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NEWS & ANALYSIS

Understanding Individuals' Environmentally Significant Behavior

by Paul C. Stern

Editors' Summary: Individual behavior impacts the environment, but what impacts individual behavior? Effective laws and regulations, strong financial incentives and penalties, social pressure, and the like leave little room for personal values to influence behavior. It is only when these contextual influences are weak that personal factors are likely to play a larger role. Paul Stern therefore argues that the best way to change behavior depends on the behavior and its context and that interventions in the context are more effective than targeting individuals directly with verbal appeals, information, or other efforts to change attitudes or beliefs. And because a variety of factors influence behavior, creative approaches involving multiple influences on behavior offer the greatest potential for change.

I. Introduction

A relatively new policy argument holds that individual behavior is the new frontier in environmental governance because as traditional regulation has reduced environmental pollution emanating from large firms, the proportional role of individuals as a source of many kinds of pollutants has increased.[1] Individual behavior has long been an important source of environmental harm, although it is still relatively minor compared to organizational behavior in many environmental systems.[2] Its relative importance may indeed be increasing in some important domains. Individuals' environmentally significant behavior remains a frontier area in research despite some attention to the issue by psychologists and others since at least the 1970s. A new report from the National Research Council (NRC) on environmental research priorities for the social and behavioral sciences identifies understanding and better informing individuals' environmentally significant behavior as one of the five top priority research areas.[3]

Despite the importance of individual behavior, large actors (businesses, governments, etc.) still produce the lion's share of many environmental problems, and broader social institutions are important in shaping the behavior of both individual and organizational actors. The NRC's report also listed the study of environmental considerations in business decisions and research on the social institutions of environmental governance among the top research priorities.[4]

This Article focuses on individual behaviors, recognizing, though, that these behaviors are shaped not only by individual will, but by a variety of other factors. It briefly reviews available knowledge about environmentally important individual behaviors and about the factors that shape those behaviors, particularly ones that might be altered to reduce environmental impact.

II. Types of Environmentally Significant Individual Behavior

It is worth distinguishing at least four major types of environmentally significant behavior that are different both in how they affect the environment and in the combinations of causal factors that shape them.[5] One is committed activism, as reflected in active involvement in organizations and po-

Paul C. Stern is a principal staff officer in the Division of Behavioral and Social Sciences and Education of the National Research Council, where he has worked since 1980. He has directed the council's Committee on the Human Dimensions of Global Change since 1990. He holds a B.A. from Amherst College and M.A. and Ph.D. degrees from Clark University, all in psychology.

1. Michael P. Vandenbergh, *From Smokestack to SUV: The Individual as Regulated Entity in the New Era of Environmental Law*, 57 Vand. L. Rev. 515 (2004).

2. *See, e.g.*, Paul C. Stern & Gerald T. Gardner, *Psychological Research and Energy Policy*, 36 Am. Psychol. 329-42 (1981); Paul C. Stern & Gerald T. Gardner, *The Place of Behavior Change in Managing Environmental Problems*, 2 Zeitschrift Für Umweltpolitik 213-39 (1981). These papers showed that individuals accounted for about one-third of direct energy use in the United States in the late 1970s and widely varying proportions of pollutants for which data were available. For an account of individuals' contributions to the depletion of some wildlife populations, see Felicia C. Coleman et al., *The Impact of United States Recreational Fisheries on Marine Fish Populations*, 305 Science 1958-60 (2004).

3. Panel on Social and Behavioral Science Research Priorities, NRC, Decisionmaking for the Environment: Social and Behavioral Science Research Priorities ch. 5 (Garry D. Brewer & Paul C. Stern eds., 2005).

4. *Id.* chs. 4, 3.

