علـوم محـیـطی سال نهم، شماره اول، پاییز ۱۳۹۰
ENVIRONMENTAL SCIENCES Vol.9, No.1 , Autumn 2012
1-22

Investigating Agricultural Professionals' Intentions and Behaviours towards Water Conservation: Using a Modified Theory of Planned Behaviour

Masoud Yazdanpanah,[1*] Dariush Hayati[2] and Gholam Hossein Zamani[3]

1-Ph.D. Student of Agricultural Extension and Education, Department of Agricultural Extension and Education, Faculty of Agriculture, Shiraz University, Shiraz, Iran.

2- Assistant Professor, Department of Agricultural Extension and Education, Faculty of Agriculture, Shiraz University, Shiraz, Iran.

3- Professor, Department of Agricultural Extension and Education, Faculty of Agriculture, Shiraz University, Shiraz, Iran.

تاریخ دریافت: ۸۹/۱/۲۸ تاریخ پذیرش: ۹۰/۸/۲۹

Abstract

Despite the increasing importance of water conservation across the world, there is very little understanding about the psychosocial variables that help predict people's water conservational behaviour. This study used a modified model of the Theory of Planned Behaviour (TPB), including the additional variables of moral norms, self-identity and subjective myths of the nature as general beliefs, to predict intentions and behaviour regarding water conservation through a random sample of agricultural professionals (n= 80) using the survey method in Bushehr Province. Findings revealed that the modified theory of TPB can explain intention and behaviour regarding water conservation. Multiple regression analysis showed that moral norms, perceived behavioural control and risk perception can predict 68 percent of variances in water conservational intention, while subjective norms and perceived behavioural control can predict 49 percent of variances in water conservational intention based on the original TPB model. Therefore, those agricultural professionals who perceived a greater normative and commitment feeling regarding water conservational behaviour had a higher level of intention to engage in such behaviours and the significance of perceived behaviour control revealed that professionals did not have complete volition in their water conservational behaviour. Furthermore, myths of nature can predict about 39 percent, 20 percent and 28 percent of variances in attitude, moral norms and risk perception regarding water conservation.

Keywords: Theory of Planned Behaviour, Myths of nature, Water conservation, Agricultural professionals, Bushehr, Iran.

واکاوی رفتار و تمایلات رفتاری کارکنان سازمان‌های کشاورزی نسبت به حفاظت آب: کاربرد تئوری تکامل یافته رفتار برنامه‌ریزی شده

مسعود یزدان‌پناه[۱*]، داریوش حیاتی[۲]، غلامحسین زمانی[۳]

۱- دانشجوی دکترای ترویج و آموزش کشاورزی، دانشکده کشاورزی، دانشگاه شیراز

۲-استادیار گروه ترویج و آموزش کشاورزی، دانشکده کشاورزی دانشگاه شیراز

۳-استاد گروه ترویج و آموزش کشاورزی، دانشکده کشاورزی دانشگاه شیراز

چکیده

علیرغم افزایش روزافزون اهمیت حفاظت از آب در سراسر جهان، در باره متغیرهای روانی- جامعه‌شناختی که قادرند رفتارهای حفاظت از آب مردم را پیش‌بینی کنند، درک اندکی وجود دارد. در این مطالعه تلاش شده با استفاده از تئوری تکامل یافته رفتار برنامه‌ریزی شده شامل متغیرهای هنجارهای اخلاقی، خویش هویتی و اسطوره‌های ذهنی نسبت به طبیعت بعنوان باورهای عمومی، رفتارها و تمایلات رفتار افراد نسبت به حفاظت آب، مورد پیش‌بینی و مطالعه قرار گیرد. جمعیت مورد مطالعه کارکنان سازمان جهاد کشاورزی استان بوشهر بوده‌اند که از طریق نمونه‌گیری تصادفی تعداد ۸۰ نفر از ایشان جهت انجام این مطالعه انتخاب گردیدند. روش تحقیق از نوع پیمایش بوده است. یافته‌ها نشان داد که تئوری تکامل یافته رفتار برنامه‌ریزی شده، قادر به پیش‌بینی رفتار و تمایلات رفتاری افراد مورد مطالعه در رابطه با حفاظت آب می‌باشد. نتایج حاصل از تحلیل رگرسیونی چند گانه نشان داد که متغیرهای هنجار اخلاقی، کنترل رفتار درک شده، و درک از ریسک قادرند ۶۸ درصد از تغییرات متغیر وابسته تمایلات رفتاری نسبت به حفاظت از آب را پیش‌بینی کنند. در حالی که در مدل اولیه تئوری رفتار برنامه‌ریزی شده، هنجار ذهنی و کنترل رفتار درک شده تنها قادر به پیش‌بینی ۴۹ درصد از تغییرات تمایلات رفتاری نسبت به حفاظت از آب بوده‌اند. بنابراین آن‌دسته از کارکنانی که درک و تعهد بیشتری را در رابطه با حفاظت از آب احساس می‌کرده‌اند، تمایلات رفتاری بیشتری را برای درگیر شدن در چنین فعالیت‌هایی از خود نشان داده‌اند. همچنین یافته‌ها نشان داد که کارکنان مورد مطالعه در رابطه با رفتارهای حفاظت از آب، اختیار و تسلط کاملی بر روی رفتارشان نداشته‌اند (منظور رفتارهایی است که علاوه بر خود فرد، تا حدودی تحت تاثیر محیط و اطرافیان است). هم‌چنین اسطوره‌های ذهنی افراد نسبت به طبیعت توانسته بترتیب ۳۹ درصد، ۲۰ درصد، و ۲۸درصد از تغییرات متغیرهای وابسته نگرش، هنجار اخلاقی و درک ریسک افراد نسبت به حفاظت از آب را پیش‌بینی کند.

کلمات کلیدی: تئوری رفتار برنامه‌ریزی شده، اسطوره طبیعت، حفاظت آب، کارکنان کشاورزی، بوشهر، ایران.

* Corresponding author. *E-mail Address*: masoudyazdan@gmail.com

Introduction

In recent decades, Iran has been facing a water crisis so severe that the government has been forced to accept foreign aid for only the second time since the revolution of 1979. This crisis, exacerbated by severe drought, has resulted in much of Iran's land ceasing to be productive. Because of the lack of water, there was a complete evacuation of 50 villages in Kerman province in 2000 (Foltz, 2002) and of 86 villages in Zabol County in Sistan Baluchistan province in 2003 (Beik Mohammadi *et al.,* 2006), with more than one million head of livestock perishing and three million tons of wheat and barley being lost—12 million tons of wheat being the estimated amount of grain needed to feed the Iranian population for one year). Circumstances then became even worse. In Esfahan Province 100,000 farm workers lost their jobs because of the drought and, in the southeast of the country Lake Hamoun, formerly the largest body of freshwater in Iran, dried up. Before that happened, fishermen from the villages around Hamoun had been taking 12,000 tons of fish a year from the lake. With the disappearance of Lake Hamoun, strong winds and sandstorms increased soil erosion in 94 villages in the southeast of the country (Foltz, 2002).

