

## **Exploring Applications of Behavioral Economics Research to Environmental Policy-making in the Chesapeake Bay Watershed**

**Workshop Steering Committee:** Charles Abdalla (chair), Susan Julius, Poornima Madhavan, Jim Pease, Marc Ribaldo, Kurt Stephenson and Lisa Wainger.

### **Topics, Objectives, and Urgency:**

Many pressing environmental management challenges, including restoring the Chesapeake Bay, are complicated and intractable. Solutions are elusive because these problems are influenced by a myriad of factors, including social and political ones. Their messy, or what has been termed “wicked” nature, stems not only from their biophysical complexity but from stakeholders’ differing perceptions and values, and the trade-offs that may be needed in problem-solving. Batie (2011) argues that normal science assumptions are inadequate for addressing wicked problems. The complexity of such problems implies that new research approaches are needed. The social sciences, including the emerging fields of behavioral economics and behavioral decision making, have much to offer in helping resolve these problems.

The workshop we propose for Fall 2014 will investigate potential applications of behavioral economics and behavioral decision research to policy-making in the Chesapeake Bay watershed. The proposed activity will build on findings of the successful “Integrating the Social Sciences into Chesapeake Bay Restoration” workshop funded by the CRC (Paolisso, et al. 2011). In March 2011, researchers and decision-makers participated in a first-time discussion of the use of social sciences in Chesapeake Bay management. One of several areas of inquiry at the event was how to better understand individual decision-making utilizing social science theories and research findings. Greater understanding of individual behavior change holds promise of more effective policy decision-making for restoring the Bay. Our proposal for a follow-up workshop has the goal of increasing the depth of STAC and other social scientists’ knowledge about behavioral economics and behavioral decision-making and exploring potential applications in the Chesapeake Bay watershed.

For more than 30 years bio-physical research conducted on the Chesapeake Bay has been elevating awareness of serious water quality problems and has been used to support better management of pollutants. Science-based policy has been instrumental in organizing command-and-control efforts directed towards the regulated sector of polluters, mostly larger point source polluters that are easier to identify. One challenging and “wicked” aspect of Chesapeake Bay management is how to address the countless individual actions by consumers and households, farmers and smaller landowners, and others located throughout the watershed, that cumulatively affect the Bay.

Traditional educational and incentive-based policies have produced less than desired performance in dealing with unregulated sectors. Policy innovations such as market-based approaches like water quality credit trading entail daunting transaction costs. Many such policies also face intractable implementation obstacles. Given the need to make progress on implementing the Chesapeake Bay TMDL, contributions from across the sciences should inform Bay watershed management decisions. In particular, more involvement and integration of the social, economic, behavioral and decision sciences will be critical.

The National Research Council concluded in its 2012 report “*Science for Environmental Protection: The Road Ahead*” that there was “a need to integrate theories, evidence, and tools for understanding how people respond to changes in the environment, how people respond to policy interventions that are designed to alter human behavior, and how specific policies can be implemented within the legal system of rights and strongly held, diverse cultural values”. A major conclusion of the report was that EPA’s

science programs will only be effective if there is explicit consideration of the social and behavioral contexts in which policies will be implemented. The report cited examples of EPA's underinvestment in economic, behavioral and decision sciences in the agency's process for developing the Chesapeake Bay watershed's TMDL (NRC 2012, p. 140).

Behavioral economics and decision research, with its combination of economic concepts and psychological analysis of decision-making, is a rapidly developing field that is helping to address critical social problems. Insights and predictions from behavioral economics have proven to be invaluable ingredients in policy decisions. There have been successful applications to consumer choice about medical care and insurance and to individual decision-making in the food and public health arenas.

