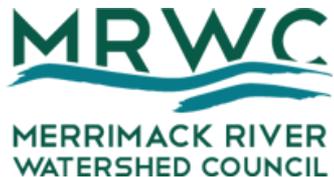


# BEHAVIORAL BARRIERS AND OPPORTUNITIES FOR CLIMATE ADAPTATION



Caroly Shumway, Ph.D.  
Executive Director, Merrimack River Watershed Council  
National Adaptation Forum, April 2, 2013

- Because conservation is a human effort.
- Because too many plans are stuck on shelf.
- Because you ignore it at your peril.

- Time: Hand-washing in Guatemala
- How our Brains are Wired: Lung cancer and outcomes (McNeil et al., 1982, NE J of Med).
- Skills/Training: Engineer vs scientist.
- Values/Beliefs: Individual vs community messages and ethnicity (NPR, 2013).
- Knowledge conflicting with Values: If outcome affirms your values, you consider it; if not, you don't (Kahan et al., 2<sup>nd</sup> National Risk and Culture Study, 2007).
- Techno-arrogance: Meffe, 1992, Cons. Bio. 6(3).

# HOW BEHAVIOR IMPACTS ADAPTATION OPTIONS

PROTECT

RETREAT ACCOMODATE

ENHANCE

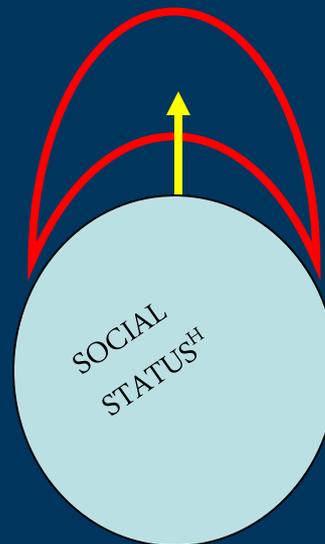
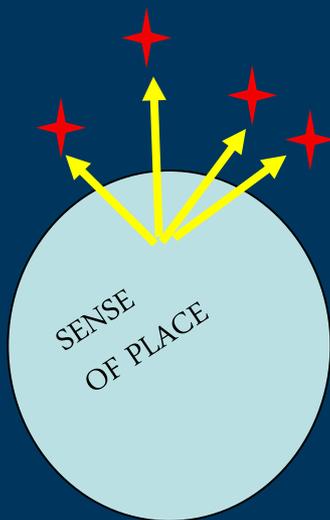
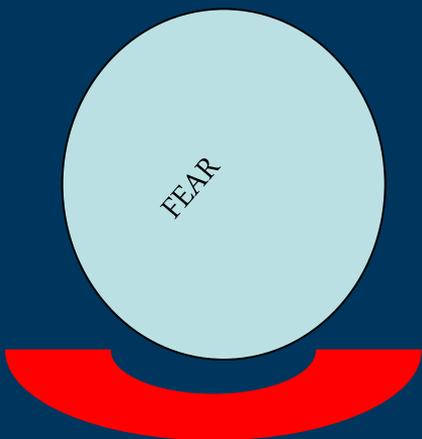
RESILIENCE

*Living  
Shorelines*

*Move People and  
Wildlife*

*Ensure Opportunity  
For Movement*

*Reduce other  
threats*



CLIMATE CHANGE IMPACTS TO RIVERS  
 (BEYOND SLR)

PRECIPITATION INCREASE  
 TEMPERATURE INCREASE  
~~FLOODING~~  
 NOAA (2011)

ESTUARIES/  
 MARINE



**STORMWATER**  
 TEMPERATURE  
 NUTRIENT RUNOFF  
 SEDIMENT RUNOFF

FRESHWATER



LAND

We know riverine communities  
worry about flooding...

We know they worry about  
water quality (but don't  
understand stormwater)....

We know climate change will  
increase both flooding and  
stormwater...SO...



NEUROLOGICAL CONSTRAINTS  
ON PERCEPTION OF RISK

Two paths of thought: fast, intuitive, emotional vs  
slow, deliberative, logical  
(Kahneman, 2011; Gore, 2007)

We'd react more strongly if..