Though Iran has always had cycles of drought, a major World Bank report (Balali *et al.,* 2009) has confirmed that, this time, things are different. Iran faces not just a periodic dry spell, but a severe water crisis, made even worse by recent high rates of population growth. According to an FAO (2006) report, per capita availability of water was 7,000 m^3 per year 50 years ago when Iran's population was 19 million. In recent years it has decreased to 1,910 m^3 and is predicted to further decrease to 1,400 m^3 in 2025. The FAO has projected that rainfall will continue to decrease (by at least 40 mm) this century in Middle Eastern countries (FAO, 2007). Climate change which, according to estimates, will reduce the per capita availability of water by one half by 2050 is just the icing on the catastrophic cake. The crisis is set to turn into a super-crisis, with increasing amounts of land being taken out of production over the coming decades (Balali *et al.,* 2009). Iran now seems unable to cope with its historically familiar reality of scarce water resources.

In Iranian plateau areas, cycles of drought have always occurred; however, with the recent high rates of population growth and increasing water demands, there few alternative options left for water management. The realities of Iran's climate have recently turned the focus to water conservation, which is obviously the first option that needs to be considered against a background of demand for water increasing at rates that are outstripping traditional supply sources (Bakir, 2001; Gikas and Tchobanoglous, 2009). If water conservation is to be implemented effectively, the public must understand the dimensions of the drought problem (Boland and Whittington, 2000) and also accept the need for water conservation. Meanwhile, some questions inevitably arise, for instance: What are people's attitudes to water conservation? What encourages them to accept or reject water conservation as a part of their daily lives? What factor/s determine/s their attitude to conserving water? The answers have important

policy ramifications for the implementation of water conservation programmes. This is because, in contrast to the rational model which assumes that policy processes proceed in stages (from problem, to plan, to implementation) (Termeer, 2009), a wide range of attitudes must be taken into account for a plan ultimately to be implemented. This is one reason why so many policies regarding environmental problems remain merely symbolic (Lubell, 2004). To sum up, no matter how many policy instruments are introduced, their success will be limited unless a more positive attitude toward water conservation practices is instilled into the minds of all stakeholders.

The agriculture sector is the main user of water in Iran as it is throughout the world. Thus, water conservation by farmers in Iran is very important for success of any overall water conservation plan. But how can farmers be encouraged to accept this role? This paper takes the position that agricultural professionals play an important part in informing and educating farmers (and the public) about innovations through teaching or extension work (Wheeler, 2008). As far as forestry is concerned, for instance, Karppinen (2005) argues that forestry professionals are among the most important promoters of reforestation and that forest owners are sensitive to what forestry professionals have to say. Thus professionals do have an important role, and their intentions and behaviour regarding water conservation need to be understood. Studying the behaviour of professionals involved in agricultural water conservation clearly provides insights into their attitudes to water conservation and related activities. However, very little research of this kind has been undertaken in Iran. The aim of this study is to provide much-needed empirical data about the attitudes of Iranian agricultural professionals toward water conservation, as well as their behaviours with respect to it. This will provide a knowledge base for the development of public policy measures that ultimately aim to increase water conservation among Iranian farmers. For this purpose we have applied a well established social-psychological model, the Theory of Planned Behaviour (TPB) (Fishbein and Ajzen, 1975; Ajzen, 1988, 1991), to identify the psycho-social factors that influence agriculture professionals to decide to engage in water conservation.

Theoretical Framework

The forerunner of TPB was the Theory of Reasoned Action (TRA), the first model to be used for predicting and explaining human behaviour. It was introduced by Fishbein and Ajzen in 1975. A social-psychological model, TRA maintains that a person's actual (volitional) behaviour is directly guided by his/her behavioural intentions (Ajzen, 1991). This intention is, in turn, determined by subjective norms (i.e., the attitude of others toward the person's behaviour) (Ajzen, 1991). The TRA model, in fact, assumes that all behaviour is entirely voluntary (Liao *et al*., 2007; Kaiser *et al.,* 1999; King and Gribbins, 2002).

In the early 1980s there were criticisms that TRA was unsound when dealing with behaviour over which people have incomplete volitional

control (Liao *et al*., 2007; Burton, 2004). In response, Ajzen (1985, 1991) removed the limitations of the original model, adding "perceived behavioural control" (PBC) as a measure of the extent to which people believe they are able to control the outcome of their behaviour. He also changed the name of the model from the Theory of Reasoned Action to the Theory of Planned Behaviour. Unlike TRA, TPB accepts that there are involuntary aspects of behaviour (Hung and Chang, 2005). In other words, as Kaiser (2006) argued, the more a person's behaviour depends on external circumstances, the less he can intentionally control his behaviour.

Although the success of TPB in terms of predicting behaviour has been proven (Nigbur *et al.,* 2010; Liao *et al.,* 2007; Kaiser, 2006), the theory has not stopped evolving, and other researchers in various research domains have added their own constructs to the theory in order to increase the utility of its predictive power (Fielding, 2008; Burton, 2004).

In this context, Kaiser (2006) believed that behaviour aimed at conservation is a form of moral behaviour because being a conservationist often means deciding against one's own self-interest. This is why she added the "moral norm" into TPB. A moral norm is something that mediates a person's attitude before it affects his intention. Kaiser and Scheuthle (2003) had previously found a moral norm to be a supplementary predictor of a person's intention to act in a conservational manner (after attitudes, subjective norms, and perceived behavioural control). In this regard, Bisonette and Contento (2001) have called a moral norm a perceived responsibility; they considered it to be a variable influencing both intentions and behaviour. Moral norms are internal moral rules or values, motivated by anticipated self-administered rewards or punishments (Arvola *et al.,* 2009). For example, people who see themselves as typical water conservationists are more likely to conserve water than those who do not perceive themselves as such.

In the TPB there is also growing evidence for the inclusion of self-identity (how one perceives oneself) as being predictive of behavioural intention (Burton, 2004; Pelling and White, 2009; Nigbur *et al.,* 2010). The concept of self-identity comes from identity theory introduced by Stryker (Burton, 2004). According to Stryker's theory, the self is a set of socially constructed roles that reflect the extent to which a person sees himself as fulfilling the criteria for a particular societal role (Pelling and White, 2009). The fact that water conservation activities are a way for agriculture professionals to express their identity an examination of the role of self-identity on the part of agriculture professionals involved in water conservation activities. It is expected that the higher the importance of water conservation is to an agriculture professional's self-identity, the more he is likely to engage in such activities. Self-identity, therefore, is generally interpreted as a label that people use to describe themselves, as well as something that is expected to be an important influence on intention (Cook *et al.,* 2002). Sparks and Shepherd (1992) also confirm that self-identity has an influence on behaviour.

Douglas and Wildavsky (1982) argue that people choose what to fear and how to fear it in order to sustain their preferred pattern of social relations. Moreover, there is much discussion in the scientific community regarding the seriousness of environmental problems, the need to manage environmental risks, and the (type of) measures that should be taken (Roe, 1996). Thus, both environmental policy and the perceived acceptability of environmental policy are to a large extent based on the perceptions and judgments of risk of various groups of both experts and laypersons. Understanding the differences in risk perceptions and risk judgments could facilitate the design of effective environmental risk management strategies (Steg and Sievers, 2000). Agricultural professionals' intention and behaviour with regard to water conservation, being to a large extent based on their risk perceptions and judgments, will increase in the context of a water crisis. We have thus added risk perception to the TPB.