Thaler and Sustein (2009) found that individuals exhibit many cognitive biases as they make decisions, are often strongly influenced by social norms, and make decisions automatically without calculation. Cognitive biases include framing effects (e.g., the context in which a decision is presented affects the outcome), and individuals often prefer to stay with the status quo, resulting in inertia. McCann (2013) notes that the policy-maker's choice of what will be the "default" (i.e. what occurs when an individual does nothing and an automatic result occurs, or an automatic "opt in" unless the person decides otherwise) may be an important variable when applying behavioral economics insights to natural resources/environmental problems. As an example of the power of defaults, Johnson and Goldstein (2003) showed how much higher organ donation rates were in countries where the default was giving, rather than not giving, even with culturally similar countries, such as Denmark and Sweden. In the context of environmental decision making, a hunting license could automatically include a default donation toward the protection of an endangered species or a default that limits the license validity to 12 months or less. The theory of behavioral decision making suggests that people prefer erring on the side of inaction rather than action. Because of this inertia, they may stick with a default option. Furthermore, people dislike ambiguous choices and consequently they may prefer the default rather than thinking too hard to make an alternative choice.

While there have been fewer applications to the environmental problem arenas, researchers have identified several promising paths for research. One example in the water area was conducted by Arocha and McCann (2013) in which they assessed water usage in women's restrooms that had dual-flush toilets installed. The restrooms studied used toilets that the manufacturer had designed a push-down mechanism for a maximum volume flush, and a push-up feature for a low-volume flush. This design did not lead to water choice use that best met water usage needs. Given that a low-volume flush was needed most of the time for users, a smarter design that conserved water consumption would have reversed the mechanism such that pushing the handle down resulted in a low-volume flush.

Steering Committee Discussions. We have identified two major problem areas for which there may be good potential for application of behavioral economics and behavior decision-making to individual decisions that affect Chesapeake Bay water quality. The first problem area is non-point source agricultural pollution. The second problem area is household/homeowner land and water management. Several specific examples for exploration at the workshop are outlined below.

a. Non-point source agricultural pollution. Farmers adopt some BMPs and not others. Considerable sociological research (Nowak et al., 1997) has been done on the monetary and non-monetary factors affecting farmers' willingness to change their farming practices to improve water quality. One research finding concerns the "proximity effect" (Nowak et al., 1997; Pease and Bosch, 1994; Hoban and Wimberly, 1992). For this workshop section, the literature on "what works" and "what doesn't" in terms of farmer BMP adoption from the national/international context would be collected and synthesized. A theme for exploration in the non-point source ag pollution would be observability as it relates to implementation of BMPs on the farmer's own property versus land management in a larger peer group or

localized watershed. Comparisons could also be made to easily observable BMPs versus less observable BMPs, etc. (Stahlman and McCann 2012).

b. Lawn fertilization and landscape management. A source of nutrients in the Bay watershed is lawn fertilizer. Lawn fertilizer is unregulated, and fertilizer decisions made by homeowners is largely unknown. Most homeowners do not test their lawns for nutrient deficiencies, and are most likely to apply fertilizer on an ad hoc basis, without really understanding the nutrient content of the products they apply. Some companies try to make things easier for homeowners (and sell more product) by providing fertilizer programs that call for different products at different times of the year. In a few watersheds experiencing nutrient problems attempts were made to address excess lawn nutrients. The most common approach has been educating homeowners about how their actions affect local water quality. One study demonstrated that watershed landowners will adopt urban lawn nutrient practices if Extension programs can link nutrient management and local water quality (Hefner et al., 2009). Another approach that demonstrated success was keeping products containing P off the shelf (default) unless a homeowner could present the results of a soil test (Lehman et al., 2011). For this workshop, the applicability of these and other approaches for “nudging” landowners to better manage their fertilizer decisions will be explored.

c. Green infrastructure and storm water management decisions. Storm water runoff from the built environment is a principal contributor to water quality impairment within the Bay. New storm water management regulations place an emphasis on on-site storm water controls for new development but it has had limited acceptance within communities (NRC, 2008). Very few examples exist where on-site practices have been applied on private land sufficient to cause changes in volume or water quality. Such practices are readily available and are often subsidized by local governments for households to control storm water, but adoption has been slow. In this workshop section, we would explore the literature on factors that inhibit or promote implementation of on-site green infrastructure BMPs (rain gardens, green roofs, etc.) by households to identify gaps in our understanding of the socio-ecological settings, and drivers of household behavior and explore ways in which behavioral psychology and economics could address those gaps to encourage significant changes in household behavior toward storm water green infrastructure BMP adoption.