- climate change had a **face**;
- the public understood climate change to be a **present danger**, with **local impacts**;
- we had a better **capacity** to recognize gradual change; and
- the public and decision-makers better understood **connections**



## WHAT INFLUENCES INDIVIDUAL BEHAVIOR?

How our brains are wired\*\*

Values/beliefs\*

Attitudes

Peers/Social norms

Family

Habits

Time (capacity; also temporal aspect to change)

Skills, Training

Laws

Enforcement/Perceived ability to enforce\*

Knowledge

Options

Money (economic incentive or disincentive)\*

## WHAT INFLUENCES INSTITUTIONAL BEHAVIOR?

- Irrational behavior: short-term rationality wins
- Competitive behavior overrides cooperation
- Fragmentation of interests and values
- Fragmentation of responsibility and authority  
(overlapping jurisdiction, lack of integrated planning)
- Fragmentation of information and knowledge

### IN ORDER OF PRIORITY

Yaffe (1997) *Cons. Biol.* 11(2)

- Institutional governance
- Attitudes, values, motivation
- Resources, funding
- Politics
- Leadership
- Adaptation Options
- Understanding/Science

Moser and Ekstrom (2012)

## Objectives:

1. Identify behavioral barriers to climate adaptation in pilot suburban and urban inland communities through surveys, interviews.
2. Identify behavioral opportunities and strategies to effect change at the municipal scale.
3. Focus on solutions with both short-term benefit to neighbor concerns and a longer-term benefit to resilience.  
*See Heath (2010) [Switch: How to Change Things when Change is Hard](#).*
4. Precedent: EPA Urban Waters Grant on Stormwater (suburban towns, environmental justice urban areas)

1. Talk with residents and municipal officials about their environmental concerns and community goals.

Do not bring up stormwater until after we hear concerns.

Do not use stormwater word. (See [WaterWordsThatWork](#)).

2. Summarize predominant concerns.

3. Review greatest stormwater problem relative to these concerns.

4. Use focus groups to tailor message and solutions to these concerns.



Overreliance on engineered solutions (structural BMPs) versus what the science tells us is solution! (NRC, 2009, Stranko et al., Miltner et al., Scheffe and Benoit, 2007)!