Additions to the TPB did not end there. According to Stern *et al* (1995) behaviour is significantly determined by specific attitudes about the environment, which in turn are based on a generalized view of the vulnerability of nature and the environmental system. The authors of the present paper, however, were concerned about the effects of adding general beliefs to the revised model. However, from cultural theory we find that myths of nature (e.g., Schwarz and Thompson, 1990) can be used as a basis for categorizing general beliefs. Steg and Sievers (2000) argued in this regard that myths of nature refer to general beliefs regarding environmental issues and can be considered as beliefs in how vulnerable nature and the environmental system are (Poortinga *et al.,* 2002). Cultural theory is concerned with people's values, ideas, and worldviews (Billgren, and Holmen, 2008; Thompson *et al*., 1990). It pinpoints the fact that stakeholders embody different perceptions of nature (Douglas, 1982; Thompson *et al.,* 1990) which they bring into the natural resource management process (Billgren, and Holmen, 2008). Cultural theory has been gaining influence in the study of environmental thought in terms of how broader belief systems help to structure views of nature and the environment (Lima and Castro, 2004). According to cultural theory, there are four different archetypal views on the vulnerability of nature:

- Nature benign
- Nature tolerant/perverse
- Nature ephemeral, and
- Nature capricious (see, e.g., Schwarz andThompson, 1990).

Myths of nature are based on theoretical reasoning and include views on nature, resources, how to optimize resources, environmental risk perception, and preferences for strategies for managing environmental risks (Schwarz and Thompson, 1990). Each of these perspectives is also linked to a view on nature and attitude toward risk (Pahl-Wostl *et al*., 2008). Very briefly, cultural theory claims the following:

- Nature benign is the individualists' view. Consequently, for instance, the business world considers nature to be forgiving and able to

recover from almost anything. The management style of the individualists is thus casual (Thompson *et al.,* 1990).

- Nature tolerant/perverse, is the hierarchist' view. Nature tolerant is resilient, and able to cope with almost everything; sometimes, however, something abnormal or perverse will occur and when it does, the resulting problems are manageable.
- Nature ephemeral is the egalitarians' view. Egalitarians believe that nature has to be managed very carefully, as it is unforgiving and human manipulation can lead to disaster at any moment.
- Nature capricious is the fatalists' view; fatalists assume that nature is strange and always changing. Hence, they neither manage nature, nor aspire to do so, as they believe that it will make no difference.

How can these categories and their views be applied in our revised TPB model? Each of the four myths of nature links to: specific risk perception preferences (here, risk perception regarding water crisis); environmental concerns and a sense of responsibility for the problems (here, attitude and social and moral norms regarding water conservation); and strategies to manage environmental risks (here, behaviour regarding water conservation). For a comprehensive outline of cultural theory and myths of nature see Schwarz and Thompson, (1990), Steg and Sievers (2000), Poortinga *et al* (2002), Lima and Castro (2004). Thus, people subscribing to different myths of nature differ both in their environmental concerns and in their preferences for environmental risk management strategies. We therefore propose a model (Figure 1) with respect to water conservation in which behaviour is determined by intention. Intention, in turn, is influenced by specific attitudes, risk perception, sense of responsibility, perceived behaviour control, self-identity, and moral norms. These, in turn, are preceded by general views on the vulnerability of nature and the environmental system (myths of nature). We have also assumed that there is a linear relationship between all parameters. That is, higher environmental concern is accompanied by more positive attitudes, a greater number of social and moral norms, and higher risk perception with respect to water conservation and, in turn, to more positive intention and behaviour in this regard.

Materials and Methods

Participants

The study used a cross-sectional survey design. The population of interest consists of 100 agriculture professionals in Bushehr province. This is a semi-arid and drought-prone area in the south of Iran. The study sample consisted of 80 agriculture professionals selected through random sampling from lists of professionals (random systematic procedure) provided by the Bushehr agricultural organization. Agriculture professionals were visited in March 2011 to deliver the questionnaire. About a week later, the completed questionnaires were collected.

Instrument and Variables Measured

Survey data were collected through self-administered questionnaires. An in-depth

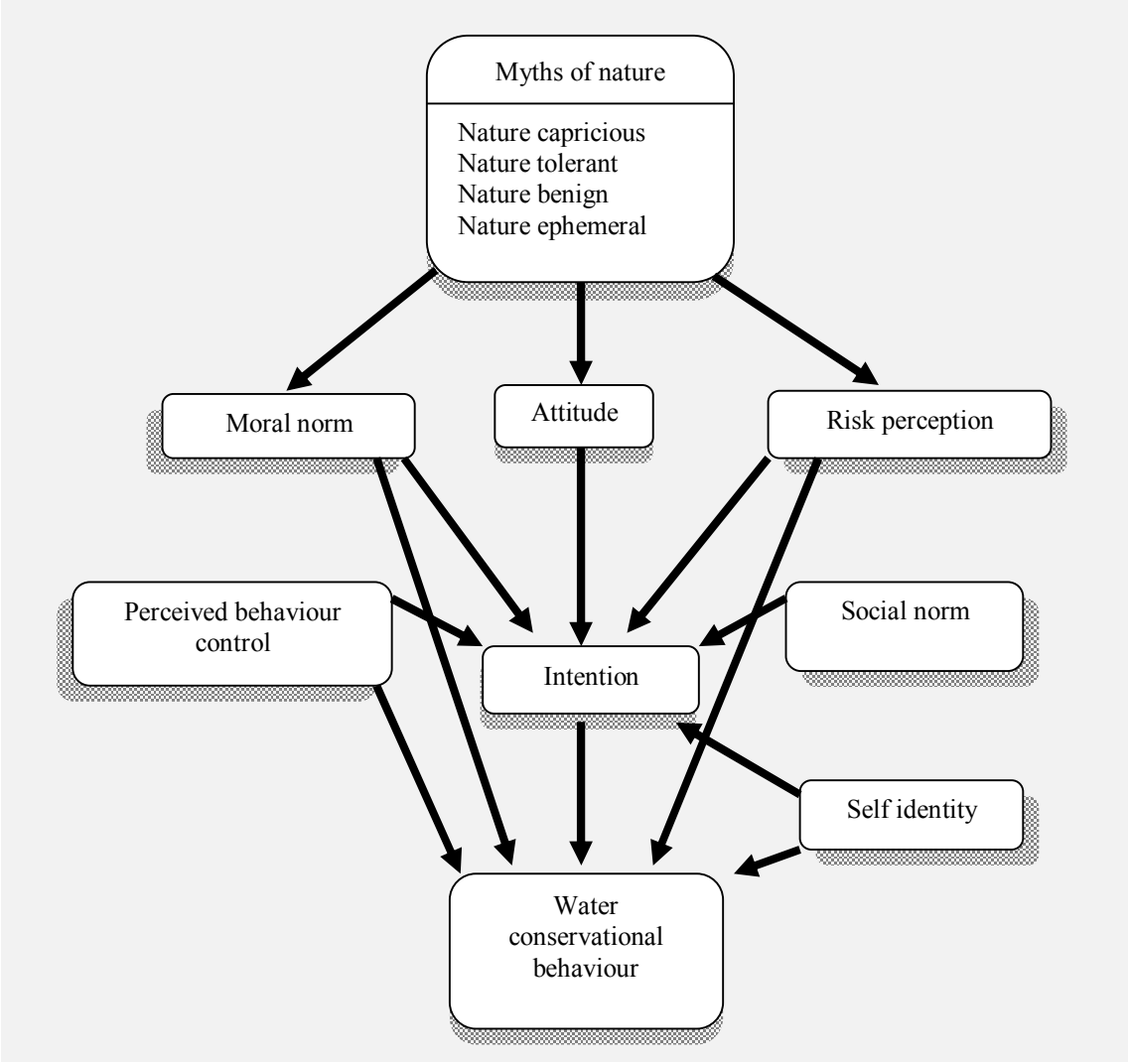

Figure 1. Theoretical framework of the research.

literature review, pre-pilot study, field observation, and in-depth interviews with professionals were used to develop the questionnaire that collected data for this study. The questionnaire was based on the TPB and additional variables. In designing the questionnaire, a 10-point scale was used to reduce the statistical problem of extreme skewness (Fornell, 1992).

