

# Public Preferences for Resilience Infrastructure and Policy Solutions in a Coastal Urban Environment

Wie Yusuf, Professor, School of Public Service & Assistant Director, Institute for Coastal Adaptation & Resilience (Contact: jyusuf@odu.edu)

Michelle Covi, Assistant Professor of Practice, Dept. of Ocean, Earth & Atmospheric Sciences & Virginia Sea Grant

J. Gail Nicula, Adjunct Professor, School of Public Service

Daniel Richards, Associate Professor, Dept. of English

Khairul A. Anuar, Data Scientist, Institute for Coastal Adaptation & Resilience

Old Dominion University

## Research question:

What factors explain public support for different financing and funding options to pay for coastal resilience infrastructure?

## Approach:

- Consider public support for policies or issues related to coastal resilience as proenvironmental behavior
- Apply theory or model from environmental psychology – Theory of Planned Behavior
- Collect and analyze data from a survey of residents Virginia Beach conducted in summer 2019

## PROENVIRONMENTAL BEHAVIORS

Structural solutions for coastal resilience (e.g., installing flood gates and elevating infrastructure) require significant investment. An important precondition for successful implementation of these policy solutions is public support and willingness to pay. It is often assumed that the public is unwilling to pay for infrastructure or policies with expensive price tags. But it is also likely the case that the public is divided over the best way to finance and fund infrastructure more than they are simply opposed to all efforts to raise more money.

**We consider public support for different mechanisms to finance or fund coastal resilience infrastructure as proenvironmental behavior.** Although these behaviors affect the environment indirectly, by influencing policy implementation they may have large effects because the policies and infrastructure solutions can change the behaviors of many individuals, businesses, and organizations at once.

Proenvironmental behaviors:

- Actions that contribute to environmental preservation/conservation
- Examples: reduce or avoid damage to the environment, rehabilitate the environment, mitigate environmental degradation.
- Climate change mitigation and adaptation activities are proenvironmental behaviors.
- Individuals make short-term sacrifices to safeguard collective environmental interests.
  - Most require the individual to restrain egoistic tendencies to benefit collective interests
  - Do not provide immediate, clearly perceptible benefits to the individual
  - Environmental benefits are shared by the community, and are uncertain and distant in both time and place
- 4 types of proenvironmental behavior (Stern, Dietz, Abel, Guagnano, & Kalof, 1999)
  - Environmental activism - active involvement in environmental organizations or demonstrations
  - Environmental citizenship and low-commitment active citizenship (e.g., writing letters, donating to an environmental organization)
  - **Support and acceptance of public policies that may involve costs such as higher taxes and prices (or sacrifices such as regulation of behavior)**
  - Private-sphere behaviors (e.g., purchasing green products, recycling)

## ENVIRONMENTAL PSYCHOLOGY

The environmental psychology literature has grown in terms of proposing and testing various theories and models that aim to explain or predict environmentally-relevant behavior. The norm activation model (NAM) and the Theory of Planned Behavior (TPB) are two foundational frameworks that can be applied to understanding drivers of proenvironmental behaviors. Integrated or comprehensive models such as the value-belief-norm (VBN) theory builds on these foundational frameworks.