Over-focus on standard definition of pollutants so other impacts not addressed

Lack of capacity at local and state level

Lack of regulation and enforcement at all levels

Lack of incentives for municipalities to follow regional plans

**Pollutants** from stormwater runoff (oil, grease, brake fluid, animal waste, road salt)

**Nutrients:** Phosphate/nitrate

**Thermal** stress (heat from impervious surfaces)

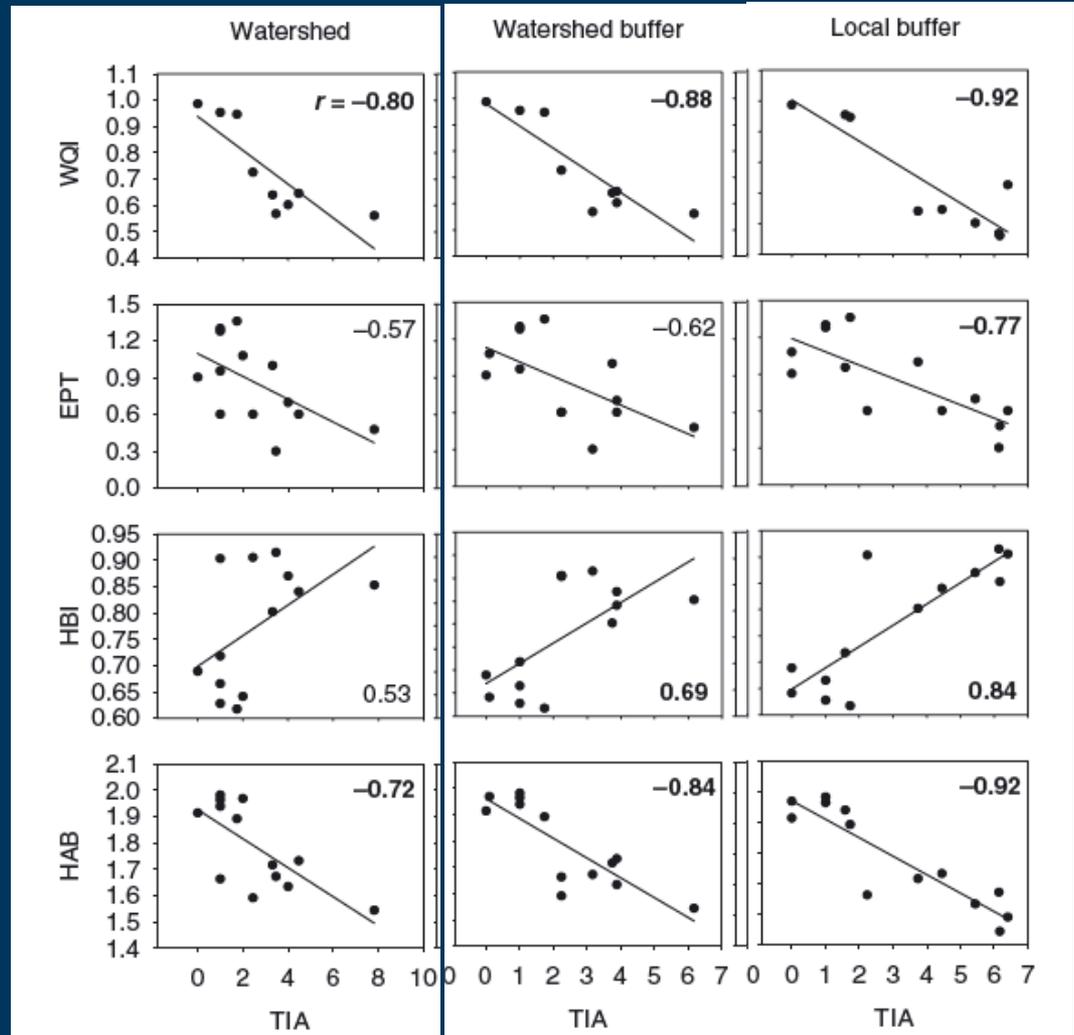
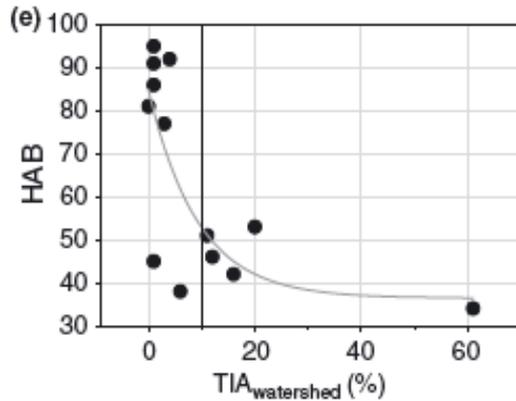
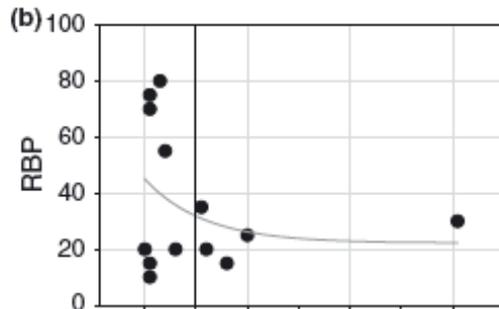
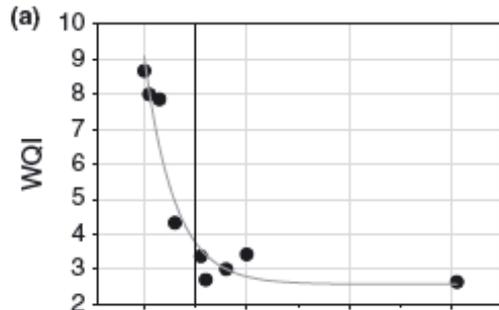
Reduction in water **quantity** (1" storm)

**Flashiness**, leading to bank erosion.

**Sediment/erosion:** Construction impact! (NRC, 2009)

Combined sewer overflow (CSO)

**BOTH WATER QUALITY AND ECOLOGY ARE DEGRADED BELOW  
5-7%  
IMPERVIOUS COVER. BUFFERS MATTER.**



## HOW WELL ARE WE PROTECTING OUR RIPARIAN/WETLAND BUFFERS?

NOT WELL.

