

---

## **Towards an environment-sociologic model for prediction of environmental behaviors and investigation of strategic policy alternatives**

---

**KuroshRezaei-Moghaddam<sup>\*</sup> and MahsaFatemi**

Department of Agricultural Extension and Education, College of Agriculture, Shiraz University, Shiraz, Iran

KuroshRezaei-Moghaddam and MahsaFatemi (2013) Towards an environment-sociologic model for prediction of environmental behaviors and investigation of strategic policy alternatives. Journal of Agricultural Technology 9(6):1381-1397.

Development of a comprehensive environment-sociologic model constitutes one of the important steps toward enhancing a better understanding of environmental sustainability. A comprehensive behavioral model would provide a quasi-objective means for identification and evaluation of significant factors related to individual as well as communal environmental behaviors. Literature review indicates that current models are not suitable for prediction of environmental behaviors. This paper uses an environment-sociologic worldview to provide a comprehensive model to study individual and communal behaviors in conjunction with environmental sustainability. The main determinant factors of the model which influence environmental behavior through individual and communal actions include: awareness of environmental consequences, manifestation of behavioral environmental responsibility, environmentally-based social affects, environmental knowledge, social norms, environmental identity and controllability of behaviors. Our review suggests that, compared to existing constructs, a more comprehensive model is needed to provide a better tool for reliable prediction and adoption of environment-conscious behaviors.

**Keywords:** Environmental sociology, Environment-Based Behavior, Environment-Conscious Identity, Environmental Affects, Environmental responsibility, Environmental Consequences.

### **Introduction**

Environmental degradation, whether at the global, national or local level, is a result of multiple major human-related factors including human intervention in natural ecosystems, current patterns of economic development, and social organization. Environment is threatened by modern man who has become detached from nature. There is an urgent necessity to ask questions related to the environmental effects of socio-economic and political conditions

---

<sup>\*</sup>Corresponding author: KuroshRezaei-Moghaddam; e-mail: [rezaei@shirazu.ac.ir](mailto:rezaei@shirazu.ac.ir); [dr.rezaeimoghaddam@gmail.com](mailto:dr.rezaeimoghaddam@gmail.com)

and reasons for technological changes. Our behavior with regard to nature and the environment should be guided by a code of ethics, which is to be driven from basic principles and a pragmatic consideration of the issues at stake. Therefore, there appears to be an urgent need for a serious reflection on and critical evaluation of the relationship between society and environment (Hayati and Rezaei-Moghaddam, 2006).

The study of the relationship between society and environment comprises the core of environmental sociology. Environmental sociology investigates complicated and diverse symbolic and non-symbolic interactions and reciprocal influences between society and environment, which includes not only social and cultural aspects, but also physical and biological ones (Rezaei-Moghaddam *et al.*, 2005; Rezaei-Moghaddam and Karami, 2008). Specifically, environmental sociology concentrates on the reciprocally influential relationships between the environment-social and physical-and human behavior (Hughes, 1995).

Attention to environmental issues is part of a new way of thinking that has not been linked to social models. A number of critics have suggested that the lack of a general theoretical model may be one reason that research on environmental attitudes and behaviors has failed to reach the scale it deserves.

Prediction and improvement of behaviors related to environment should be and appears to be evolving as a universal priority. Therefore, the study of environmental attitudes and behaviors is a vitally important task for the scientific community. Fortunately, environmental research has given increased attention to behaviors to promote environmental conservation. Contemporary advances in environmental consciousness provide a multitude of opportunities for research and new knowledge generation in topics of interest to environmental sociologists and environmental scientists. Thus, a more robust and systematic sociological study of environmental issues seems to be universally meritorious and very timely.

Our review indicates that the inconsistencies observed by environmental sociologists in the relationship between attitudes and behaviors may partially be attributed to the fact that the models and metrics used to scale attitudes, knowledge and intentions fail to produce a reliable and sufficiently adequate understanding of people's behavior. Indeed, this is an argument that has been leveled against the current theories of behavior. Our findings suggest that an environmental sociologic approach could be used to develop and reconstruct better models to predict individual and communal environmental behaviors.

This paper is divided into three major sections. In the first section, we identify and summarize published general models related to attitudes and behaviors. Section two describes the environmental sociology methodology and

the key issues in the field. In section three, we introduce an alternative model for a more consistent and systematic investigation of environmental behavior.