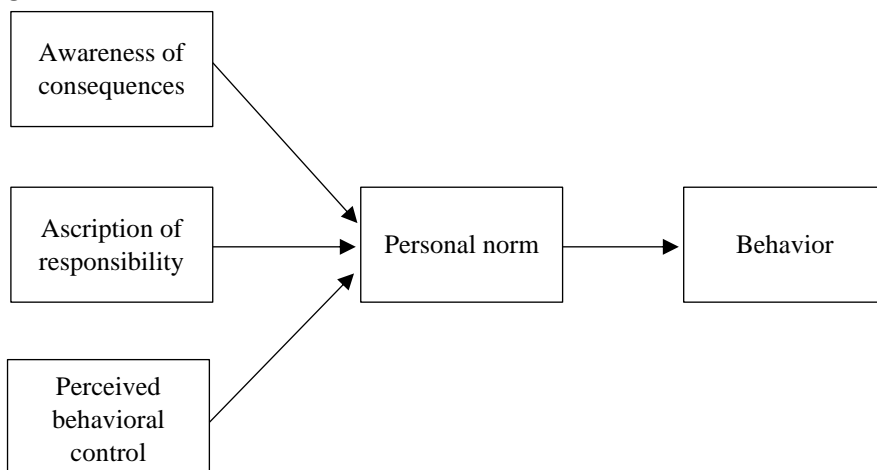
## **NORM ACTIVATION MODEL (NAM)**

NAM was initially developed specifically to explain altruistic and helping behavior (Schwartz, 1977; Schwartz & Howard, 1981), but have more recently been applied to explain proenvironmental behaviors (Bamberg & Schmidt, 2003; Ebreo, Vining, & Cristancho, 2003; Hopper & Nielsen, 1991).

- Basic assumption is that people help others if they feel morally obliged to in a given situation characterized by an activated personal norm.
- Personal norms are self-expectations that are based on internalized values.
  - Reflect commitment with internalized values, are experienced as feelings of personal obligation to engage in a certain behavior
  - Personal norms will only influence behavior **when they are activated**
- Activation of personal norms occurs when the individual
  - is aware of the need for the behavior
  - is aware of the consequences of the behavior
  - ascribes at least some responsibility for the behavior
  - perceives capability to perform the behavior

**NAM has been useful in explaining low-cost environmental behavior, but has less explanatory power for behaviors characterized by strong constraints such as when the behavior is too costly in terms of effort, money or time and for repetitive behaviors.**

Figure 1. Norm activation model



## **THEORY OF PLANNED BEHAVIOR (TPB)**

The Theory of Planned Behavior (TPB) was developed as a theory explaining deliberate behavior (Ajzen, 1985, 1991). The central assumption is that behavior is directly determined by the intention to perform this behavior, which is the will to make an effort to demonstrate the behavior in question.

Intention to act is determined by 3 sets of beliefs:

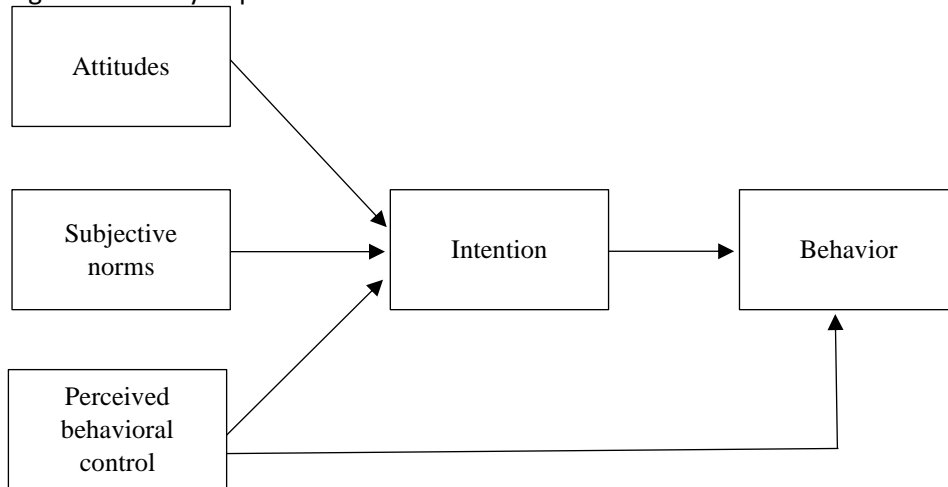
- **Attitude** toward the behavior as a general measure of the favorability a behavior, determined by beliefs about outcomes or attributes of the behavior and evaluation of those outcomes or attributes.
- **Subjective norms** as the perceived expectations of relevant others (social norms) regarding whether the behavior should be performed (in other words the social pressure) times the willingness to comply with that expectation
- **Perceived behavioral control** as a measure of the degree to which the individual has the opportunity and ability to perform the behavior. Perceived behavioral control also directly affects behavior.

TPB assumes a causal chain that links behavioral beliefs, normative beliefs, and control beliefs to behavioral intentions and subsequent behaviors via attitudes, subjective norms, and perceived control.