While filling in of wetlands is prohibited, setbacks are too limited for plants or wildlife to survive.

Wetland bird species declining (MA Audubon, 2012).

WHAT ARE WE REPLACING WETLANDS WITH? Artificial ones wildlife can't use.

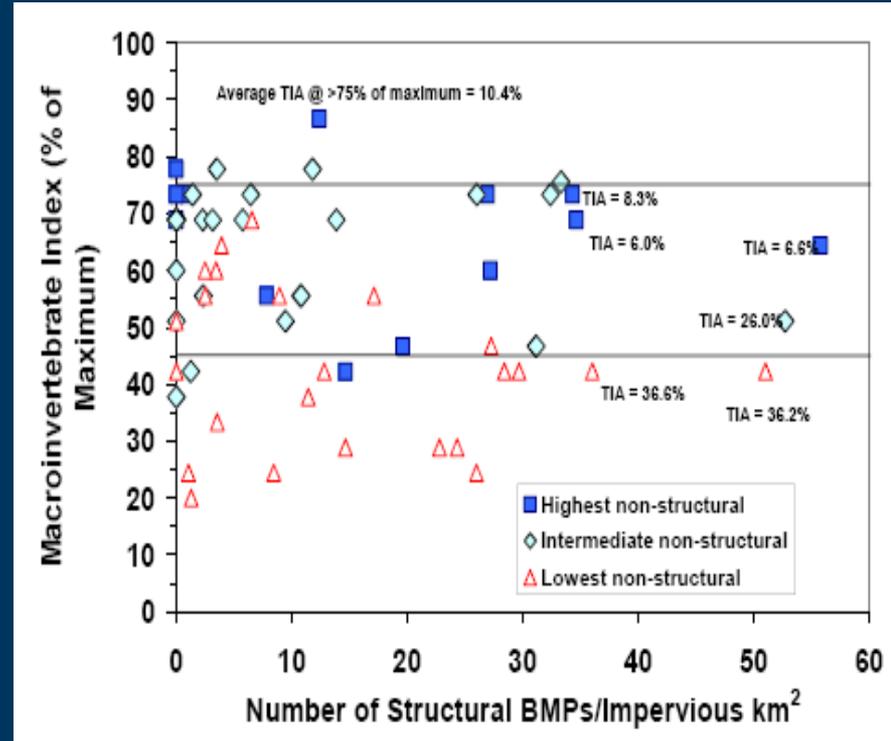
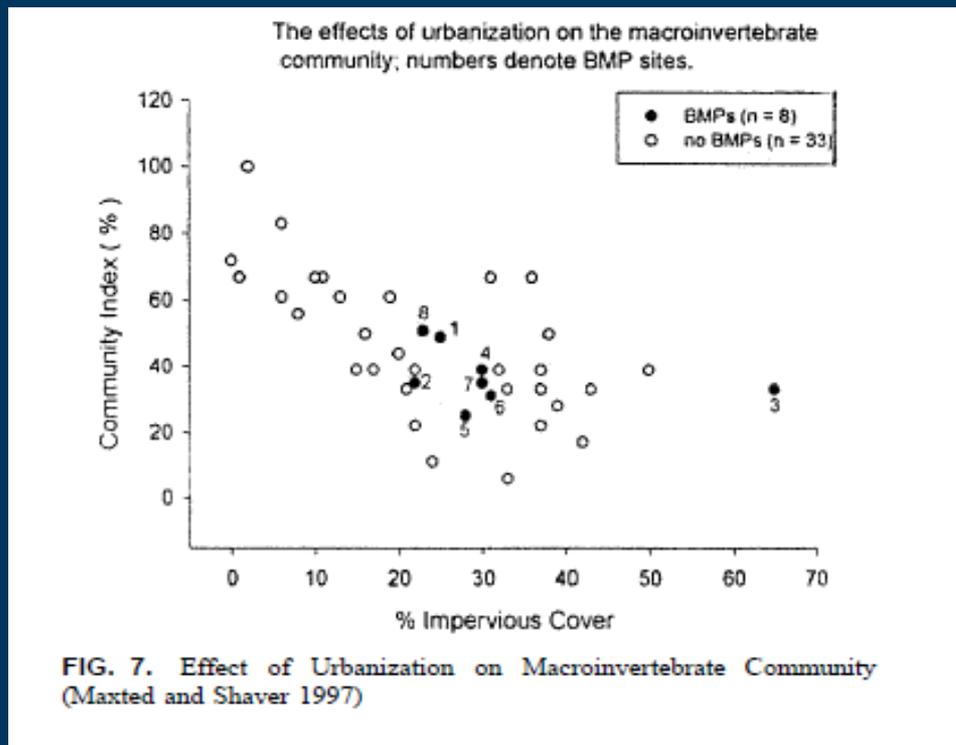
Retention ponds