Based on Ajzen's (1985) recommendations, scales containing multiple items were developed to measure each of the following psychosocial variables and myths of nature: attitudes, social norms, perceived behavioural control, moral norms, self-identity, behavioural intention, behaviour, and risk perception. The survey's internal reliability was investigated using coefficient (Cronbach's) alpha. All scales indicated good-to-excellent reliability, generally 0.6 to 0.9. The validity of the questionnaire was approved by a panel of experts. The following are examples of survey items contained in the water conservation questionnaire.

Behaviour: Twelve items about water

conservation activities. Participants were asked what their behaviour was with respect to water conservation in 1) everyday life and 2) their professional life, for example what they do to influence farmers to conserve water (classes, workshops, fact sheets, etc.). *Behavioural intention:* Five items, for example: "I intend to engage in water conservation activities." (On a scale of 1 to 10: 1 = extremely unlikely; 10 = extremely likely). *Attitudes:* Eleven items. For example: the farmers aim should be to maximize production efficiency and farm efficiency and profitability not conservation, Water conservation is important but must be careful to water only during drought, I think, now it is not necessary to protect water, I believe, however, is produced prior to conservation, Soil and water are the main producers. *Perceived behavioural control:* Five items, for example: "How much control do you have over whether you engage in water conservation activities?'" (1 = very little control; 10 = a great deal of control); "For me to engage in water conservation activities is (1, very difficult; 10, very easy)"; "If I wanted to, I could easily engage in water conservation activities" (1, strongly disagree; 10, strongly agree); "It is mostly up to me whether or not I engage in water conservation activities" (1, strongly disagree; 10, strongly agree); "How difficult would it be for you to engage in water conservation activities?" (1, very difficult; 10, very easy). *Moral norm:* Five items, for example: "I feel I should do something positive for water conservation." "I feel an obligation to carry out water conservation." *Self-identity* Three items, for example: "I think of myself as an water conservation person" (1, disagree, 10, agree), "I think of myself as someone who is very concerned about water issues" (1, disagree, 10, agree) "Engaging in water conservation activities is an important part of who I am" (1, disagree, 10, agree). *Subjective norm:* Three items measured by asking the respondents to answer three statements: "Most people who are important to me think that I should be engaged in water conservation activities." (1, disagree, 10, agree); "If I engaged in water conservation activities people who are important to me would approve." (1, disagree, 10, agree); "Most people who are important to me think that engaging in water conservation activities is desirable." (1, disagree, 10, agree). *Risk perception:* Six items. *Myths of nature*: Items were adapted from previous studies (Marris *et al*., 1998; Steg and Sievers, 2000; Castro and Lima, 2005). The items are listed in Table 1 and responses were on a 10-point (1 = totally disagree; 10 = totally agree). General information was also collected about participants' gender, age, and level of education.

Results

Descriptive Statistics

Regarding demographic variables, the participants comprised 56 males and 24 females aged from 20 to 52, with a mean age of 34.5 years (Sd. = 7.23). The majority (60%) of the participants had bachelor' degrees (B.Sc.). Some 18.8% had post-secondary (P.S.) education, or tertiary education and 21.3% had M.Sc. degree in agriculture.

TPB revised model: descriptive relationship between variables and comparing different groups

The findings revealed that different TPB items vary in their mean score, i.e. attitude was 7.07

Table1: Items used to assess the myths of nature.

Ephemeral	• If things continue on their present course, we will soon experience a major ecological catastrophe • The environment is fragile, and human interference can cause unexpected disaster • The balance of nature is very delicate and easily upset • Environmental problems can only be controlled if people are forced to radically change their behaviour
Benign	• Humans will eventually learn enough about how nature works to be able to control it • Human beings were meant to rule over the rest of nature • The environment is quite adaptable, and it will recover from any damage caused by us • We do not need worry about environmental problems because science and technology will be able to solve them
Tolerant	• It is possible to avoid ecological catastrophe if environmental problems are managed by experts and scientists • Environmental problems are controlled, but the government should produce laws indicating clearly what we can and what we cannot do • To avoid environmental disasters it is necessary to pay more attention to the advice of specialists
Capricious	• No matter what we do, what it will happen to the environment is unpredictable • We do not know whether environmental problems will become worse or not • Everything to do with the environment depends on chance • Why bother? Hopefully the environment is OK

from 10 (Sd. = 1.40), and subjectively influenced by social norms in relation to water conservation. The moral norm was 9.18 from 10 (Sd. = 1), suggesting that most professionals are influenced by a high moral norm and obligation in relation to water conservation. Self-identity was 7.67 from 10 (Sd. 1.77). Intention was 8.75 from 10 (Sd. = 1.37), and behaviour was 7.38 from 10 (Sd. = 1.16), all relatively favourable. Risk perception was 8.48 from 10 (Sd. = 1.29). But the mean of PBC was low at 5.73 from 10 (Sd. = 1.83), suggesting that most respondents experience high constraints in relation to water conservation.

A Pearson correlation test was used to investigate the relationship between all variables (Table 2). As expected, the results reveal a significant relationship between behavioural intention and actual behaviour, PBC, and subjective norms. The Pearson correlation test did not show any significant relationship between attitude and behavioural intention, actual behaviour, PBC, and subjective norms. The Pearson correlation further demonstrated that there was no significant relationship between actual behaviour and PBC. However, it did reveal a significant relationship between subjective norms and actual behaviour. The Pearson correlation test showed a significant relationship between self-identity and attitude, PBC, moral norms, and actual behaviour. Self-identity, moreover, showed no significant relationship between social norms and intention. The Pearson correlation test also showed a significant relationship between moral norms with all variables of the original TPB. Of particular note is the strong correlation between subjective norms and intention, between

behavioural intention and actual behaviour, and between moral norm and social norm, intention, and actual behaviour. The Pearson correlation test showed a significant relationship between risk perception and moral norms, social norms, self-identity, and actual behaviour. Self-identity, moreover, showed no significant relationship with attitude, PBC, and intention.

Regarding the relationship between myths of nature and revised TPB variables, the Pearson correlation test showed nature capricious had a significant negative relationship with all variables except PBC, risk perception, and intention. This finding is in line with cultural theory's claims that the fatalist's attitude toward nature would be characterized by indifference and opportunism and that fatalists have no feeling or responsibility toward nature (Pahl-Wostl *et al*., 2008). Nature tolerant attitudes had a significant positive relationship with risk perception but no significant relationship with other variables. Furthermore, nature benign attitudes had only a significant negative relationship with attitude. Nature ephemeral attitudes had a significant positive relationship with risk perception but no significant relationship with other variables. Our findings confirmed those myths of nature (general beliefs) which influence specific beliefs, attitudes, and norms, but also those they are not directly related to behaviour (Stern *et al.,* 1995).

