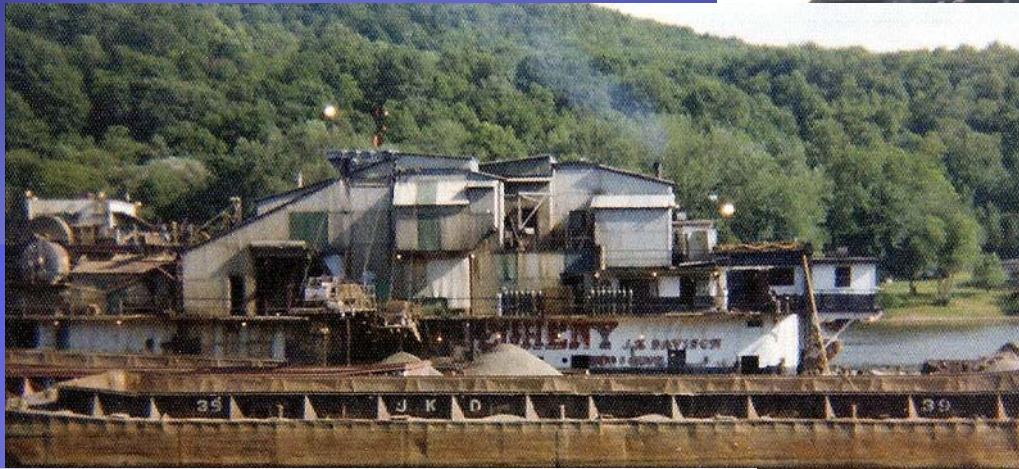




# The ARSP is an extension of the Three Rivers Fish Consumption Project (TRFCP)

- A significant result of the TRFCP leading to the ARSP was the findings of significantly higher levels of mercury and selenium found in channel catfish caught upstream at Kittanning as opposed to those caught in the Pittsburgh Pool
- The cooperation and significant input of anglers to the TRFCP

# RIVER MINING



Sewer Overflow – Waste  
Water Treatment



# Coal Fired Energy Production



Legacy and Ongoing  
Industrial Pollution

Fish are bio-indicators of human exposure to environmental carcinogens, endocrine active substances (EAS – substances that affect the operations of or mimic the actions of hormones such as estrogen) and metal and metalloid and elemental toxins



# PURPOSE

- ◆ The Allegheny River Stewardship Project (ARSP) is a Community Based Participatory Research (CBPR) effort by leading researchers, working together with concerned citizens of the Alle-Kiski Valley river communities, to determine the sources and types of river pollutants by monitoring the levels of toxins in fish living in the river, as well as river water and sediment



# Specific Aims

- ◆ ENGAGE RESIDENTS AROUND THE RIVER
- ◆ IDENTIFY COMMUNITY ISSUES AND PROBLEMS
- ◆ BETTER UNDERSTAND TOXIC METALS AND ENDOCRINE DISRUPTORS IN RIVER WATER, SOIL and FISH
- ◆ IDENTIFY EXPOSURE AND RISK TO HUMAN HEALTH FROM CONTAMINANTS IN RIVER WATER
- ◆ EVIDENCE FOR POLICY CHANGE
- ◆ FORM STRATEGIC PARTNERSHIPS AND COLLABORATION.

# Assumptions

- ◆ Residents living near and around the Allegheny River will engage in participation of this project because of a concern for the ongoing stewardship of this river.
- ◆ That these same residents have knowledge and expertise about the rivers of Pittsburgh that university researchers do not have

# Assumptions

- ◆ There are groups of anglers who are subsistence fishers and may not be aware of the extent of bio accumulation of toxins in the fish they consume.
- ◆ Anglers using rod and reel to obtain a sample of fish will provide a sample typical of human consumption.