**Workshop Goals.** The goals of the workshop are to:

- 1) Broaden participants’ knowledge of behavioral economics and behavioral decision-making and potential applications of these fields in the Chesapeake Bay watershed;
- 2) Explore in an in-depth manner the potential of applications in the problem areas of non-point source agricultural pollution, and household/homeowner land and water management;
- 3) Increase the exchange of knowledge and expand collaboration between behavioral economics scholars and social science researchers in the region who know the policy-making challenges; and
- 4) Identify and prioritize follow-up strategies for extending the insights gained at the workshop, and communicate this knowledge to state and EPA policymakers and other key audiences.

The invitation only 1 ½ day workshop will be held in Annapolis in early Fall 2014. Beginning in March 2014, the Steering Committee will meet via conference call to make decisions about: 1) workshop format; 2) selecting, securing and preparing speakers (e.g., work to be assigned to them in return for honoraria); 3) workshop invitations; 4) workshop evaluation and report writing; and 5) logistics. The workshop will begin on the first day at 1 pm and end at 3 pm on the second day. In order to keep logistical costs to a minimum, we plan to structure the workshop to reduce overnight hotel stays and plan to hold the meeting at a free or nominal cost agency or university facility.

Preliminary Steering Committee discussions of potential speakers has led to suggestions that the external speakers will be of three types: a) leading behavioral economists and decision-making sciences experts;

b) behavioral economists who have made contributions to applied research and applications in other fields; and c) applied social scientists who are making contributions to water quantity and water quality decision-making.

**Workshop products:** The two products of the workshop will be an Executive Summary and Final Workshop Report.

The Executive Summary will include:

- A brief description of what was learned about potential applications of behavioral economics to the two problem areas (non-point source agricultural pollution, and household/homeowner land and water management) discussed at the workshop;
- An applied research agenda that will take the form of a prioritized list of high-potential topics within the two problem areas; and
- Recommendations for: a) how to stimulate greater applied research issues and b) how to stimulate greater decision-making action and innovation on Chesapeake Bay water issues that integrate the insights gained at the workshop.

In addition to the above, the Final Workshop Report will include:

- A list of key individuals and organizations that will receive the Executive Summary of the report, and possible strategies to advance the recommendations;
- Summaries of key presentations and citations for key reference materials;
- Brief discussion group summaries; and
- Results of an informal workshop evaluation.

The products will be completed by December 31, 2014.

**Number of participants:** The maximum number of workshop participants will be 15. The participants will include four invited speakers (top-tier behavioral economists and behavioral decision-making disciplinary researchers), four invited economic and psychology researchers working on Chesapeake Bay water issues, and the workshop Steering Committee (seven).

**History of previous STAC-funded workshops applied for by the team:** Marc Ribaud, Lisa Wainger, Kurt Stephenson and Charles Abdalla were members of the steering committee for the “Critical Issues in Implementing Nutrient Trading Programs in the Chesapeake Bay Watershed” 2013 STAC-funded workshop. Also, Jim Pease, Susan Julius, Lisa Wainger and Poornima Madhavan participated in the 2011 “Integrating the Social Sciences into Chesapeake Bay Restoration” STAC workshop.

**Proposed Budget:** \$9,500. On-site workshop expenses (lunch, breaks, etc.) are estimated at \$500; Speakers’ costs estimated at \$5,500. Attendees’ costs estimated at \$3,500. Also, in-kind contributions are estimated at a minimum of \$2,500 (e.g., use of university/government agency meeting space, a speaker not requiring an honorarium for workshop preparation efforts). The proposed budget is on page 6.