As Table 3 demonstrates, the result of the t-test revealed that there was significant difference between female and male professional groups regarding risk perception, moral norm, and intentions regarding water conservation (Table 3), the mean score of males were higher than females in all those three variables.

Table 2. Relationship between the variables.

	Attitude	SN	control	MN	SI	RP	NE	NB	NT	NC	Intention	behaviour
Attitude	1											
SN	.145 (.204)	1										
PBC	.28* (.011)	-.079 (.49)	1									
MN	.440** (.0001)	.630** (.0001)	.21 (.064)	1								
SI	.342** (.002)	.20 (.066)	.342** (.002)	.54** (.000)	1							
RP	.008 (.946)	.420** (.0001)	.218 (.054)	.43** (.000)	.380** (.001)	1						
NE	.163 (.151)	.22 (.051)	.086 (.450)	.015 (.89)	.183 (.106)	.260** (.022)	1					
NB	-.510** (.0001)	.039 (.73)	.207 (.068)	-.21 (.058)	.085 (.457)	.200 (.078)	.210 (.062)	1				
NT	.132 (.246)	.18 (.13)	.032 (.779)	.187 (.097)	.141 (.215)	.370** (.001)	.26* (.019)	.360** (.001)	1			
NC	-.500** (.0001)	-.25* (.030)	-.077 (.501)	-.39** (.000)	-.310** (.005)	.090 (.43)	-.031 (.78)	.400** (.000)	.084 (.46)	1		
Intention	.215 (.057)	.670** (.0001)	.400** (.000)	.680** (.000)	.132 (.246)	.470** (.000)	.16 (.16)	.039 (.73)	.16 (.14)	-.17 (.13)	1	
Behaviour	.280* (.012)	.50** (.000)	.115 (.313)	.65** (.000)	.430** (.0001)	.370** (.001)	.14 (.20)	.14 (.23)	.029 (.80)	-.28* (.012)	.64** (.000)	1

** P < 01 * P < 05

SN= Social norm. PBC= Perceived behavioural control. MN= moral norm. SI= Self-identity. RP= Risk perception.

NC= Nature capricious. NT= Nature tolerant. NB=Nature benign. NE= Nature ephemeral

The result of analysis of variance (ANOVA) further revealed no significant difference between levels of education with respect to TPB variables, except attitude toward water conservation. As Table 4 demonstrates, agricultural professionals who have BSc. or MSc. degrees have a more positive attitude than those without a tertiary education. This result shows that an increase in years of university study improves the attitude to water conservation.

Drivers of attitude, moral norm, risk perception, perceived responsibility, intention, and behaviour

The statistical procedure was recommended by Ajzen for examining the utility of the TPB (Green and Kreuter, 1991). These analyses (Stepwise Multiple Regression Analysis (SMRA)) were conducted to determine the extent to which those variables predict attitude, risk perception, moral norm, intention, and behaviour regarding water conservation. Note that these models reflect statistical relationships rather than causal ones

Attitude towards water conservation

A SMRA was conducted with attitude toward water conservation as the criterion variable and the myths of nature and demographic variables (age, job experience, and education) as the independent variables. Table 5 gives the results for predictors of attitude to water conservation. It was found that nature capricious and nature benign are significant predictors of attitude toward water conservation (F= 22. 398, sig=0.0001). These two variables predicted 39% of the variance in attitude toward water conservation. Belief in nature capricious appears to contribute most to the model ($b = -0.285$, $p < 0.0001$), followed by belief in nature benign ($b = -0.276$, $p < 0.002$) but in a negative direction. The results are presented in Tables 5 and 6. The value of beta in Table 6 shows that one standard deviation change in belief in nature capricious and belief in nature benign causes a -0.409 and -0.330 standard deviation changes, respectively, in attitude toward water conservation. The effects of each of these variables in explaining attitude towards water conservation are significant (Table 6, significant T).

Table 3. Comparison mean of risk perception, moral norm, and intention toward water conservation in males and females.

Variables	Male		Female		T- value	Sig
	Mean	Sd.	Mean	Sd.		
Risk perception	9.30	0.81	8.12	1.3	4.856	0.0001
Moral norm	9.53	0.64	9	1.1	2.099	0.040
Intention	9.16	0.95	8.57	1.50	2.525	0.014

Table 4. Comparison mean of attitude towards water conservation in different educational groups.

Group	Mean	Sd.	F-value	P
P.S.	5.97a	1.25	6.12	.008
BSc.	7.25b	1.45		
MSc.	7.46 b	.84		

*Different words mean significant difference

Table 5. Step-wise multiple regression of variables on attitude regarding water conservation.

Independent variables	b	Std.er	Beta	Signif T
Nature capricious	-0.285	0.72	-0.409	0.0001
Nature benign	-0.276	0.086	-0.330	0.002
Constant=9.904, F= 22. 398, sig=0.0001				

Table 6. Summary statistics for stepwise regression of variables on attitude regarding water conservation.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Nature capricious	0.548	0.301	0.291	0.301
Nature benign	0.625	0.390	0.373	0.089

Moral norm regarding water conservation

Conducting a similar step-wise regression analysis with the same variables on the moral norm regarding water conservation (Tables 7 and 8), it was found that nature capricious and nature tolerant predicted 20.2% of the variance in the moral norm. The model was found reliable in terms of predicting the outcome (F= 8.842. sig= 0.0001). These variables appear to contribute to the model (b = -0.210, $p < 0.0001$) and (b = 0.114, $p < 0.043$), respectively. The results are presented in Tables 7 and 8. The value of beta in Table 7 shows that one standard deviation change in nature capricious and nature tolerant respectively cause a -0.422 and 0.222 standard deviation change in the moral norm regarding water conservation. The effects of each of these variables in explaining moral norm are significant (Table 8, significant T).

Risk perception regarding water crisis

Conducting similar step-wise regression analysis with the same variables on risk perception regarding water conservation (Tables 9 and 10), it was found that nature tolerant, job experience, and nature ephemeral predicted 22.6% of the variance in risk perception. The model was found reliable at predicting the outcome (F= 9.024. sig= 0.0001). These variables appear to contribute to the model (b = 0.208, $p < 0.005$), (b = -0.057, $p < 0.002$) and (b = 0.227, $p < 0.023$), respectively. The results are presented in Tables 9 and 10. The value of Beta in Table 9 shows that one standard deviation change in nature tolerant, job experience, and nature ephemeral causes, respectively, a 0.309, -0.328, and 0.246 standard deviation changes in risk perception regarding water conservation respectively. The effects of each of these variables in explaining risk perception are significant (Table 10, significant T).

Table 7. Step-wise multiple regression of variables on moral norm regarding water conservation.