## **Behavioral Modeling**

### ***Conventional Models relating Attitudes and Behaviors***

One of the important steps to promote environmental sustainability is identification of determinant factors related to environmental behaviors and development of a comprehensive model. A lot of recent research on the attitude-behavior relation has been conducted within the framework of the Theory of Reasoned Action (TRA). Fishbein and Ajzen's (1975) theory of reasoned action (TRA) maintained that beliefs influence attitude. This theory emphasized that the performance or nonperformance of a specific behavior is determined by the intention to perform that behavior. Consequently, prediction of behavior from a priori attitude toward that behavior would be accurate only when the attitude influences the intention to perform the behavior. Thus, behavioral intention is a function of beliefs, not about the object of the behavior, but about behavior itself. Based on TRA, a person's intention to perform a given behavior is represented as a function of two types of beliefs. The first is that performing the behavior will lead to certain evaluated consequences and the second consists of subjective norms. Indeed, the constructs employed by the TRA are fundamentally motivational in nature.

The so-called group of "rational choice models" (Egmond and Bruel, 2007) have forward the Theory of Planned Behavior (TPB). This theory modifies the TRA by incorporating the construct of perceived behavioral control to address situations in which individuals lack substantive control over a specific behavior (Ajzen, 1991). Based on TPB, three determinants explain behavioral intention: The attitude, the subjective norm, and the perceived behavioral control. According to TPB, attitudes, subjective norms, and perceived behavioral control predict the intention, which in turn predicts the behavior. Background variables such as demographical factors, are supposed to influence the behavior through the three determinants and the underlying intention. It may be argued that TPB is not sufficient, but can be used as a starting point to analyze internal/motivation factors. Three major criticisms of the TPB have been proposed. First, the TPB focuses on the role of the individual while neglecting the role of wider social issues (Bamberg and Mosher, 2007). Second, the TPB fails to account for habitual behavior which may supersede behavioral intention over time (Fransson and Garling, 1991).

Third, it has been argued that in the TPB, intentions do not necessarily translate into behavior.

Various researchers have applied Schwartz' norm-activation theory of altruistic behavior. The Schwartz model treats pro-environmental behavior as a special case within a social-psychological theory of altruism. Stern *et al.* (1993) argued that this model assumes that people have a general value orientation toward the welfare of others. This means people value outcomes that benefit others and can be motivated to act to prevent harm to others. They have discussed three value orientations in environmental attitudes and behavior. These consist of orientation toward human welfare, egoistic value orientation and biosphere value orientation (Stern *et al.*, 1993).

The model of goal – directed behavior (MGB) was proposed as an extension of the theory of planned behavior. The MGB is of particular interest for the study of environmental behavior because it adds the constructs of past behavior and anticipated emotions to the original TPB components (Carrus *et al.*, 2008). Furthermore, the MGB introduces a distinction between desire and intention as the primary variable motivating human deliberate action. Carrus *et al.* (2008) argue that although emotion could be fruitfully integrated within rational choice model to better explain individual environmental performance, however, many studies have indicated that the entire MGB framework has not yet been applied to the study of environmental behaviors .

Carrus *et al.* (2008) discuss three major differences between TPB and MGB. From their point of view, the major difference concerns the direct predictors of intentions. These consist of the desire to perform a certain behavior and the frequency with which that behavior has been performed in the past. The second difference relates the role of past behavior in the prediction of intention and behavior. The third refers to positive and negative anticipated emotions. These are conceived as predictors of desire, parallel to attitudes, subjective norms and perceived behavioral control .

In this paper, it is proposed that models reviewed above are not adequate for prediction of environmental attitudes and behaviors. These models fail to incorporate the dynamics of interactions between and impact of individual and communal human behavior and the environment. In the light of advancements in the field of environmental sociology, we suggest new models are needed to incorporate additional constructs and provide a more robust and comprehensive tool to predict environmental behaviors and evaluate environmental policy making and social engineering. The scope of behaviors of interest are extensive and range from macro to local levels and include air quality, water quality, waste disposal and other environmental activities. We use environmental-

sociologic concepts to introduce a more powerful model to predict environmental behaviors.

### ***Environment-Sociologic Modeling Approach***

#### ***Background: Environmental sociology***

The study of the relationship between nature and human societies has received special attention since the end of World War I. The field of environmental sociology has a somewhat more diverse intellectual history. The expression environmental sociology appeared for the first time in North America in 1971 (Vaillancourt, 1995). It began to grow with the formation of the American Sociological Association (ASA) Section on Environmental Sociology (Dunlap and Catton, 2002).