# Assumptions

- ◆ Fish caught near water treatment outflows would have accumulated higher concentrations of endocrine disrupting chemicals because the water released by the over 400 sewer overflows (SOs) in the southwestern Pennsylvania area is hypothesized to contain both pharmaceutical and xenoestrogens which have known effects in aquatic species.
- ◆ The river water contaminated by SOs is the primary drinking water source for Allegheny County residents potentially exposing large, susceptible population groups

# Assumptions

- ◆ Mercury, arsenic and selenium are of primary interest in fish protein because they are like fingerprints of coal fired power plant pollution.
- ◆ Higher concentrations of toxic metals in fish caught in the Allegheny River upstream from the Pittsburgh Pool will be found due to deposition from coal fired energy production



# Key Partnerships Formed

- ◆ Rachel Carson Homestead
- ◆ Venture Outdoors
- ◆ RiverQuest
- ◆ Alle-Kiski Health Foundation



- ◆ Scoping expedition in June 2007 to identify environmental problems- used also to announce the Allegheny River Stewardship Project (ARSP) to communities through print and broadcast media.



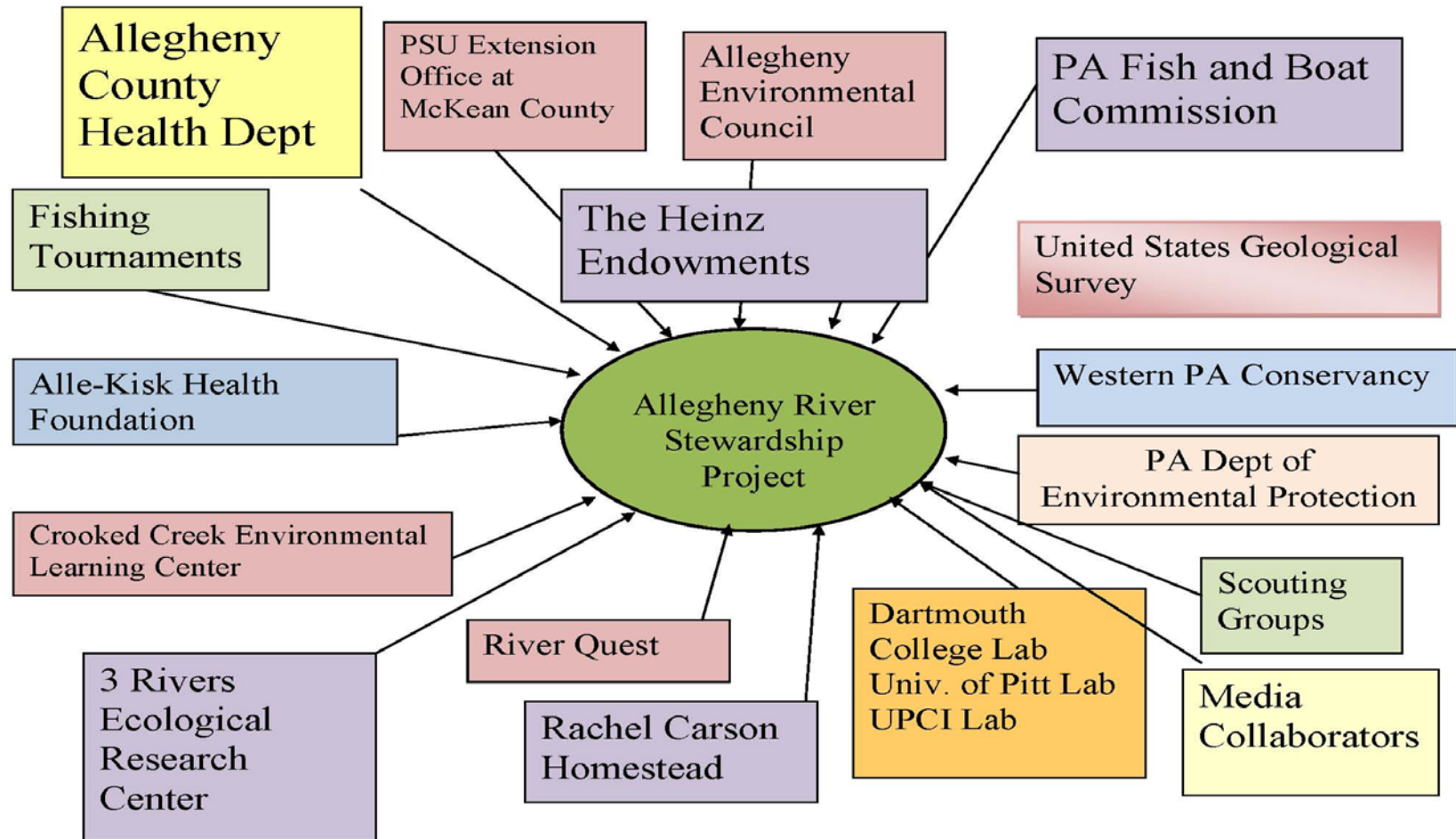
# METHODS

- Information from a systems approach formed the basis of extensive contact with community organizations.
- Community Organizing - consisted in part of three town hall meetings,
- High Visibility in the Community - Numerous presentations on the ARSP to community organizations, schools and various groups as well as radio, television and print media.
- Information Sharing - The internet was an important tool for sharing information with the community as well as providing an expeditious means for volunteer recruitment.
- Needs Assessment - Pollution narrative statements were used extensively throughout the community to assess community needs and concerns related to environmental issues.





# A MULTITUDE OF COMMUNITIES





# Community Meetings

## Pollution Narratives Returned



Pittsburgh Mills Shopping Plaza 68

Crooked Creek Environmental Learning Center 33

Allegheny Township Municipal Bldg 19

Discover Island RiverQuest Presentation 10

Freeport High School and Highland School 160

Ford City High School 22

# Data from Pollution Narratives

ADULT Response		STUDENT Responses	
Sewage	32	Litter/Trash/Garbage	162
Chemical, Pesticides, Cancer-causing agents	24	Pollution in Rivers/Streams	86
Industrial Pollution Dumping	22	Air Pollution (smoke and car exhaust)	38
Acid Mine Drainage	20	Chemical Pollution/Metal	22
River Mining	16	Factory Pollution	18
Trash (tires, trash from recreation)	15	Sewage	15
Power Plant Emissions	6	Mine Release	6
Runoff	6	Cars	3
Combined Sewer Overflow	5	River Mining	2
Radioactivity from Burial	5	Weather	1
Sewer Overflow	1	Alternative Fuels	1
Loss of Riparian Zones/Wetlands	1		