Independent variables	b	Std.er	Beta	Signif T
Nature capricious	-0.210	0.054	-0.422	0.0001
Nature tolerant	0.114	0.056	0.222	0.043
Constant=9.051, F= 8. 842, sig=0.0001				

Table 8. Summary statistics for step-wise regression of variables on moral norm regarding water conservation.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Nature capricious	0.392	0.153	0.141	0.153
Nature tolerant	0.449	0.202	0.179	0.048

Table 9. Step-wise multiple regression of variables on risk perception regarding water conservation.

Independent variables	b	Std.er	Beta	Signif T
Nature tolerant	0.208	0.071	0.309	0.005
Job experience	-0.057	0.018	-0.328	0.002
Nature ephemeral	0.227	0.098	0.246	0.023
Constant=5.940, F= 9. 024, sig=0.0001				

Table10. Summary statistics for step-wise regression of variables on risk perception regarding water conservation.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Nature tolerant	0.367	0.135	0.122	0.135
Job experience	0.475	0.226	0.204	0.091
Nature ephemeral	0.531	0.282	0.251	0.056

Intention regarding water conservation

Two SMRA were conducted with intention towards water conservation as the criterion variable. The first SMRA was conducted based on original model of Theory of Planned behaviour (TPB) antecedent variables, and the second SMRA was conducted based on revised model of Theory of Planned Behaviour (TPB) antecedent variables at framework, separately (Fig 1) as the independent variables.

Original TPB

Tables 11 and 12 give the results for predictors of intention regarding water conservation. It was found in the original model that subjective norms and PBC are significant predictors of intention regarding water conservation (F= 36. 623, sig=0.0001). These two variables predicted 49.1% of the variance in intention regarding water conservation. Subjective norms appear to contribute most to the model (b = 0.516, $p < 0.0001$), followed by PBC (b = 0.168, $p < 0.011$). In contrast with the TPB, when all variables were included in the analysis, attitude was not a significant independent predictor of intention. The results are presented in Table 11 and 12. The value of beta in Table 11 shows that one standard deviation change in subjective norms causes a 0.603 standard deviation change in intention regarding water conservation, and one standard deviation change in PBC causes a 0.224 standard deviation change in the same. The effect of each of these variables in explaining intention regarding water conservation is significant (Table 12, significant T).

Revised Model

Table 14 gives the results for predictors of intention regarding water conservation. It was found, in the revised model, that moral norms, PBC, social norms, and risk perception are significant predictors of intention regarding water conservation (F= 36. 988, sig=0.0001). These four variables predicted 68.2% of the variance in intention regarding water conservation. Moral norms appear to contribute most to the model (b = 0.586, $p < 0.001$), followed by PBC (b = 0.173, $p < 0.002$), social norms (b = 0.214, $p < 0.008$), and risk perception (b = 0.213, $p < 0.008$). In contrast with the TPB, when all variables were included in the analysis,

Table 11. Stepwise multiple regression of variables on intention regarding water conservation.

Independent variables	B	Std.er	β	Signif T
Subjective Norms	0.516	0.73	0.603	0.0001
PBC	0.168	0.064	0.224	0.011
Constant=3.654, F= 36. 623, sig=0.0001				

Table 12. Summary statistics for stepwise regression of variables on intention regarding water conservation.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Subjective Norms	0.667	0.445	0.437	0.437
PBC	0.701	0.491	0.477	0.040

attitude was not a significant independent predictor of intention. The results are presented in Tables 13 and 14. The value of beta in Table 13 shows that one standard deviation change in moral norms, PBC, social norms, and risk perception causes a 0.438, 0.224, 0.205 and 0.246 standard deviation change, respectively, in intention regarding water conservation. The effects of each of these variables in explaining risk perception are significant (Table 14, significant T).

Water conservation activities

Original Model

Table 16 gives the results for predictors of behaviour regarding water conservation. It was found, in the original model, that intention regarding water conservation predicted 40.7% of the variance in behaviour. The model was found reliable in terms of predicting the outcome (F= 52.866. sig= 0.0001). Intention regarding water conservation appears to contribute to the model ($b = 0.540$, $p < 0.0001$). The results are presented in Tables 15 and 16. The value of beta in Table 15 shows that one standard deviation change in intention regarding water conservation causes a 0.638 standard deviation change in behaviour regarding the same. The effect of this variable in explaining behaviour regarding water conservation is significant (Table 15, significant T).

Table 13. Step-wise multiple regression of variables on intention regarding water conservation regarding water conservation.

Independent variables	b	Std.er	Beta	Signif T
Moral norm	0.586	0.121	0.438	0.001
PBC	0.173	0.055	0.224	0.002
Social norms	0.214	0.079	0.253	0.008
Risk perception	0.213	0,078	0.205	0.008
Constant=-1.070, F= 36. 988, sig=0.0001				

Table14. Summary statistics for step-wise regression of variables on intention regarding water conservation.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Moral norm	0.716	0.513	0.506	0.513
PBC	0.771	0.595	0.583	0.082
Social norms	0.805	0.648	0.633	0.053
Risk perception	0.826	0.682	0.664	0.034

Table15. Stepwise multiple regression of variables on behaviour regarding water conservation.

Independent variables	B	Std.er	β	Signif T
Intention regarding water conservation	0.540	0.074	0.638	0.0001
Constant=2.639, F= 52. 866, Sig=0.0001				

Table 16. Summary statistics for stepwise regression on behaviour regarding water conservation

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Intention regarding water conservation	0.638	0.407	0.399	0.407

Revised TPB

Table 18 gives the results for predictors of behaviour regarding water conservation. It was found in the revised model that moral norms and intention regarding water conservation predicted 48.9% of the variance in water conservation activities. The model was found reliable at predicting the outcome (F= 34.026. sig= 0.0001). Surprisingly, moral norm appears to contribute most to the model ($b = 0.524$, $p < 0.0001$), followed by intention ($b = 0.254$, $p < 0.017$). The results are presented in Table 17 and 18. The value of beta in Table 17 shows that one standard deviation change in moral norms and intention causes a 0.456 and 0.296 standard deviation change, respectively, in water conservation activities. The effect of each of these variables in explaining water conservation activities is significant (Table 18, significant T).

Discussion

This paper reports on an attempt to explain water conservation practices in Iran among agricultural professionals. Its purpose was three-fold: 1) to examine the use and efficacy of the TPB and revised TPB (comparison) in this domain; 2) to provide a preliminary insight into the factors explaining engagement in water conservation activities; and 3) to ascertain if general beliefs can predict antecedents' variables such as attitude, moral norm, and risk perception.

Findings revealed that the presented theoretical framework is an effective tool for this policy question. In a meta-analysis of the TPB, Armitage and Conner (2001) revealed that the TPB accounted for 27% and 39% of the variance in behaviour and intention, respectively. In our study, explained variance in behaviour and intention for original TPB was higher than their

Table17. Step-wise multiple regression of variables on water conservation activities.

Independent variables	b	Std.er	Beta	Signif T
Moral norm	0.524	0.139	0.456	0.0001
Intention	0.254	0.104	0.296	0.017
Constant=-.361, F= 34. 026, sig=0.0001				

Table18. Summary statistics for step-wise regression of variables on water conservation activities.

Steps	Multi. R	R^2	R^2 Adjust	R^2chang
Moral norm	0.668	0.447	0.439	0.447
Intention	0.700	0.489	0.475	0.043

findings (40% and 49% respectively). Regarding the revised model, behaviour and intention, predictive validity was even higher (49% and 68% respectively). Furthermore, it is evident that the extended models leaded to improvement toward the TPB.