5. For a discussion, see Paul C. Stern, *Toward a Coherent Theory of Environmentally Significant Behavior*, 56 J. Soc. Issues 409-11 (2000).

litical demonstrations supporting public policies that affect the environment. A second is non-activist support of environmentally relevant public policies, such as is evident in financial contributions to organizations and support for policies that affect the environment. These two classes of behavior may support policies that preserve or alter environmental systems. They affect the environment only indirectly by influencing public policies. Nevertheless, the effects may be large because public policies can change the behaviors of many people and organizations at once.

A third important class of behavior involves the influence individuals can have on the environment by affecting the actions of organizations to which they belong. For example, engineers may design manufactured products in more or less environmentally benign ways, bankers and developers may use or ignore environmental criteria in their decisions, and maintenance workers' actions may reduce or increase the pollution produced by manufacturing plants or commercial buildings. Such behaviors can have great environmental impact because organizational actions are still the largest direct sources of many environmental problems.[6] Unfortunately, the study of the factors affecting environmentally significant organizational behavior is still in its infancy.[7]

Finally, there is personal, private-sphere, environmentally significant behavior—the purchase, use, and disposal of personal and household products that have environmental impact. This is what usually comes to mind when one thinks of individuals' environmentally significant behavior, and it is the class of environmentally relevant behavior that has been the major focus of interest among consumer researchers and psychologists.[8] It is useful to make finer distinctions among these behaviors according to types of decisions: the purchase of major personal goods and services that have significant environmental impact in their manufacture or use, e.g., automobiles, home heating and cooling systems, recreational travel; the use and maintenance of environmentally important goods, e.g., driving cars, setting home thermostats; household waste disposal; and everyday "green" consumerism (purchasing practices that consider the environmental impact of production processes, e.g., purchasing recycled products or organically grown foods).

Some of these types of behavior, such as infrequent decisions to purchase automobiles and major household appliances, tend to have much greater environmental impact than others, such as changes in the level of use of the same equipment.[9] Some, like private-sphere behaviors, have direct environmental consequences, whereas others, such as most public-sphere environmental behavior, have only indirect effects. The environmental impact of personal, private-sphere environmentalism is important only in the aggregate when many people do the same things. These distinctions among behavioral types are both statistically reliable and psychologically meaningful in the sense that behaviors of the same type tend to be associated and that similar behaviors have similar patterns of social-psychological and sociodemographic predictors.[10]

III. Influences on Individual Behavior

The influences on environmentally significant behavior are many, and their effects are to some extent mutually dependent. They can be roughly classified as shown in Table 1.[11] Generally speaking, the stronger the contextual influences (those toward the top of the table), the less important are the personal factors toward the bottom.

Table 1. Variables Influencing Environmentally Significant Behaviors

Contextual Factors (constraint and facilitation)
• Available technology
• Embodied environmental impact, e.g., energy efficiency of buildings, vehicles; materials in consumer products
• Legal and regulatory requirements
• Material costs and rewards (payoffs)
• Convenience, e.g., of public transit, recycling
• Social norms and expectations
Personal Capabilities
• Financial resources
• Literacy
• Social status
• Behavior-specific knowledge and skills
Habit and Routine
Attitudinal Factors
• Personal values
• General environmentalist predisposition (abstract norms)
• Behavior-specific (concrete) norms and beliefs
• Nonenvironmental attitudes, e.g., about product attributes
• Perceived costs and benefits of action

This pattern of influences implies that effective laws and regulations, strong financial incentives or penalties, irresistible technology, powerful social norms, and the like can leave little room for personal factors to affect behavior. Control over these strong influences means control over behavior—at least in the short run. In the long run, of course, people can change their context to a significant degree by changing laws, policies, financial incentives, technology, and so on. The pattern of influences on behavior also implies that when contextual influences are weak, the personal factors at the bottom of the table are likely to be the strongest influence on behavior. Also, when the contextual factors cannot be changed, the personal factors may provide the only levers on behavior, even if they are weak or only apply in restricted situations.