Environmental sociology is focused on development of social theories for studying the interrelations of social action and environment and the environmental consequences of the individual and communal behavior of human societies. Pragmatically speaking, environmental sociology explores the ways in which sociology can help us understand and consider the environment as a social issue requiring action at individual, communal, as well as universal levels. Environmental sociology has its core foundations in general sociology, philosophy, and the humanities. It tries to develop a sociological theory combining the concepts of environment and nature. In other words, environmental sociologists seek a reorientation of sociology toward a more holistic perspective that integrates social processes within the overall context of the biosphere. Hofstee (1972, quoted in Leroy and Nelissen, 1998) define the central task of environmental sociology as "to study environmental deterioration and environmental control as societal phenomena. This definition establishes a double agenda for environmental sociology: studying the societal causes of environmental problems and the societal reaction resolve or control them.

Environmental sociology has been utilized for a specific category of inquiry focusing on the way in which factors in the physical environment shape and are shaped by social organization and social behavior (Dunlap and Catton, 1979 as reported by Buttel, 1987). In time, the conceptual orientation and analytical focus of environmental sociology have shifted from the individual to the nation-state. The theoretical dynamical interactions and linkages among attitudes, intentions and behaviors and environment have been investigated to better understand the phenomenology of environmental issues (Field *et al.*, 2008).

Environmental sociology is in general interested in social topics like the green movement, public opinion and attitudes concerning the environment, environmental problems, ecological constraints on human activities, the built versus natural environment, environmental impact studies, scarce natural resources and their allocations, energy issues, risks of catastrophes, environmental policies and natural hazards research. Contemporary research areas in environmental sociology include the "new human ecology", "environmental attitudes, values, and behaviors", "the environmental movement", "technological risk and risk assessment", "the political economy of the environment and environmental politics", "social impact assessment" and "the built environment" (see Buttel, 1987). Tindall (1995) introduced eight subdomains comprised of: social impact assessment, environmental design research, political economy approaches, organizational decision making approaches, new human ecology/congruence perspectives, social psychology of environmental problems, social construction of environmental problems and theories of collective action and social movements.

### ***Environment-Sociologic Model: Determinant Factors***

Analysis of different theories and models indicate that attitudes and beliefs may not lead in a straightforward way to environmental behaviors. Social factors influence individual attitude and intention and thereby impacting behavior toward environment. Based on our review, we propose to utilize seven main determinant factors to model environmental behavior by individuals and societies. These factors include awareness of environmental consequences, manifestation of behavioral environmental responsibility, environmentally-based social affects, environmental knowledge, social norms, environmental identity and controllability of behaviors .

### ***Environmental Knowledge***

Agricultural and environmental knowledge has a direct relationship to sustainable agricultural development. One important direction in policy interventions to influence behavior is diffusion of information and knowledge. Information could mould or change attitudes. However, although awareness and knowledge are necessary, they may often be insufficient to induce behavioral change. Maohua (2001) argues that the key restriction of slow pace of agricultural development and decreased food production in developing countries is attributed to backwardness of agricultural sciences in those regions. Crosson and Anderson (1994) argued that, the supply elasticity is greater for knowledge than it is for land, water, genetic and climate resources. They

maintain that the elasticity of substitution of knowledge for natural resources is generally high.

### ***Controllability of Behavior***

The controllability factors of behavior are contextual attributes and situational conditions that facilitate proclivity to act and allow new behavior to be realized. Ajzen and Madden (1985) defined perceived behavioral control as a person's belief regarding the ease or difficulty of engaging in a certain behavior. The more resources and opportunities individuals think they possess, and the fewer obstacles or impediments they may anticipate, the greater should be their perceived control over the considered behavior. These factors consist of external financial, technical and organizational resources and new skills necessary to realize the desired behavior.

Individuals learn how to create a specific plan of action to execute an environmental policy. The concept of locus of control in Attribution Theory refers to this factor. Analysis of self-efficacy beliefs by Bandura have provided evidence showing that people's behavior is strongly influenced by their confidence in their ability to perform i.e. by perceived behavioral control. Control of behavior is viewed as a continuum. On one extreme, there are behaviors that encounter few if any problems of control, while on the other extreme are behaviors or behavioral events over which we have relatively little control. Most behaviors fall somewhere in between those extremes (Ajzen and Madden, 1985). Often the most desired behaviors are driven by goals whose attainment is subject to some degree of uncertainty. Environmental protection and behaviors related to sustainability have a great degree of uncertainty. Those who believe they have neither the resources nor the opportunities to perform activities and behaviors related to protection and sustainability of environment are unlikely to engage in such actions.