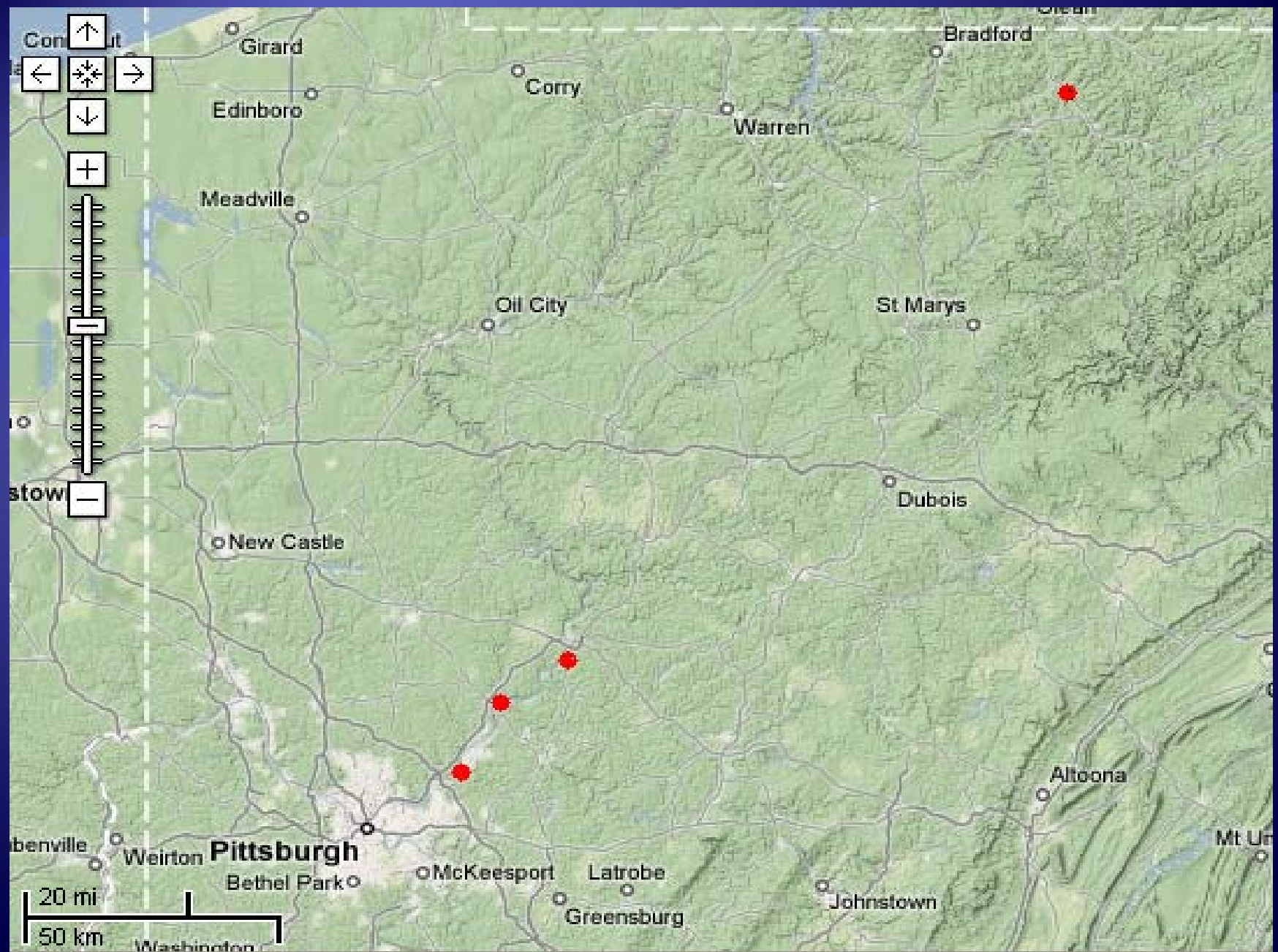
# Women's Focus Group

- ◆ 8 women
- ◆ Ages 45 → 61 years of age
- ◆ All White
- ◆ Living in - Apollo, Leechburg (2), Freeport, Natrona Heights, Pittsburgh
- ◆ Employment – Professional, unemployed, realtor, no employment given, nurse, speech pathologist, retired.



# Sampling Sites

- ◆ **Ford City, PA** – At the mouth of Crooked Creek
  - ◆ Coal Fired Energy Production, Cadogan Waste Site, Water Sewage Treatment
- ◆ **Freeport, PA** – At the mouth of Buffalo Creek
  - ◆ Water Sewage Treatment Plant and River Mining
- ◆ **Springdale/Cheswick, PA** – The site of the Keystone Coal Fired Energy Production Plant
  - ◆ Flyash
- ◆ **Turtle Point, PA** – headwaters of the Allegheny River
  - ◆ Control site





# Cadogan Waste Site







# Community Volunteers attended the four community fishing days at each of the collection sites

- Ford City (5/10/08) – 88
- Springdale/Cheswick (5/31/08) – 75
- Freeport (6/7/08) – 79
- Turtlepoint (6/14/08) - 10



Registered community volunteers permitted ongoing dialogue with researchers resulting in a feedback loop affecting study variables and study parameters