6. See various sources *supra* note 2.

7. *See supra* note 3, ch. 4, and in the same volume, Andrew J. Hoffman, *Business Decisions and the Environment: Significance, Challenges, and Momentum of an Emerging Research Field*, *id.* at 200-29.

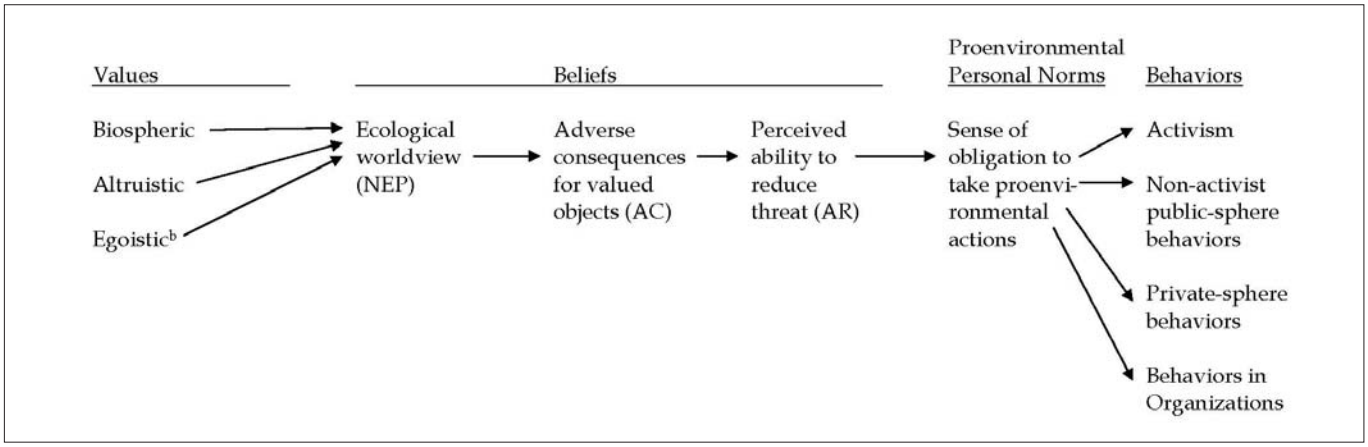
8. *See, e.g.*, Committee on the Behavioral and Social Aspects of Energy Consumption and Production, NRC, Energy Use: The Human Dimension (Paul C. Stern & Elliot Aronson eds., 1984); Committee on the Human Dimensions of Global Change, NRC, Environmentally Significant Consumption: Research Directions (Paul C. Stern et al. eds., 1997); Gerald T. Gardner & Paul C. Stern, Environmental Problems and Human Behavior chs. 2-7 (2d ed. 2002).

9. See various sources *supra* note 2.

10. *See, e.g.*, J. Stanley Black et al., *Personal and Contextual Influences on Household Energy Adaptations*, 20 J. Applied Psychol. 3-21 (1985); Thomas Dietz et al., *Social Structural and Social Psychological Bases of Environmental Concern*, 30 Env't & Behav. 450-71 (1998); Paul C. Stern et al., *A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmental Concern*, 6 Hum. Ecology Rev. 81-97 (1999); Christopher Bratt, *Consumers' Environmental Behavior: Generalized, Sector-Based, or Compensatory?*, 31 Env't & Behav. 28-44 (1999).

11. Stern et al., *supra* note 10.

Figure 1. A Schematic Representation of Variables in the Value-Belief-Norm Theory of Environmentalism[a]
Source: Paul C. Stern, *Toward a Coherent Theory of Environmentally Significant Behavior*, 56 J. Soc. Issues 412 (2000).



[a] Arrows represent postulated direct effects. Direct effects may also be observed on variables more than one level downstream from a causal variable.
[b] Empirically, measures of egoistic values have been negatively correlated with indicators of environmentalism.