### ***Awareness of Environmental Consequences***

According to TPB, decision making is guided by a rational evaluation of behavioral consequences. The sum of perceived positive and negative outcomes determines the global attitude toward a behavioral option (Ajzen, 1981). In the applications of Schwartz' theory, one of the determinants of intentions to perform pro-environmental behavior include awareness of consequences (Garling *et al.*, 2003). According to Schwartz's norm-activation model, the key beliefs are that a specific situation has negative consequences for other people and that the individual is responsible for those consequences in the sense that

he or she can take action that would prevent them. It emphasizes how understanding of beliefs regarding the impact of environmental situations could account for environmental attitudes. The Schwartz norm-activation model of altruism holds that individuals experience a sense of moral obligation and act on it when they believe adverse consequences are likely to occur to others and that they personally can prevent those consequences by ascription of responsibility to self (Stern and Dietz, 1994).

Various studies have emphasized that pro-environmental behavioral intention is causally related to personal norms which in turn are rooted in assumption of responsibility and awareness of consequences. These authors categorized the awareness of consequences to impact on oneself, others, and the biosphere. This concept is thus generalized as awareness of egoistic, social-altruistic, and biospheric consequences. Awareness of consequences related to environment reflects the underlying assumption that people construct attitudes about the environment on the basis of how the environment affect what they value (Stets and Biga, 2003).

### ***Social Norms***

Various researchers have proposed moral norm as an independent predictor of attitude and behavior. Moral norms are feelings of strong moral obligations that people experience for engaging in pro-social behavior. Awareness of and knowledge about environmental problems are considered important preconditions for developing moral norms in environmental behavior (Bamberg and Mosher, 2005).

Social norms directly contribute to the development of moral norms. A social norm is primarily conceptualized as perceived social pressure emanating from perceived communal expectations to perform or avoid certain behavior. Social norms are thought to determine behavior not directly but indirectly through interaction with other factors such as intention (Bamberg and Mosher, 2005). It is assumed that frequently people follow social norms not because they fear social pressure but because they use social norms as the reference to determine if a certain behavior is appropriate.

Stern *et al.* (1992) proposed that the values, personal norm and behavior hierarchy is also a useful framework for understanding environmentally responsible behavior. Many other studies have confirmed that personal norms are good predictors and serve as a tool for proximal determination of this type of behavior.

### ***Environmental Responsibility***

Schwartz's theory of altruism suggests that pro-environmental behavior becomes more probable when an individual ascribes responsibility to herself or himself for changing the detrimental environmental condition. When people become aware of negative consequences and assume responsibility, they normally experience a sense of moral obligation to prevent or mitigate the negative impacts (Stern *et al.*, 1993).

In order for a behavior to be performed, attention to or awareness of consequences must induce an ascribed responsibility that in turn activates a personal norm or moral obligation to act. Based on Garling *et al.* (2003) pro-environmental intentions are causally related to personal norms that in turn are causally related to ascribed responsibility and awareness of environmental consequences.

### ***Environmental Affects***

Emotional affinity toward nature and love of nature play an important role in the context and orientation of behaviors related to environment. Emotional responses to various situations are assumed distinct from rational-instrumental evaluations of consequences, and may include both positive and negative responses of varying strengths. Emotions constitute a fundamental mechanism at the basis of human evolution and adaptation to the changing environment (Carrus *et al.*, 2008). Affect influences decision-making in a more or less unconscious fashion, which is governed by instinctive behavioral responses in particular (Egmond and Bruel, 2007).

Research work to incorporate emotional aspects into a model to predict behavior has received a lot of support in recent studies. Recent studies offer an explicit role for affective factors on behavioral intentions (Bagozzi *et al.*, 2004; Steg *et al.*, 2001).

### ***Environmental Identity***

A sociological approach to self and identity begins with the assumption that there is a reciprocal relationship between the self and society. Identity is a set of meanings applied to the self in a social role or as a member of a social group that define who one is. The core of an identity is the categorization of the self as an occupant of a role, and incorporating, into the self, the meanings and expectations associated with the role and its performance (Burke, 1991). Burke has discussed the hierarchy of identities and maintains that individuals assume

multiple role identities. Indeed, individuals are always acting in the context of a complex social structure out of which these multiple identities emerge .

Environmental identity is defined as "the meanings that one attributes to the self as they relate to the environment" (Stets and Biga, 2003). Indeed, environmental identity is an experienced social understanding through which we relate to and interact with the natural environment.

## **Discussions**

Environmental degradation, whether at the global, national or local level, is a result of multiple major human-related factors including human intervention in natural ecosystems, current patterns of economic development, and social organization. Development of a comprehensive environment-sociologic model constitutes one of the important steps toward enhancing a better understanding of environmental sustainability. A comprehensive behavioral model would provide a quasi-objective means for identification and evaluation of significant factors related to individual as well as communal environmental behaviors. Such a model would serve as a valuable tool for socio-economic decision making, social engineering, trend setting and promotion of environment-friendly cultural values. Furthermore, this modeling approach may be utilized by policy makers, educators, social and community activists for evaluation of proposed developmental planning, social action, cultural education and training at individual, family, community levels as well as national and universal arenas.