# Breakdown of Volunteers

- ◆ Males and Females fairly equal (82 each
  - ◆ 13 no responses on survey form
- ◆ 127 Caucasian, 2 African American, 1 Latino
  - ◆ 24 no responses on survey form
- ◆  $N > 16 = 136$
- ◆  $N > 50 = 60$
- ◆  $N < 16 \text{ and } < 30 = 27$
- ◆  $N > 30 \text{ and } < 50 = 27$









## Fish Collection Record

5/7/2008

Sampling Date and Time (24 h):

05/10/08 10:30

River Subsection code:

1

Lat. / Long.: N 40°45.116' / W 79°33.787

Species Name:

Channel Cat

Waypoint ID:

Angler's / Collector's Name:

Jeremy Snyder

Site Location:

☒ Ford City

☐ Springdale / Cheswick

☐ Freeport

☐ Headwaters

To be filled in only by the logmaster.~

ARSP

1-015-051008-CC-1

Channel Cat Fish C002 Jeremy Snyder (cool) Larry  
5/10/08-10:30 N 40°45.116' W 79°33.787  
Snyder after (cool) Larry  
Craig

11/04/2008





### Fish Collection Record

Sampling Date and Time (24 h):

River Subsection code:

3

05 / 24 / 08

10 : 20

Lat. / Long.: N 40° 45.255 / W 07° 37.351

Species Name: Smallmouth Bass

Waypoint ID:

E

004

Angler's / Collector's Name: Jim Caruso

Site Location: ☒ Ford City ☐ Springdale / Cheswick

☐ Freeport

Waypoint #

☐ Headwaters

To be filled in only by the logmaster.