Social-psychological research is helping to reveal the workings of the personal factors influencing environmentally significant individual behavior. Debates continue in the field about which theoretical model best accounts for the evidence. The model in Figure 1 has considerable support from the available research and is useful in describing important personal influences and in thinking about influences that bear not only on single environmental behaviors, but also on broader classes of behaviors. It describes what many call the "value-belief-norm" (VBN) theory of environmentally significant behavior.[12] As is evident from the discussion so far, it is in fact a partial theory, focusing only on the role of personal influences on behavior. The key element in the model is the notion that individual choice can be driven by personal norms, that is, an internalized sense of obligation to act in a certain way. Personal norms for pro-environmental actions (recycling, reducing car use, producing less household waste, etc.) are activated when an individual believes that violating them would have adverse effects on things the individual values (called awareness of consequences (AC), in the research literature) and when the person believes that by taking action, he or she would bear significant responsibility for those consequences (called ascription of responsibility (AR), in the literature).[13] Research shows that with behaviors that are not strongly constrained by contextual forces, these AC and AR beliefs are associated with a sense of personal obligation and, in turn, with environmentally significant behavior. Although the evidence is weaker for lack of studies, there is evidence that interventions that change AC and AR beliefs also affect behavior. The weaker the contextual influences, the stronger these personal-norm effects are.[14] Table 2 presents the VBN model in the context of other influences on behavior.[15]

Table 2. A Causal Model of Environmentally Relevant Behavior[16]
(The parts of the table in italics are those elaborated by the VBN theory)

Level of Causality	Type of Variable	Examples
7	Social background and general personal capabilities	Race, socioeconomic status, financial resources
7	External conditions (incentives and constraints)	Prices, regulations, technology, convenience
7	Social influences	Social norms, advertising
6	*Basic values*	*Egoism, altruism, openness to change, maintaining tradition*
5	*General beliefs and norms*	*Belief the environment is fragile or resilient; attitude about environmental protection*
4	*Behavior-specific attitudes, beliefs, and personal norms*	*Belief that recycling is good for environment, sense of personal obligation to reduce fossil fuel use; beliefs about the personal and environmental costs and benefits of particular behaviors*
3	Behavior-specific knowledge	Knowing which packaging is biodegradable; which household behaviors emit air pollutants; how to petition legislators
2	Behavioral commitment	Decision to travel by bus
1	Environmentally relevant behavior	Automobile purchase

This model suggests that it is possible to influence individual behavior, within the limits set by context, habit, personal capability, and the like, by making people aware of the consequences, particularly adverse ones, for things they value, and by showing them that their personal behavior is

12. *Id.*

13. Canonical statements of this model are by Shalom H. Schwartz, *Normative Explanations of Helping Behavior: A Critique, Proposal, and Empirical Test*, 9 J. Experimental Soc. Psychol. 349-64 (1973); Shalom H. Schwartz, *Normative Influences on Altruism, in* 10 Advances in Experimental Social Psychology 221-79 (L. Berkowitz ed., 1977).

14. Black et al., *supra* note 10; Stern et al., *supra* note 10.

15. The table is modified from Paul C. Stern & Stuart Oskamp, *Managing Scarce Environmental Resources, in* Handbook of Environmental Psychology 1043-88 (D. Stokols ed., 1987); Gardner & Stern, *supra* note 8, at 161.

16. Variables at higher numbered levels of causality have the potential for direct influence on variables at each lower numbered level. Sometimes, the most important effects skip levels of causality. For example, many external conditions (level 7) influence behavior mainly through their direct effects on behavior-specific knowledge and beliefs (level 3).

important enough to make a difference. People who do not see connections between their behavior and such consequences or who believe that their actions are so insignificant in the scheme of things as not to matter will not be motivated to act by an internalized sense of obligation. It will require external motivations or pressures to get them to change.