Our results also show that in the original model, intention toward water conservation is the only determinant of behaviour. But, in the revised model, moral norms are the main predictors of water conservation activities, together with intention. We also found that perceived behavioural control was not significant in either the original or the revised model.

Regarding intention, the results reveal that, while being positively influenced by subjective norms and PBC in the original model, water conservation was positively influenced by moral norms, social norms, PBC and risk perception in the revised model. However, attitude and self-identity do not influence intention in the revised model. Moral norms had the greatest influence on intention; the finding that moral norms significantly predicted intentions suggests that the more a person feels it is a moral norm to conserve water (i.e., when water conservation is an important part of the person's obligation and commitment) the greater the person's intention is to engage in high-level water conservation activities. This supports previous research on the role of moral norm in the TPB (Kaiser, 2006)

PBC is the second variable in explaining water conservation intention. PBC refers to the degree to which an individual feels that the performance of behaviour is under his or her own volitional control. It is to be expected that the perceived difficulty (or ease) of water conservation could have an impact on the possibility of performing this behaviour. The significant coefficients for PBC on the prediction of intention indicate that professionals believe they do not possess full volitional control over performing this behaviour. In this study the mean of PBC was somewhat low (5.73 out of 10). We can thus conclude that there may be other variables that prevent agricultural professionals feeling that water conservation behaviour is under their volitional control. Future studies for determining these obstacles are recommended; suggestions could also be sought from agricultural professionals as to how agriculture organizations could reduce bottlenecks that prevent agricultural professionals becoming more engaged in water conservation behaviour. In contrast to the original model, the subjective norm variable in the revised model was less important in terms of determining intention. The significance of the subjective norm variable implies that professionals are influenced by community (subjective) norms with respect to water conservation behaviour and that individual professionals who are more influenced by the community will be more likely to perform this behaviour. This is because water conservation for agricultural professionals, being a very public job behaviour, is influenced by a variety of societal norms. In other words the core business of most agricultural organizations is to promote agricultural professionals who help protect the environment, a message that is presumably communicated to their members. However, in the revised model, the moral norm variable has

presumably more effect on professional intention and can thus somewhat reduce the effects of social pressure.

Risk perception was last and obviously the least prominent in determining intention. Risk perception refers to the degree to which the water crisis is related to potentially hazardous activities. The finding that risk perception significantly predicts intentions suggests that the more fear a person feels with respect to water crisis, the greater the person's intention will be to engage in high-level water conservation activities.

The evidence for attitude (Fielding *et al.,* 2008; Vermeir and Verbeke, 2008; Kaiser, 2006; Kaiser and Scheuthle, 2003) and concepts of self exerting a direct influence on people's behavioural intention is extensive (Pelling *et al.,* 2009; Fielding *et al.,* 2008; Terry *et al.,* 1999). In spite of this, in the current study, attitude and self-identity were not predictors of water conservation intentions. In this regard, Trafimow and Finlay (1996) illustrating the possible lack of predictive power of one or more of the TPB constructs, argued that it is common for people to be under either attitudinal or normative control across a large number of behaviours.

From the high degree of correlation between self-identity and moral norms (i.e., r = 0.54; see Table 2), we can conclude that within the TPB concepts of self are endorsed as significant antecedents of a moral norm, rather than of intention. In other words, self-identity has a considerable, but probably only an indirect, impact (mediated by moral norms) on people's intention. The findings of the present study suggest that professional self-identity does not play a role in predicting intention to engage in high-level water conservation activities. It is possible that agricultural professionals really are conservationists of water and other natural resources or, in other words, water conservation activities for agricultural professionals is a primary, clear, and common task and consequently, self-identity in this domain is not something that influences intention.

Finally, and unexpectedly, the moral norm variable had a direct effect on high-level water conservation activities, suggesting that the more water conservation activities are a salient part of a agricultural professional's obligation, the greater the professional's engagement in water conservation activities will be. Strategies that aim to reduce low-level engagement in water conservation activities could emphasize that engaging in high-level water conservation activities is the moral norm in a professional's life and job.

Regarding attitude, moral norm, and risk perception our findings revealed that myths of nature (general beliefs) were fairly successful in their predictive ability. Results show that nature capricious and nature benign views are predictors of attitude toward water conservation. The finding that nature capricious and nature benign views significantly and negatively predicted attitude suggests that the more a person sees nature as capricious and benign, the more unfavourable his/her attitude toward water conservation will be—which supports cultural theory's claims that the myths of nature have a role in shaping attitude toward nature (Pahl-

Wostl *et al.,* 2008).

With respect to the moral norm regarding water conservation and risk perception regarding a potential water crisis, cultural theory claims were once again confirmed. Nature capricious was the most important (negative) predictor of the moral norm variable regarding water conservation, followed by natural tolerant (positive predictor). In other words, the more a person sees nature as capricious, the less that person feels an obligation or responsibility for water conservation; similarly, the more a person see nature as tolerant, the more he/she feels an obligation or responsibility for water conservation. Finally, risk perception regarding a potential water crisis was determined by nature tolerant, job experience, and nature ephemeral. Surprisingly, the more job experience a professional has, the less fear he/she has about water crisis risks. Agricultural professionals with less experience have possibly read or studied more about water crises that have been occurring recently than older professionals.

Water conservation in agriculture would be a notable innovation in Iran. Agricultural professionals play an important role in helping to create and develop innovations. They also inform and educate farmers (and the public) about innovations through teaching or extension work. Given the importance of their role, it is important to try to understand why professionals are positive or negative toward water conservation. We argue that rendering professional decision making less of an automatic process and more of a reasoning process and moving away from social processing of ideas and more towards individual processing of ideas can lead to more "controllable" and predictable conservation behaviour. Understanding agricultural professionals' thoughts, feelings, and beliefs toward water conservation can help intervention specialists develop and implement effective programmes to promote water conservation among agricultural professionals. The results of this study also demonstrate that TPB, and particularly the revised TPB, can be used as a conceptual framework for intervention programmes aimed at increasing water conservation intention and behaviour in agricultural professionals in Iran. Furthermore, myths of nature can predict part of the attitude, moral norm, and risk perception regarding water conservation.

In contrast, there may be some other variables which prevent agricultural professionals from controlling their behaviour towards water conservation, volitionally. Future studies for determining these obstacles are recommended and through suggestions from agricultural professionals, agriculture organisation can reduce related bottlenecks so that leading agricultural professionals more engaged in water conservational behaviour.

Acknowledgments

We express appreciation to Kathryn Platzer, Communications Department, IIASA, who kindly edited this article.

Masoud Yazdanpanah also is a researcher at International Institute for Applied Systems Analysis Schlossplatz 1, Laxenburg, Austria

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In: J. Kuhl, and J. Beckmann (Eds.), Action- control: From cognition to behaviour (pp. 11–39). Heidelberg: Springer.

Ajzen, I. (1988). Attitudes, personality and behaviour. Chicago: Dorsey Press.

Ajzen, I. (1991). The theory of planned behaviour. Organizational Behaviour and Human Decision Processes, 50: 179–211.

Armitage, C.J. and M. Conner (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. British Journal of Social Psychology, 40: 471–499.