ARSP

1 - 0 5 4 - 0 5 2 4 0 8 - 5 B - 3

5/7/2008

28/04/2008

# Results

- ◆ Recreational activity is high and has grown in recent years.
- ◆ Perceptions of the river and its cleanliness is high, especially with anglers who see the evidence of more fish and variety of fish.
- ◆ Perceptions of pollution issues from pollution narratives differs significantly from student responses.
- ◆ Yet those who said the river was clean would not swim in it.
- ◆ In high risk areas there is a blindness due to daily contact with the threats.



# Results

- ◆ It is important to balance the message of bio-accumulation of contaminants and fish consumption.
- ◆ Angling has strong roots in father/son/daughter bonding
- ◆ Anglers have a strong tie and interest in preserving and improving river water quality. They are untapped resources.
- ◆ The size, types and number of fish collected are highly indicative of fish generally caught by people living and recreating on this river

# Results

- ◆ Often community members want to do something to improve their environment, especially related to water, but lack information on how.
- ◆ Feelings of helplessness to change environmental threats, and a high number of people look for ways to make a difference.
- ◆ Anglers as well as people living on or near the rivers of Pittsburgh often think and feel that “others” need to do something to clean up river water.
- ◆ There is a huge need for community capacity building related to environmental concerns.

# Results

- ◆ New pollution sites and pollution sources were identified
- ◆ Involvement by African Americans further outside of the City of Pittsburgh boundaries was lacking.
- ◆ Most people have not heard of endocrine disrupting chemicals
- ◆ A majority of participants in the project were unaware of hazards of coal fired energy production
- ◆ Individuals with unvoiced environmental concerns contacted ARSP for assistance and were referred to appropriate resources.

# Results - Women's Focus Group

- ◆ The women believed that women in general are nurturers and have a heightened concern for the environment
- ◆ Nurturing aspect may be linked to childbearing
- ◆ High desire to motivate others for change, but frustrated in knowing how to accomplish this.
- ◆ The participants overwhelmingly considered that information and experience leads to behavior change.
- ◆ It is important who communicates information.
- ◆ Influencing young people was very important to these participants.
- ◆ The importance of water and water quality was high on the list of concerns for these participants.



# Conclusions



- The major benefit from this study is the high degree of collaboration and knowledge gained from the community allowing for targeted communication of results as well as ongoing information sharing.
- This project has also created a the opportunity for ongoing information sharing and support allowing for numerous opportunities for future research, with this study as a foundation.
- Across the Allegheny Watershed, trust has been built with many community components

# Conclusions

- ◆ There is an ethical tension between what the community reports as problems, the solution and how it is reported.
- ◆ CBPR is an ongoing process and requires continued interaction with the communities engaged in the process
- ◆ It is a complicated and time demanding process of identifying key informants and those who have the necessary influence in the community.

# Dissemination

- ◆ Report of Cadogan site results to PPG Industries, press, city council in Ford City, Ford City High School Community Meeting
- ◆ Report of ARSP initial results to Community Meeting in Allegheny Township, especially results related to river mining.
- ◆ Report of River Mining results to the Ohio River Basin Research and Education Conference
- ◆ Additional dissemination on hold until completion of analysis related to endocrine disruptors in water and fish brain samples.

# Funders

- ◉ Alle-Kiski Health Foundation (\$25,000)
- ◉ University of Pittsburgh Cancer Institute-Center for Environmental Oncology
- ◉ Highmark Foundation-Healthy People-Healthy Places, DSF Charitable Foundation (\$37,000 )
- ◉ The Graduate School of Public Health-Department of Environmental and Occupational Health (\$35,000)
- ◉ The Heinz Endowment (\$50,000)