It is worth commenting further on the psychological concepts of personal and social norms, particularly for readers more familiar with the legal literature on norms. The social-psychological research literature distinguishes personal norms, which are internalized standards, from social norms, which refer to other people's standards. Actually, what researchers usually measure are individuals' perceptions or expectations about other people's standards. Surveys usually measure social norms by asking people what family members or close friends would want them to do. Thus, the social norms that social psychologists talk about are more properly called interpersonal norms because they are defined by being shared by people who know each other personally and are not necessarily shared throughout entire societies. Both personal and interpersonal norms are different from the ones that are codified in laws, which are social norms on a larger scale. In addition, because legal norms are associated with concrete sanctions from government, they operate differently from personal or interpersonal norms.

The connections among personal, interpersonal, and social norms such as expressed in laws are not much studied by psychologists. This may be because these connections play out over far longer time scales than can be studied in the laboratory. Nevertheless, these norms clearly can influence each other. Most people obey laws not out of fear of prosecution, but because adherence to law is a widely accepted norm at the personal level and in terms of informal interpersonal influence. Interpersonal norms can become personal, as when first-generation suburbanites teach their children that it is right to keep the lawn mowed and the children internalize this norm and begin to believe that lawns should not be allowed to grow beyond an inch or two in height. And widely shared personal norms, particularly those that are activated by awareness of negative consequences to other people, are often transformed into legal norms. For example, widespread acceptance of the belief that second-hand smoke harms nonsmokers and the associated normative judgment that it is wrong to smoke indoors in the presence of others was probably the tipping point for the enactment of workplace smoking bans in many parts of the United States. These connections suggest that if one adopts a long-time perspective, it may be that personal norms can percolate up through society and become legally codified social norms.

IV. Changing Behavior

In most real-world contexts, both contextual and personal factors are involved in shaping environmental behavior, so a variety of factors are potentially available for bringing about behavior change. For example, the environmental impact of traveling to work is usually shaped largely by the location of home and of workplaces, the availability of public transportation, the fuel economy of an individual's motor vehicles, and habit. But even with behavior that is as strongly context-determined as commuting, personal factors can matter, particularly at key decision times. These include the times when people obtain new vehicles, make choices about their maintenance, and, particularly when their homes or workplaces change, making it relatively easy to form new commuting habits. Different factors matter to different individuals at different times with regard to any particular behavior. The complexities of person-situation interactions and a careful reading of the research lend support to a set of general principles for behavior change such as listed in Table 3.[17]

Table 3. Principles for Intervening to Change Environmentally Destructive Behavior

Use multiple intervention types to address the factors limiting behavior change: • Limiting factors are numerous, e.g., technology, attitudes, knowledge, money, convenience, and trust. • Limiting factors vary with actor and situation, and over time. • Limiting factors affect each other.
Address conditions beyond the individual that constrain pro-environmental choice
Understand the situation from the actor's perspective
When limiting factors are psychological, apply understanding of human choice processes: • Get the actors' attention; make limited cognitive demands. • Build on personal values and social norms. • Apply principles of community management (credibility, commitment, face-to-face communication, etc.).
Set realistic expectations about outcomes
Continually monitor responses and adjust programs accordingly
Stay within the bounds of actors' tolerance for intervention
Use participatory methods of decisionmaking

Each of these principles could be discussed at great length, but for the present discussion, two points listed under the category of "human choice processes" deserve special attention. Building on personal and social norms is one way to induce behavioral change within the limits set by the behavioral context. People resist contravening strong personal norms but they do not necessarily act in the ways that would be most consistent with them. One reason is that they often act out of habit, without reflection. Another is unawareness of the connections between a behavior like burning trash in the backyard and the health of the neighbor's children. Making people aware of the consequences of their environmentally significant behavior for other people and the environment and demonstrating that individuals' actions—at least in concert with others—are important enough to matter (that is, AC and AR), have the potential to activate personal altruistic norms and change behavior. In the short run, this sort of effect happens one person at a time.