Rain Gardens



**TOWN  
GUIDANCE:**  
✓ “Discourage  
wildlife as  
much as  
possible”



Maxted and Shaver (1997) in Roesner, ed.

Horner et al. (2003) Mar. Freshwater Research 55(3)

# ONCE DEGRADED, BIOTIC INDICES DO NOT IMPROVE WITH RESTORATION OF URBAN WATERS

## Reference Streams

All less than 5% Urban and > 60% Forest (NLCD 2001)



Baisman Run



NB Jones Falls



Timber Run

## Urban Restored Streams

All > 60% Urban (NLCD 2001)

Substantial Restoration Conducted



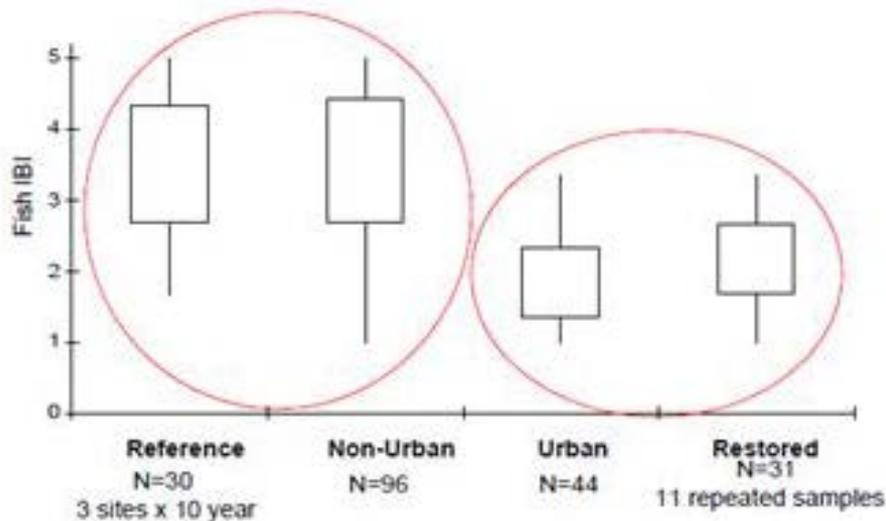
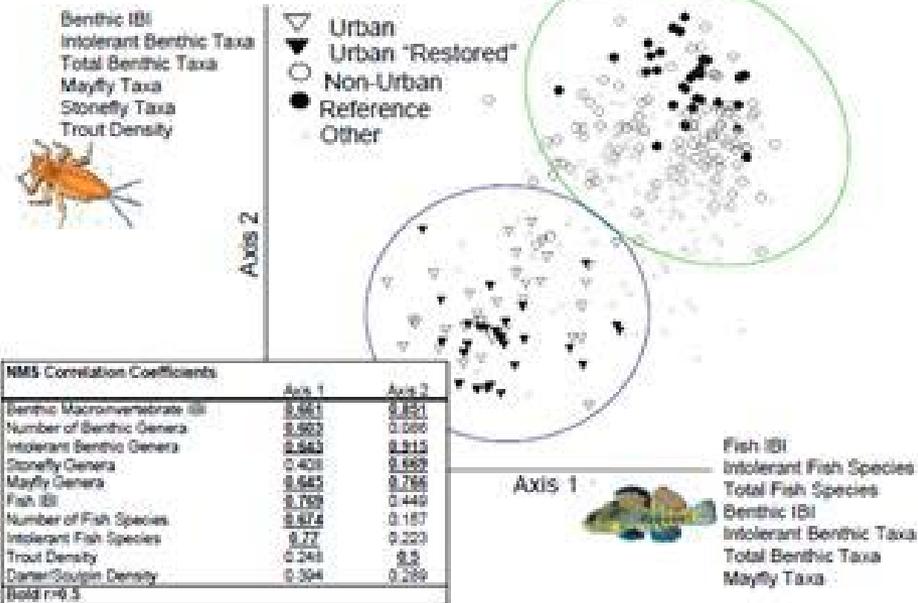
**Sligo Creek**  
Stormwater Retrofits (8)  
Created Wetland (1)  
Channel Recon (2,670 ft)  
Tree Planting  
Fish Stocked (23 spp, 6 events)  
**Completed ~2001**  
**About \$2.6 Million**