TPB offers a clear set of relationships and empirical results provide strong support for TPB in explaining proenvironmental behaviors. **But TPB overlooks moral beliefs as a factor influencing proenvironmental beliefs**

and lacks explanatory or predictive power for analysis of repetitive behaviors (Klößner, 2013; Klößner & Blöbaum, 2010).

Figure 2. Theory of planned behavior



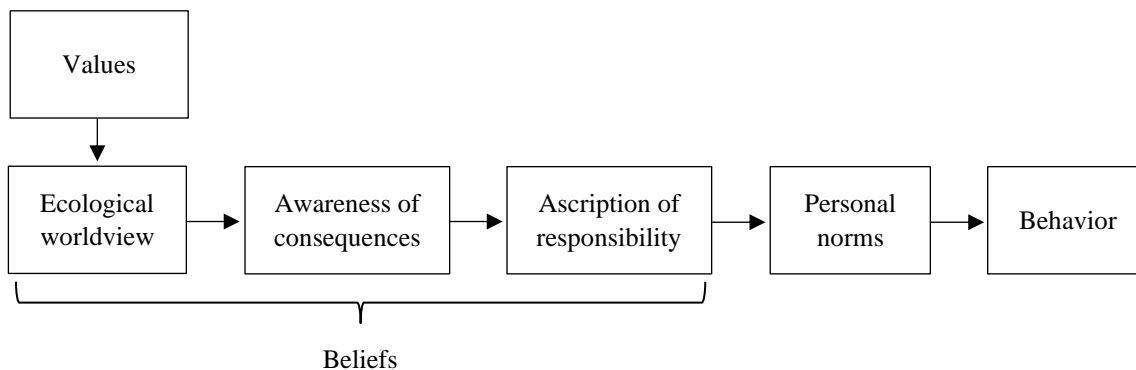
**VALUE-BELIEF-NORM (VBN) THEORY**

VBN theory, proposed by Stern and colleagues (Stern, 2000; Stern et al., 1999), builds off NAM, and posits a chain of five factors that lead to proenvironmental behavior:

- a) personal values and especially altruistic values (Stern & Dietz, 1994; Stern, Dietz, & Kalof, 1993; Stern, Kalof, Dietz, & Guagnano, 1995)
- b) ecological worldview according to the new environmental paradigm (NEP, Dunlap & Van Liere, 1978)
- c) belief that particular conditions pose threats to others (awareness of consequences),
- d) belief that actions can be taken to avert those consequences (ascription of responsibility)
- e) personal norms

VBN theory has been applied to explain proenvironmental behaviors and has been empirically support (De Groot & Steg, 2007; Hansla, Gamble, Juliusson, & Gärling, 2008; Poortinga, Steg, & Vlek, 2004). **However, the link between personal norms and behavior is weaker for those proenvironmental behaviors associated with high costs** (Steg, Dreijerink, & Abrahamse, 2005).

Figure 3. Value-belief-norm theory



**CHOOSING THE THEORY OF PLANNED BEHAVIOR**

Specifically looking at proenvironmental behaviors in terms of support for financing and funding mechanisms associated with implementing coastal resilience infrastructure:

- a) Using conventional bonds such as Revenue and/or General Obligations bonds

- b) Using alternative financing mechanisms such as green, resilience, or environmental impact bonds?
- c) Reallocating existing revenues to pay off the debt
- d) Dedicating revenue from fee- or tax-generating facilities or amenities to pay off debt associated with related infrastructure investments that improve flood resilience
- e) Creating new revenue sources associated with increased value of land, property, or economic activity from reduced flood risk

These behaviors can be characterized as high-cost (involving significant assumption of debt or payment of taxes or fees). While Thøgersen (1996) argued for classifying proenvironmental behaviors in the moral domain rather than the economic domain, high-cost behaviors may require balancing of personal costs of benefits (economic decisions) rather than evaluating the behavior in terms of right or wrong (moral decisions). Behaviors related to supporting debt or taxes and fees also happen infrequently and the behavior would be considered non-repetitive. TPB would appear to be the most applicable framework for analyzing drivers or determinants of our study's proenvironmental behaviors.

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