Under the right conditions, norm activation can be enhanced in a community context in which face-to-face communication, mutual interdependence, and the possibility for social influence can build interpersonal norms that buttress personal norms. A very large research literature on the governance of fisheries, forests, irrigation systems, and other environmental resources shows that user communities can often prevent overexploitation of their resources mainly by using informal controls based on social pressure, persuasion, and mutually agreed rules and norms.[18] They need legal rights to exclude others and authority to enforce their

17. Modified from Gardner & Stern, *supra* note 8, at 159.

18. *See, e.g.*, Elinor Ostrom, Governing the Commons: The Evolution of Institutions for Collective Action (1990); Committee on the Human Dimensions of Global Change, NRC, The Drama of the Commons (Elinor Ostrom et al. eds., 2002).

rules within the law, but legal regulation and government-imposed incentives are often unnecessary. In fact, regulatory approaches such as the establishment of protected areas for endangered species often fail because they lack informal support from the affected communities. Informal governance arrangements are more likely to succeed when the user communities are in frequent contact, when the boundaries of the resource are clear, and under other conditions that research is continuing to specify.[19] These arrangements have been studied mainly within fairly small, stable rural communities, but they have been successful even in the contexts of urban North America, for example, using block leaders to make recycling programs more successful.[20] Community-level processes can bring about change that affects norms at the personal, interpersonal, and social levels.

What do these research findings and general principles suggest as guidance for inducing individuals to do better at protecting the environment through their private-sphere behavior? They suggest, first of all, that it is possible to achieve more secure behavioral control by changing the context of behavior than by working to change behavior directly. Unfortunately, it is often impossible to change powerful contextual variables such as the transportation infrastructure, the price of oil, or regulatory controls on businesses. Still, it is well worth seeking innovative ways of changing the context of behavior. For one thing, there are fewer decisionmakers to target. For example, European product take-back laws produce innovation in the manufacturing processes of a few companies, thereby obviating the need to induce millions of consumers to recycle.

When the only available options involve change in the behaviors of millions of consumers, a lot of the obvious approaches have not worked well.[21] For instance, educating people, in the narrow sense of telling them which behaviors are environmentally beneficial, typically has little or no effect in the short term. The most likely reason is the contextual constraints on behavior: very few people are in the position to act on the information, and it is only some of those who can be changed. Information is most likely to be effective when it arrives at the time and place of decision, is linked to the available choices, is delivered from trusted sources, and is delivered personally. That is in part how salespeople earn their commissions. Broader environmental education about how climate or ecosystems function may change behavior—public-sphere behavior, most likely—but this is a long-term process that has not been the subject of careful research.

Trying to motivate people by telling them that environmental disaster looms is not likely to be helpful either. Fear appeals can lead to constructive action, but can also lead people to minimize or ignore problems. Generally, adaptive coping is most likely to occur when threats are perceived to be severe and personal and when cost-effective responses are known and available.[22] These conditions do not apply to many environmentally important behaviors. Activating altruistic norms with messages that highlight the social or environmental consequences of specific behaviors and the importance of the individual's action seems to be a more effective approach than more generalized motivational approaches. It is important to note, though, that so far, there is a serious shortage of clinical trials with norm-activation approaches in the environmental arena. Success is likely to depend on subtle details of the norm-activation messages and the ways they are delivered.

Financial incentives can make a fairly large difference when they can be put in place. However, their effectiveness depends greatly on how they are implemented. For example, when some utility companies offered homeowners large financial subsidies in the 1980s for improving the energy efficiency of their homes, the size of the subsidy made a difference, but the marketing of the program had a much bigger impact on homeowners' behavior.[23]