**Minebank Run**  
Remove Concrete (500 ft)  
Channel Recon ( 3.5mi)  
Tree Planting  
**Completed 2005**  
**About \$4.0 Million**

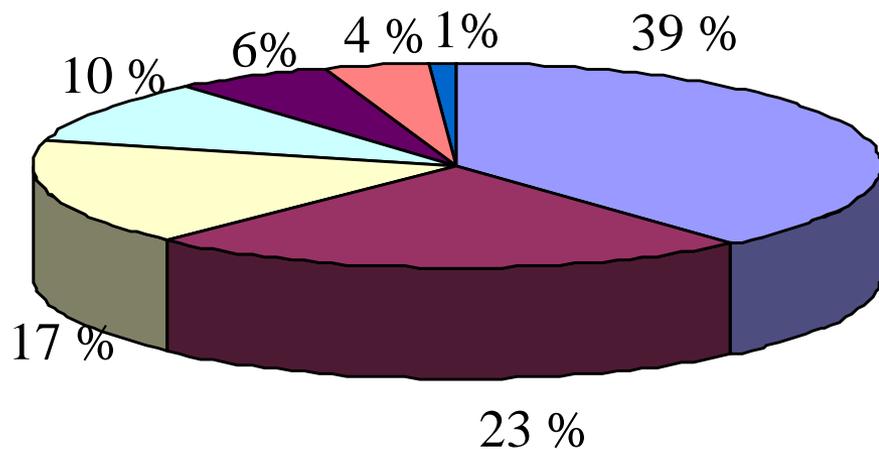


**Longwell Branch**  
Stormwater Ponds Added (2)  
Fortify Banks (~400 ft)  
Tree Planting  
**Completed 1998**  
**About \$600,000**



- Minimal educational focus on Municipal Boards when this is where difference could be made!
  - Understanding of connections, impact, solutions, and authority to regulate is critical
- Focus on individuals when they are not the greatest drivers of stormwater problems
  - Here, messages to individuals are not tailored to their concerns or to what motivates them

# WHAT MOTIVATES PEOPLE TO CARE/ACT? THEIR VALUES



- I have a responsibility to future generations
- Nature is God's work
- For my family to enjoy a healthy life
- I respect nature for its own sake
- I appreciate nature's beauty
- To protect America's natural history
- Don't know

*You only give your baby the purest water...  
Their babies need it too!*



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***SUPPORT LOCAL LAND PROTECTION!***