A number of modeling approaches have been proposed for investigation of human behavior. It appears that existing conventional models address the broad picture and are general in nature. While they provide valuable insight for understanding behavior, however, they do not incorporate parameters and metrics that could enable the researchers to understand and conduct a more quantifiable and objective investigation. Conventional models fail to incorporate the dynamics of interactions between and impact of individual and communal human behavior and the environment. In the light of advancements in the field of environmental sociology, we suggest a new modeling approach to incorporate additional constructs and provide a more robust and comprehensive tool with better resolution. Such a model would enable us to predict environmental behaviors and evaluate environmental policy making and socio-cultural engineering with deeper and more specific insight and present more concrete proposals for change.

We propose to use environmental-sociologic concepts to introduce a more powerful model to predict environmental behaviors. The scope of behaviors of

interest are extensive and range from macro to local levels and include air quality, water quality, waste disposal and other environmental activities. The main determinant factors of the model which influence environmental behavior through individual and communal actions include: awareness of environmental consequences, manifestation of behavioral environmental responsibility, environmentally-based social affects, environmental knowledge, social norms, environmental identity and controllability of behaviors.

Knowledge and dissemination of information influence behaviors through many facets. Formation as well as activation of moral norms is probably based on the interplay of cognitive, emotional, and social factors. In the field of pro-environmental behavior, it appears that awareness of and knowledge about environmental problems are important preconditions for developing supportive moral norms (Bamberg and Mosher, 2007). MalekSaeidiet *al.* (2001) have studied the empirical evidence regarding the effect of knowledge of organic farming among agricultural specialists on their attitudes towards this type of agricultural technique. They have found that knowledge of organic farming had direct impact attitudes towards environmental decision making.

An individual's perception of control over the outcome of her or his actions influences the decision to adopt or avoid such conduct. One is unlikely to engage in actions and behaviors that are perceived to be beyond reach. That is why the Theory of Reasoned Action (TRA) which relies on intention as the sole predictor of behavior, will be insufficient whenever control over the behavioral goal is deemed incomplete.

The Theory of Planned Behavior (TPB) stresses the importance of situational constraints. When people form their behavioral intention, they do not only take into account their attitudes toward this behavior but also estimate their ability to perform this behavior that is their perceived behavioral control over it (Ajzen, 1991). Thus, TPB assumes when perceived behavioral control is a reliable predictor of objective behavioral control it also predicts behavior directly. In other words, the perceived behavioral control is an estimate of the skills needed for expressing the behavior and the possibility to overcome barriers. Therefore, it is supposed that there exist a direct influence of perceived behavioral control on behavior itself.

The Motivation-Opportunity-Ability (MOA) Model attempts to integrate motivation, habitual and contextual factors into a single model of pro-environmental behavior. It emphasizes the concept of opportunity. The opportunity component in the model is clearly related to the concept of facilitating conditions offered by Triandis and the notion of external conditions by Stern. Opportunity is defined as the objective precondition for behavior. This definition has some similarities with Ajzen's concept of perceived

behavioral control. Other studies have investigated the importance of situational factors as a precondition for pro-environmental behavior (Guagnano et al., 1995; Thøgersen, 1990; Afshari, 2009 has studied the role and effect of feasibility of sustainable agricultural methods as an index of controllability on environmental behavior. She found that this factor had direct and positive effect on environmental behavior.

Known or expected consequence of an action or behavior normally serve as a feed forward mechanism in conditioning of an individual's conduct. Stern and Dietz (1994) argued that value orientations take shape during socialization process and are fairly stable in adults. They maintain that value orientations affect beliefs about the consequences of attitude objects for the things an individual values and thus have consequences for that individual's attitudes and behavior. Stern *et al.* (1993) argued that a typical example is the NIMBY protest, in which individuals become concerned when they perceive that a hazardous industrial process harms them and their families. Individuals act more or less in accordance with the predictions of various forms of rational-choice theory, and endure costs to protect the environment when such action is perceived as cost effective.

Garling *et al.* (2003) argues that with few exceptions, the relationships between awareness of environmental consequences and pro-environmental behavior has rarely been investigated. One of the important findings by Afshari (2009) is the relationship between awareness of consequences and environmental constructs i.e. knowledge, attitude and behavior. Her study showed that awareness of consequences had a direct and significant effect on environmental knowledge, attitudes and behavior. In fact, she has observed that awareness of consequences indirectly influenced farmers' environmental behaviors through environmental knowledge and attitudes.