## References

- Arocha, J. and L. McCann. 2013. Behavioral Economics and the Design of a Dual-Flush Toilet. *Journal of the American Water Research Association*, 105 (2).
- Batie, S. 2010. Taking Conservation Seriously as a Wicked Problem: In *Managing Agricultural Landscapes for Environmental Quality II: Achieving More Effective Conservation*. Eds. P. Nowak and M. Schnepf. 143-145 Ankey Iowa, Soil and Water Conservation Society.
- McCann, L. 2013. "Behavioral Economics: What Every Policy Maker Should Know, Environmental and Natural Resource Policy and Behavioral Economics. Presented at the Institutional and Behavioral Economics Section, organized symposium, American Applied Econ Assoc. Meeting, Wash, DC.
- National Research Council. 2012. *Science for Environmental Protection: The Road Ahead*, Committee on Science for EPA's Future; Board on Enviro Studies and Toxic. Wash D.C. National Academy of Science.
- National Research Council. 2008. *Urban Stormwater Management in the US*. National Research Council, Cmte. on Reducing Stormwater Contributions to Water Pollution. National Academy Press, Wash, DC.
- Hefner, S.G., C. Robertson, A. Coulier, and G. Stevens. 2009. "Engaging Citizens to Urban Nutrient Planning of Lawns within a Nutrient Sensitive Watershed," *Journal of Extension* 47(4):1-5.
- Jonson, E.J. and D. Goldstein. "Do defaults save lives?" *Science*, 302, pp. 1338-1339. 2003.
- Hoban, T.J., and R.C. Wimberley. 1992. "Farm Operators' Attitudes About Water Quality and the RCWP." In U.S. EPA, Seminar Publication: *The National Rural Clean Water Program Symposium. Proceedings of the conference, 10 Years of Controlling Agricultural Nonpoint Source Pollution: The RCWP Experience*, September 13-17, Orlando, FL. EPA/625/R-92/006. Office of Water, pp. 247-254.
- Lehman, J.T., D.W. Bell, J.P. Doubek, and K.E. McDonald. 2011. "Reduced additions to river phosphorus for three years following implementation of a lawn fertilizer ordinance," *Lake and Reservoir Management* 27:390-397.
- Nowak, P.J., G.O. O'Keefe, C. Bennett, S. Anderson, and C. Trumbo. 1997. *Communication and Adoption Evaluation of USDA Water Quality Demonstration Projects*. Madison, WI: University of Wisconsin in cooperation with U.S. Department of Agriculture.
- Paolisso, M., Van Dolah, E., Hartley T.W., Wainger L.A., Pease J., Lipton, D., and S. Julius. *Integrating Social Science Research into Chesapeake Bay Restoration*. Chesapeake Research Consortium. Edgewater, MD. Publication # STAC 11-05. November 2011.
- Pease, J., and D. Bosch. 1994. "Relationships among farm operators' water quality opinions, fertilization practices, and cropland potential to pollute in two regions of Virginia," *Journal of Soil and Water Conservation* 49(5):477-483.
- Stahlman, Michael and Laura M. J. McCann. "Technology characteristics, choice architecture, and farmer knowledge: The case of phytase. *Agric Hum Values* (2012) 29:371-379
- Thaler, R. H. and C. R. Sunstein. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New York, NY. Penguin Books. 312 pp. 2009.

## Proposed Budget

	Request to CRC	Estimated in-kind Contributions (i.e. match)
<b>A. Costs for Invited Speakers (four speakers)</b>		
Honoraria – payment for workshop preparation activities*	\$2,500*	\$1,000** (in-kind)
Travel	\$2,500	
Hotel/Meals	\$500	
<b>B. On-site Conference expenses</b>		
Conference Room rental free if held at agency or university location)	0	\$1,500 (in-kind)
1 break on Day 1 and Day 2 working lunch	\$500	
<b>C. Costs for Workshop Attendees (11 attendees, four invited researchers plus seven steering committee members)</b>		
Travel	\$2,500	
Hotel/Meals	\$1,000	
<b>D. Total Request to CRC</b>	<b>\$9,500</b>	

\*Expected honoraria amounts are for one honorarium at \$1000 and two honoraria of \$750.

\*\*One speaker will likely contribute time for preparing for the workshop without an honorarium. The value of this time is estimated at \$1000.