***GO HOLLYWOOD!*** *Be the first on your block with a Hollywood Driveway.*



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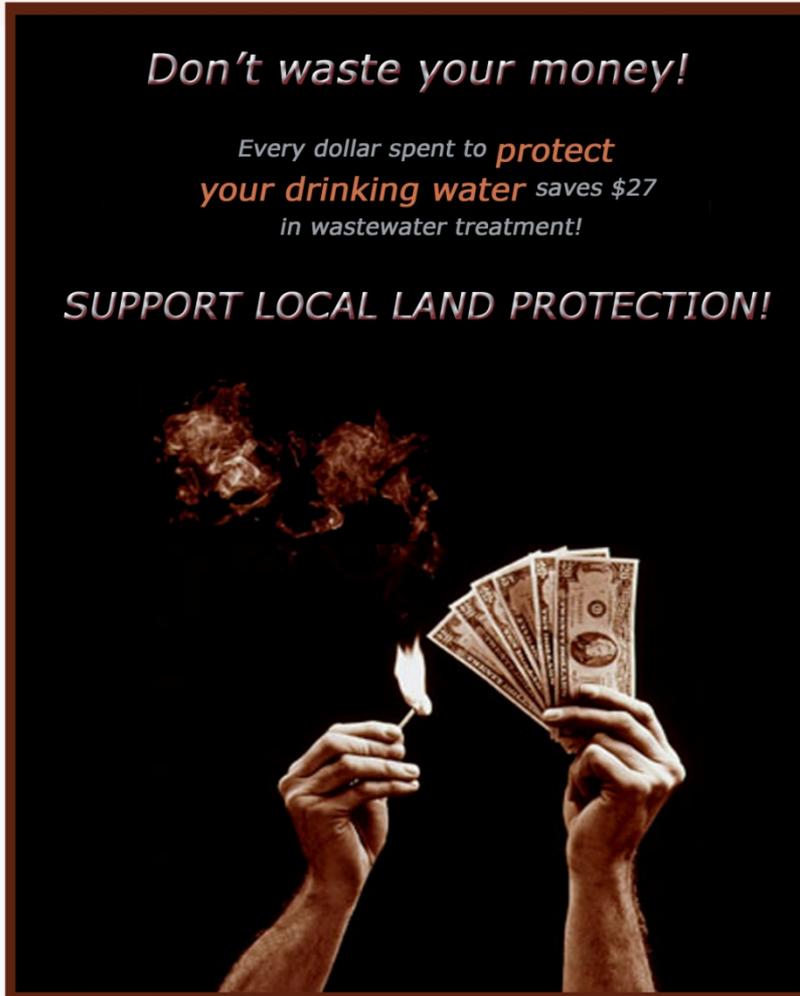


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OTHER  
APPROACHES TO  
BE TESTED

Patriotic  
Humorous  
Shocking

OTHER  
SOLUTIONS TO BE  
HIGHLIGHTED

Combined rain garden/  
community garden  
Incentive for developers

1. Don't treat social science as a 'token' or just in context of economics. Behavior must be considered at every stage!
2. Frame the problem relative to what concerns people. Start with this!
3. Use messages from regular people who have experienced impacts already – e.g., flood victims.
4. Test and determine best motivational message. Provide positive solutions and actions to respond.
5. Identify win-win options with short- and long-term gains, and with multiple benefits. E.g., all ordinances that limit impervious cover.
6. Train judges/lawyers in this area, provide legal precedents!
7. Prioritize sites where communities are motivated, where have local leader, and where can address multiple impacts.



*“The question is not whether rivers and oceans can survive what humans are doing to them, but whether humans can.”*