Stern *et al.* (1999) proposed that personal and social values, norms and behavior hierarchy constitute a useful framework for the understanding of environmentally-responsible behavior. Many other studies have confirmed that personal norms are good predictors and serve as a tool for proximal determination of this type of behavior. Harland *et al.* (1999) found that inclusion of moral norms raised the proportion of explained variance of intention by 1 % to 10 %. The study by Malek-Saeidi *et al.* (2012) in Iran has shown that understanding the dynamics of experts' attitudes towards social norms is an effective factor in determining their approach to organic farming as a sustainable agricultural system. They have concluded that established moral norms related to organic farming had direct and positive effect on attitudes towards organic farming among Iranian agricultural specialists. This study indicate that establishment of positive social norms regarding organic farming

indirectly affect farmers' attitude towards organic farming through the mechanisms of institutionalized moral norms.

Schwartz's theory of altruism suggests that pro-environmental behavior becomes more probable when an individual ascribes responsibility to herself or himself for changing the detrimental environmental condition. When people become aware of negative consequences and assume responsibility, they normally experience a sense of moral obligation to prevent or mitigate the negative impacts (Stern *et al.*, 1993). In order for a behavior to be performed, attention to or awareness of consequences must induce an ascribed responsibility that in turn activates a personal norm or moral obligation to act. Based on Garling *et al.* (2003), pro-environmental intentions are causally related to personal norms that in turn are causally related to ascribed responsibility and awareness of environmental consequences. Afshari (2009) showed that responsibility of environmental behavior had significant and direct effect on knowledge toward sustainability of environment. Thus, feeling of high responsibility by farmers leads to increasing environmental knowledge and indirectly influences environmental behaviors.

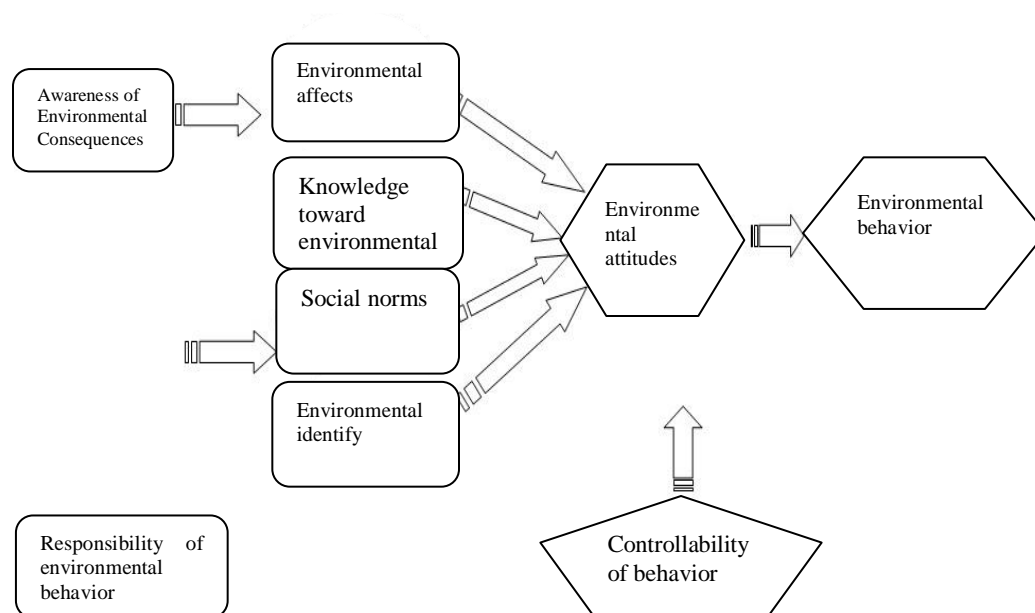
Affective factors have scarcely been considered for prediction of environmental behavior. The importance of affect in the context of human relationships with the natural environment has emerged recently. Affective connection with the natural environment is the subjective experience of an emotional attachment with the nature. It is emphasized that combination of cognitive and affective processes can drive human decisions regarding participation in environmental behavior. Schultz (2000 as reported by Hinds and Sparks, 2008) concluded that engendering greater empathy towards nature tends to increase the level of connectedness people feel towards it.