Responses to Comments of STAC Executive Board  
 Exploring Applications of Behavioral Economics Research to  
 Environmental Policy-making in the Chesapeake Bay Watershed  
 March 3, 2014

Comment/question #	Suggested answer/response	Change in proposal
<p>1. The total number of expected participants for this workshop is unclear. The proposal says there are 15 invited participants and 7 steering committee members, with speaker costs = \$5500, and attendees' costs = \$3500.</p> <p>- Does the "invited participants" category include speakers?            - And does the "attendees" category include steering committee members?</p> <p>Please separate attendance categories more clearly, and set an estimated attendance threshold.</p>	<p>Yes</p> <p>Yes</p> <p>See change</p>	<p>None</p> <p>None</p> <p>On page 3, the text has been clarified under "Number of participants"            In the proposed budget, more specific language has been added for the columns "Costs for Invited Speakers" and "Costs for Workshop Attendees."</p>
<p>2. Are honoraria required to attract the best speakers?</p>	<p>To obtain the leading researchers in this field, we believe so. Behavioral economics and decision-making is increasingly recognized in its importance and usefulness to policy decisions. It would be a big challenge to involve top-tier researchers without an honorarium.</p>	<p>No change</p>
<p>3. This would be a great group to keep engaged either by establishing a Chesapeake Bay focused list serve or online discussion forum.</p>	<p>This is a great idea and we will bring it up under "next steps" discussion during the workshop's second day.</p>	<p>None was requested</p>
<p>4. What will be in the report? And most importantly, how will it be used in the partnership, e.g., recommendations to partners, farmers, home owners; altered funding options to include documentable implementation strategies by locals; recommendations on procedures for altering behaviors, etc.? It is not clear what will be in the report or how that content will 'inform</p>	<p>The two products -- Executive Summary and Final Workshop Report -- are discussed in much more detail in the seven bullets on proposal. Related to the question about how the partnership will use the report, see bullets 4 (a list of organizations to receive the Exec. Summary) and bullets 3 concerning recommendations.</p>	<p>See narrative and seven bullets on Page 4, under workshop products.</p>

<p>management' or 'alter behavior.' How will the recommendations in the report be used by the EPA policymakers?</p>		
<p>5. The regional experts learn from other case studies and their leaders, but then what is expected to occur after that? Please outline next steps after the workshop.</p>	<p>The participants themselves will come away with new ideas and actions (RFPs, proposals, teams, etc. , which we can't detail now. But the products will document the knowledge shared, strategies, recommendations, etc. which we will give in the Executive Summary to agencies, NGOs that we identify as key. Our "next steps" are for the most part to find and generate new information strategies and get it in the hands of key Bay decision-makers</p>	<p>See expanded workshop products section on page 4.</p>
<p>6. There is no match amount (\$) listed as of now; only STAC money is being requested. Are the steering committee members seeking other resources? And if so, from which organizations are they seeking additional funding?</p>	<p>We have not yet approached another organization for matching funds</p> <p>We considered including the dollar value of STAC members' time, but decided not to do this as CRC probably anticipates this match as part of STAC members' regular involvement in projects.</p> <p>We have an estimate of non-STAC member's time on our planning committee and a speaker that will not require an honorarium.</p> <p>We have included an estimate of the money saved by not using a workshop meeting space of a hotel.</p>	<p>No change</p> <p>No change</p> <p>No change</p> <p>Budget change: Estimate of contributed time of one speaker for which no honoraria will be required. \$1000</p> <p>Budget change: Estimate of savings due to meeting space provided by university or agency. \$1500</p>

<p>7. One overarching comment is that STAC would like to see each proposal link their work directly to the New Bay Agreement outcomes or potential management strategies that will help achieve the outcomes.</p>	<p>Specific feedback about our proposal: "Some are obvious like the "Exploring Applications of Behavioral Economics..." which addresses the factors that might hinder achievement of goals.</p>	<p>Given positive feedback about our about our proposal in this regard, we have not made a change.</p>
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