*modified from Mark Hertsgaard, 2006*

## INDIVIDUAL

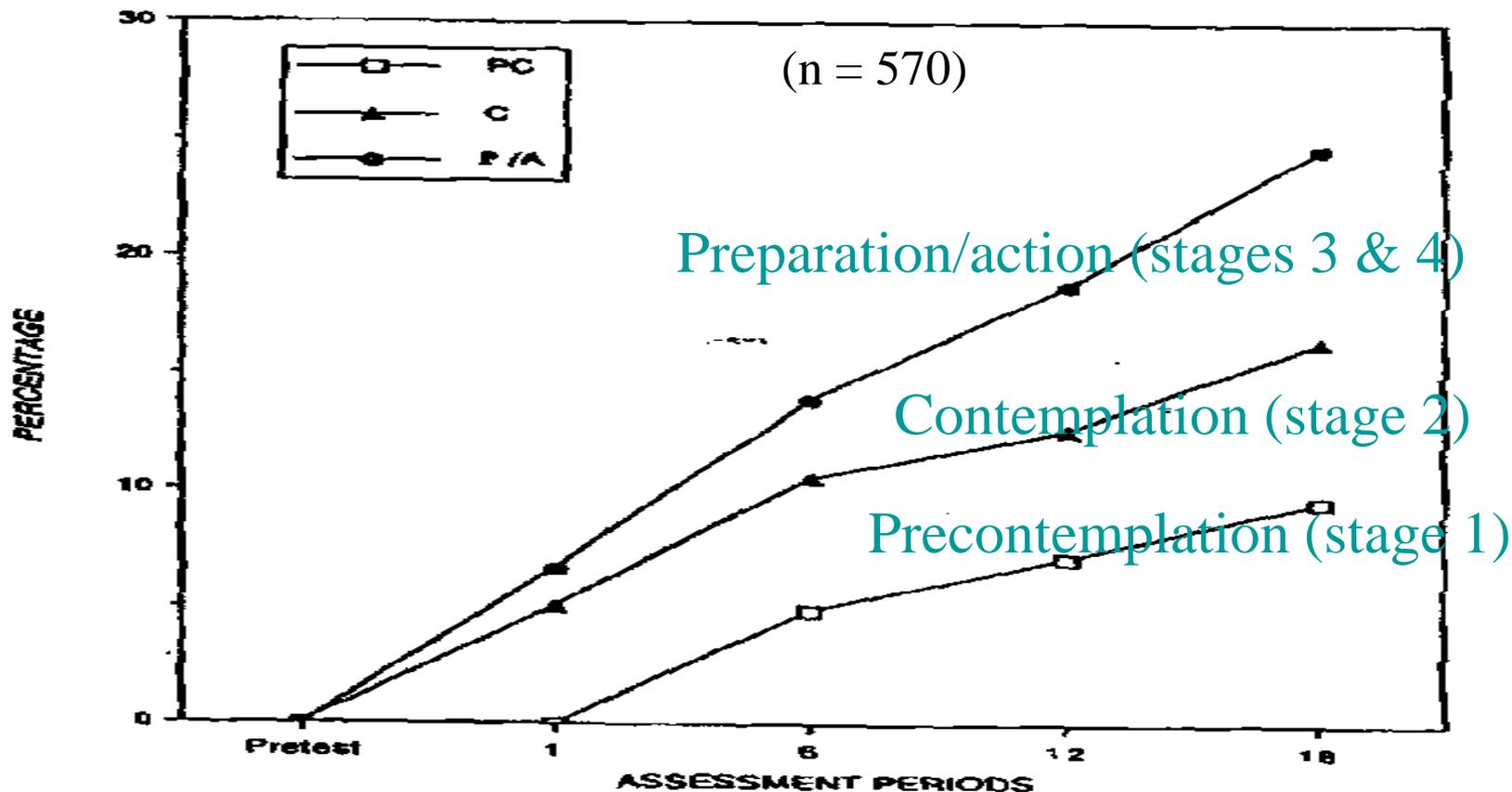
- Fear
- Sense of Place
- Denial/Nonreceptivity to Information due to attitude/beliefs
- Lack of Motivation/Low priority
- Lack of Knowledge of connections/Synergistic effects

## INSTITUTIONAL

- Lack of Capacity (time, staff, \$)
- Lack of Enforcement
- Lack of Judicial Precedent
- Lack of Motivation/Low priority
- Lack of Knowledge of Connections/Synergistic effects

# SUCCESS IN CHANGING BEHAVIOR DEPENDS ON ONE'S READINESS TO CHANGE

## THE EFFECT OF STAGES ON QUITTING SMOKING



Roger Revelle



TOP: Revelle testifying at a Congressional hearing, Washington, DC, 1979  
BOTTOM: Charles Keeling in the lab, La Jolla, CA, 1996