Recent research has shown that pro-environment behavior is positively associated with the strength of emotional connection towards nature. Hinds and Sparks (2008) have shown that affective connection is a significant independent predictor of intentions to engage with the natural environment. It is expected that people with greater experience with the natural environment would express greater affective connections with it than those with lesser experience. Afshari (2009) analyzed the effect of environmental affects on environmental behaviors among Iranian farmers. Her study showed environmental affects had direct and significant effects on knowledge about and consideration of environmental sustainability. She concludes that increased environmental affects enhance environmental knowledge, and subsequently, indirectly promote the amount and intensity of environmentally-conscious behaviors.

Stets and Biga (2003) have criticized the lack of an explicit reference to the self and one's identity in research on the role of attitudes in formation of

social behavior. They emphasize that self is a primary motivator of behavior. Burke and Reitzes (1981) found that perceptions of self and identity importantly guide the behavior of people. Stets and Biga(2003) conclude that examining one's attitude toward the environment and one's behavior toward it, as in being environmentally responsive or non-responsive, should include one's attitude toward oneself. Based on Stets and Biga(2003), we should incorporate the self into the attitude-behavior model. Hinds and Sparks (2003) showed that environmental identity was a significant predictor of intentions to engage with the natural environment. Stets and Biga(2003) maintain that there is a high correlation between environmental identity and environmental behaviors and attitudes towards the environment. Perceived environmental identity indirectly influences environmental behavior through attitudes. However, the effect of identity as a predictor may vary according to the target behavior. Therefore, environmental identity and affective connection combined with other key variables in the planned behavior model could serve as important predictors of intentions to engage with nature.

Fig. 1 presents the proposed alternative model. Based on this model, awareness of environmental consequences, manifestation of behavioral environmental responsibility, environmentally-based social affects, environmental knowledge, social norms, environmental identity and controllability of behaviors are the main determinants of the model.



**Fig. 1.** Environment-Sociologic Model to Predict Environmental Behaviors

## **Conclusion**

Prediction and improvement of behaviors related to environment should be and appears to be evolving as a universal priority. Therefore, the study of environmental attitudes and behaviors is a vitally important task for the scientific community. Fortunately, environmental research has given increased attention to behaviors to promote environmental conservation. Contemporary advances in environmental consciousness provide a multitude of opportunities for research and new knowledge generation in topics of interest to environmental sociologists and environmental scientists. Thus, a more robust and systematic sociological study of environmental issues seems to be universally meritorious and very timely. Conventional models fail to incorporate the dynamics of interactions between and impact of individual and communal human behavior and the environment. In the light of advancements in the field of environmental sociology, we suggest a new modeling approach to incorporate additional constructs and provide a more robust and comprehensive tool with better resolution. Such a model would enable us to predict environmental behaviors and evaluate environmental policy making and socio-cultural engineering with deeper and more specific insight and present more concrete proposals for change.

We propose to use environmental-sociologic concepts to introduce a more powerful model to predict environmental behaviors. The scope of behaviors of interest are extensive and range from macro to local levels and include air quality, water quality, waste disposal and other environmental activities. The main determinant factors of the model which influence environmental behavior through individual and communal actions include: awareness of environmental consequences, manifestation of behavioral environmental responsibility, environmentally-based social affects, environmental knowledge, social norms, environmental identity and controllability of behaviors.

Future work will focus on definition and development of methodologies for quantifiable metrics, reliable and repeatable data collection, as well as theoretical and operational challenges of model building, accounting for model uncertainty, and validation.