The record of single-strategy approaches to changing consumer behavior is, in short, mixed at best. The reason seems to be that behavior change depends on a conjunction of factors, so that changing just one is likely to make a difference to only a small segment of the target population. This is the rationale for the principle of using multiple intervention types in concert. Prof. Michael Vandenbergh has proposed the creation of an individual toxics release inventory (ITRI),[24] modeled after the Environmental Protection and Community Right-To-Know Act's toxic release inventory (TRI).[25] Professor Vandenbergh argues, largely on the grounds of norm-activation theory and arguments about reciprocity norms, that a set of indicators that show individuals their level of responsibility for environmental harms will activate personal altruistic norms and lead to behavior change. He also suggests that it might engage people in discussions that would build interpersonal norms for behavior change or support for public policies to address the problems. Thus, this intervention might provide information, social influence, and perhaps eventually, change in the incentives or technological context of pro-environmental behavior. He further argues that an ITRI is practicable in the current political context.

The argument from norm-activation theory and from the history of the federal TRI is creative, well reasoned, and highly plausible. Would an ITRI have the effects suggested? It might. It is worth emphasizing, though, that the strength of evidence for a cause-and-effect relationship is not what an experimental scientist would hope for. The TRI may not have done all that is claimed for it,[26] and, as already noted,

19. For a listing of such "requirements of governance," see Thomas Dietz et al., *The Struggle to Govern the Commons*, 302 Science 1907-12 (2003).

20. *See, e.g.*, J.R. Hopper & J.M. Neilson, *Recycling as Altruistic Behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program*, 23 Env't & Behav. 195-220 (1991).

21. For a general review of the evidence, see Gardner & Stern, *supra* note 8.

22. *See id.* ch. 9.

23. Paul C. Stern et al., *The Effectiveness of Incentives for Residential Energy Conservation*, 10 Evaluation Rev. 147-76 (1986).

24. Michael P. Vandenbergh, *Order Without Social Norms: How Personal Norm Activation Can Protect the Environment*, 99 Nw. U. L. Rev. 1101 (2005).

25. 42 U.S.C. §11023.

26. For claims of the effectiveness of the TRI, see U.S. General Accounting Office, Toxic Chemicals: EPA's Toxic Release Inventory Is Useful But Can Be Improved (1991) (GAO/RCED-91-121); Jeanne Herb et al., *Harnessing the "Power of Information": Environmental Right-To-Know as a Driver of Sound Environmental Policy, in* Committee on the Human Dimensions of Global Change, NRC, New Tools for Environmental Protection: Education, Information, and Voluntary Measures 253-56 (Thomas Dietz & Paul C. Stern, eds., 2002). For a critique of such claims, see Kathryn Harrison, *Challenges in Evaluating Voluntary Environmental Programs*, *in* New Tools, *supra*, at 274-75.

there is not a lot of experimental evidence that norm-activation appeals strongly affect environmental behaviors. Moreover, the available evidence suggests that even when norms are activated, the effects on behavior will probably depend on the specific behavior.

But the proposal is sufficiently well specified that it would be possible to test it out experimentally, at least as far as influencing personal norms and possibly short-term individual behavior. Such a test would be well worth doing, and not difficult. If any effect could be found in an experiment with a rough-cut ITRI, a carefully constructed one might well have stronger effects. It would likely be more credible, more widely publicized, and brought to people's attention through multiple media, and it might set in motion just the kinds of processes that the original TRI has started. This is a creative idea that deserves a good trial run, both as applied psychology and as politics.

V. Conclusion

Individuals' environmentally significant behaviors in the private sphere—those that directly affect resource consumption or cause pollution—are again receiving attention as targets of change. Research shows that the best way to change such behaviors depends on the behavior and its context and that interventions in the context are often more effective than directly targeting individuals with verbal appeals, information, or efforts to change attitudes or beliefs. When it is impracticable to change physical infrastructure, regulations, or other powerful contextual variables, creative approaches involving multiple other influences on behavior usually offer the greatest potential for change. The recent proposal to create an ITRI is a creative suggestion for changing the informational and social context of individual behaviors that cause pollutant releases, and is well worth experimental trial.