Arvola, A., M. Vassallo, M. Dean, P. Lampila, A. Saba, L. Lahteenmaki and R. Shepherd (2009). Predicting intentions to purchase organic food: The role of affective and moral attitudes in the Theory of Planned Behaviour. Appetite, 50: 443–454.

Balali, M.R., J. Keulartz and M. Korthals (2009). Reflexive water management in arid regions: The case of Iran. Environment Value, 18(1): 91-112.

Bakir, H.A. (2001). Sustainable wastewater management for small communities in the Middle East and North Africa. Journal of Environmental Management, 61: 319–328.

Beik Mohammadi, H., H. Noori and J. Bazrafshan (2006). The effects of drought of 1999–2005 on Sistan rural economy and copping strategies. Journal of Geography Development, 3: 53–72.

Billgren, C. and H. Holmen (2008). Approaching reality: Comparing stakeholder analysis and cultural theory in the context of natural resource management. Land Use Policy, 25: 550–562.

Bissonnette, M.M. and L.R. Contento (2001). Adolescents' perspectives and food choice behaviours in terms of the environmental impacts of food production practices: Application of a psychosocial Model. Journal of Nutrition Education, 33(2): 72-82.

Boland, J.J. and D. Whittington (2000). The political economy of water tariff design in developing countries: increasing block tariffs versus uniform price with rebate. In: Dinar, A. (Ed.), The political economy of water pricing reforms. Washington D.C.: Oxford University Press.

Burton, R.J.F. (2004). Reconceptualising the 'behavioural approach' in agricultural studies: A socio-psychological perspective. Journal of Rural Studies, 20(3): 359-371.

Cook, A.J., G.N. Kerr and K. Moore (2002). Attitudes and intentions towards purchasing GM food. Journal of Economic Psychology, 23(5): 557–572.

Douglas, M. (1982). Introduction to Grid/Group Theory. In: M. Douglas (Ed.), Essays in the sociology of perception. London: Routledge and Kegan Paul.

Douglas, M. and A. Wildavsky (1982). Risk and culture: An essay on the selection of technological and environmental dangers. Berkeley: University of California Press.

Fielding, K., S.R. McDonald and W.R. Louis (2008). Theory of planned behaviour, identity and intentions to engage in environmental activism. Journal of Environmental Psychology, 28(4): 318–326.

Fishbein, M. and I. Ajzen (1975). Belief, attitude, intention, and behaviour: An introduction to theory and research. Reading, MA: Addison-Wesley.

Foltz, R.C. (2002). Iran's water crisis: Cultural, political and ethical dimension. Journal of Agriculture and Environmental Ethics, 15: 357–380.

Food and Agricultural Organization of the United Nations (FAO) (2006). National strategy and action plan on drought preparedness, management and mitigation in the agricultural sector: Iran. Terminal statement prepared for the government of the Islamic Republic of Iran by the Food and Agricultural Organization of the United Nations. Cairo, Egypt.

Food and Agricultural Organization of the United Nations (FAO) (2007). High level conferences of world food security and the challenges of climate change and bio energy, thirty fourth sessions, Food and Agricultural Organization of the United Nations, Rome, Italy, November.

Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. Journal of Marketing, 56: 6-21.

Gikas, P. and G. Tchobanoglous (2009). Sustainable use of water in the Aegean Islands. Journal of Environmental Management, 90 (8): 2601–2611.

Green, L. and M. Kreuter (1991). Health promotion planning, (2nd ed.), Mountain View: Mayfield Publishing Co.

Hung, S.Y. and C.M. Chang (2005). User acceptance of WAP services: Test of competing theories. Journal of Computer Standards and Interfaces, 27(4): 359–370.

Kaiser, F.G. (2006). A moral extension of the theory of planned behaviour: Norms and anticipated feelings of regret in conservationism. Personality and Individual Differences, 41: 71–81.

Kaiser, F.G. and H. Scheuthle (2003). Two challenges to a moral extension of the theory of planned behaviour: Moral norms and just world beliefs in conservationism. Personality and Individual Differences, 35: 1033–1048.

Kaiser, F.G., S. Wolfing and U. Fuhrer (1999). Environmental attitude and ecological behaviour. Journal of Environmental Psychology, 19: 1- 19.

Karppinen, H. (2005). Forest owners' choice of reforestation method: an application of the theory of planned behaviour. Forest Policy and Economics, 7: 393– 409.

King R.C. and M.L. Gribbins (2002). Internet technology adoption as an organisational event: An exploratory study across industries. In: The proceedings of the 35th Hawaii International Conference on System Sciences-2002, IEEE Computer Society.

Liao, C., J.L. Chen and C.Y. Yen (2007). Theory of planning behaviour (TPB) and customer satisfaction in the continued use of e-service: An integrated model. Computers in Human Behaviour, 23: 2804–2822.

Lima, M.L. and P. Castro (2005). Cultural theory meets the community: Worldviews and local issues. Journal of Environmental Psychology, 25: 23-35.

Lubell, M. (2004). Collaborative environmental institutions: All talk and no action? Journal of Policy Analysis and Management, 23 (3):549-573.

Marris, C., I. Langford and T. O'Riordan (1998). A quantitative test of the cultural theory of risk perceptions: Comparison with the psychometric paradigm. Risk Analysis, 18: 635–647.

Nigbur, D., E. Lyons and D. Uzzell (2010). Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programmeme, British Journal of Social Psychology,49 (2): 259 – 284.

Pelling, E., L.B. Behav and M. Katherine (2009). The Theory of planned behaviour applied to young people's use of social networking web sites. Cyber psychology and Behaviour, 12 (6): 755-759.

Poortinga, W., L. Steg and C. Vlek (2002). Environmental risk concern and preferences for energy-saving measures. Environment and Behaviour, 34: 455–478.

Roe, E.M. (1996). Sustainable development and cultural theory. International Journal of Sustainable Development and World Ecology, 3: 1-14.

Schwarz, M. and M. Thompson (1990). Divided we stand: Redefining politics, technology, and social choice. Philadelphia: University of Pennsylvania Press.

Sparks, P. and R. Shepherd (1992). Self-identity and the theory of planned behaviour: Assessing the role of identification with `green consumerism'. Social Psychology Quarterly, 55: 388-399.

Steg, L. and I. Sievers (2000). Cultural theory and individual perceptions of environmental

risks. Environment and Behaviour, 32 (2): 250-269.

Stern, P.C., T. Dietz and G.A. Guagnano (1995). The new ecological paradigm in social psychological context. Environment and Behaviour, 27: 723-743.

Termeer, K.A.M. (2009). Water professionals and public leadership. Irriga and Draining, 58(2): 212-216.

Terry, D.J., M.A. Hogg and K.M. White (1999).The theory of planned behaviour: Self-identity, social identity and group norms. British Journal of Social Psychology, 38: 225–244.

Thompson, M., R. Ellis and A. Wildavsky (1990). Cultural theory. Boulder, CO: West view.

Trafmow, D. and K.A. Finlay (1996). The importance of subjective norms for a minority of people: Between-subjects and within-subjects analyses. Personality and Social Psychology Bulletin, 22: 820-828.

Vermeir, I. and W. Verbeke (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and value. Ecological Economics, 64: 542-553.

Wheeler, S.A. (2008). What influences agricultural professionals' views towards organic agriculture? Ecol. Econ, 65: 145–154.