## **References**

- Afshari, Z. (2009). Factors affecting attitudes and sustainable behaviors among cotton producers in Isfahan province. Unpublished master's theses, Ramin Agricultural and Natural Resource University, Iran (In Farsi).
- Ajzen, I. and Madden, T.J. (1985). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology* 22:453-474.
- Ajzen, I. (1991). From intentions to actions: A theory of planned behavior. In J. Kuhl, J. Beckmann (eds.). *Action control: From cognition to behavior* Heidelberg: Springer. pp. 11-39.
- Bagozzi, R., Gurnao-Canli, Z. and Priester, J. (2002). *The social psychology of consumer behavior*. Buckingham: Open University Press.
- Bamberg, S. and Mosher, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behavior. *Journal of Environmental Psychology* 27:14-25.
- Burke, P.J. (1991). Identity processes and social stress. *American Sociological Review* 56:836-849.
- Burke, P.J. and Reitzes, D.C. (1981). The link between identity and role performance. *Social Psychology* 44:83-92.
- Buttel, F.H. (1987). New directions in environmental sociology. *Annual Review of Sociology* 13:465-488.
- Carrus, G., Passafaro, P. and Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology* 28:51-62.
- Crosson, P. and Anderson, J.R. (1994). Demand and supply: Trends in global agriculture. *Food Policy* 19(2):105-119.
- Dunlap, R.E. and Catton, W.R.JR. (2002). Which function(s) of the environment do we study: A comparison of environmental and natural resource sociology. *Society and Natural Resources* 15:239-249.
- Egmond, R.B. and Bruel, R. (2007). Nothing is as practical as a good theory: Analysis of theories and a tool for developing interventions to influence energy-related behavior.
- Field, D.R., Luloff, A.E. and Krannich, R.S. (2002). Revisiting the origins of and distinctions between natural resource sociology and environmental sociology. *Society and Natural Resources* 15:213-227.
- Fishbein, M. and Ajzen, I. (1975). *Belief, attitude, intention and behavior*. Addison-Wesley, Reading, MA.
- Fransson, N. and Garling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology* 19:397-408.
- Garling, T., Fujii, S., Garling, A. and Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behavior intention. *Journal of Environmental Psychology* 23:1-9.
- Guagnano, G., Stern, P. and Dietz, T. (1995). Influences on attitude behavior relationships: A natural experiment with curbside recycling. *Environment and Behavior* 27(5):699-718.
- Harland, P., Staats, H. and Wilke, H.A.M. (1999). Explaining proenvironmental intention and behavior by personal norms and the theory of planned behavior. *Journal of Applied Social Psychology* 29:2505-2528.
- Hayati, D. and Rezaei-Moghaddam, K. (2006). Toward a paradigm shift for agricultural extension: An environmental sociology perspective. *Journal of Food, Agriculture and Environment* 4(3-4):244-251.

- Hinds, J. and Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology* 28:109-120.
- Hughes, D.E. (1995). Environmental sociology: A distinct field of inquiry. In M. D. Mehta and E. Ouellet (eds.) *Environmental Sociology: Theory and Practice* Captus Press. Canada. pp. 61-82.
- Malek-Saeidi, H., Rezaei-Moghaddam, K. and Ajili, A. (2012). Professionals' attitude towards organic farming: The case of Iran. *Journal of Agricultural Science and Technology* 14:37-50.
- Malek-Saeidi, H., Rezaei-Moghaddam, K. and Ajili, A., (2011). Iranian agricultural professionals' knowledge on organic farming. *African Journal of Agricultural Research* 6(2):907-915.
- Maohua, W., (2001). Possible adoption of precision agriculture for developing countries at the threshold of the new millennium. *Computers and Electronics in Agriculture* 30:45-50.
- Leroy, P. and Nelissen, N. (1998). The social and policy approach of the environment in the Netherlands: A state of the art. *Natures Sciences Societies* 6(4):33-40.
- Rezaei-Moghaddam, K., Karami, E. and Gibson, J. (2005). Conceptualizing sustainable agriculture: Iran as an illustrative case. *Journal of Sustainable Agriculture* 27(3):25-56.
- Rezaei-Moghaddam, K. and Karami, E. (2008). Developing a green agricultural extension theory. *International Journal of Sustainable Development and Planning* 3(3):242-256.
- Rezaei-Moghaddam, K. and Karami, E. (2008). Developing a Green Agricultural Extension Theory. *International Journal of Sustainable Development and Planning* 3(3):242-256.
- Steg, L., Vlek, C. and Slotegraaf, G. (2001). Instrumental-reasoned and symbolic-affective motives for using a motor car. Groningen: Center for Environmental and Traffic Psychology.
- Stern, P.C., Dietz, T. and Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior* 25(3):322-348.
- Stern, P.C. and Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues* 50(3):65-84.
- Stern, P.C., Dietz, T., Abel, T., Guagnano, G.A. and Kalofi, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review* 6(2):81-97.
- Stets, J.E. and Biga, C.F. (2003). Bringing identity theory into environmental sociology. *American Sociological Association*.
- Stryker, S. and Burke, P.J. (2000). The past, present, and future of an identity theory. *Social Psychology Quarterly* 63(4):284-297.
- Tindall, D.B. (1995). What is environmental sociology? An inquiry into the paradigmatic status of environmental sociology. In M. D. Mehta and E. Ouellet (eds.) *Environmental Sociology: Theory and Practice*, Captus Press. Canada. pp. 33-59.
- Thogersen, J. (1990). A behavioral science framework for source-separation systems for household waste. Aarhus Business School, Department of Marketing, Working Paper.
- Vaillancourt, J.G. (1995). Sociology of the environment: From human ecology to ecosociology. In M. D. Mehta and E. Ouellet (eds.) *Environmental Sociology: Theory and Practice*, Captus Press. Canada. pp. 3-32.

(Received 17 Febuary 2013; accepted 31 October 2013)