Environmental and Climate Technologies
2020, vol. 24, no. 1, pp. 516–528
https://doi.org/10.2478/rtuect-2020-0032
https://content.sciendo.com

Extending the Theory of Planned Behaviour to Explain Energy Saving Behaviour

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***Abstract* – Existing research in environmental psychology suggests that humans are conscious of the impact that their actions have on the environment. However, a corresponding change is yet to be seen in the voluntary adoption of pro-environmental behaviour by the Indian population. While there is an overall improvement in the ecological consciousness, we need to find out the psychological factors that promote adoption and maintenance of environmentally responsible behaviour. The current study incorporated the construct of consideration of future consequences (CFC) into the theory of planned behaviour (TPB) to investigate energy-conservation behaviour in 232 college students. Results confirmed that TPB constructs predict pro-environmental behaviour. Results also confirmed that consideration of future consequences is positively related to efficiency enhancing pro-environment behaviour. The research has implications for planning interventions that address both adoption and maintenance of pro-environment behaviour.**

***Keywords* – Consideration of future consequences; environmental awareness; pro-environment behaviour; theory of planned action.**

1. INTRODUCTION

The TPB proposes that intentions to engage in a behaviour are influenced by attitudes, social norms, and perceived behavioural control (PBC) [1], [2]. Pro-environmental behaviour may be understood as behaviour that minimizes harm to the environment, and, also behaviour that benefits the environment [3]–[6]. Examples include minimizing energy use, and reducing waste. Protection of the environment is one of the most important global concerns raised by many stakeholders. The government, providers and consumers of goods and services and many non-government organizations (NGOs) have shown concern over environmental consciousness of humans. There is an extent of literature on prime environmental concerns like carbon emission [7], [8], green manufacturing [9], [10], environment management [11], eco-friendly technology [12] among others to promote eco consciousness (ECO). The government maintains a top-down approach and the initiatives taken by government bodies have helped to raise the awareness over environmental issues. But still there is a lack of bottom-up receptive approach of the consumers and manufacturers. Research in psychology tends to look for the causes of this gap in the awareness of individuals and their intentions and propensity to indulge in pro-environmental behaviour.

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Energy saving behaviour at the level of the individual is an important pro-environmental behaviour and holds a huge potential in bridging the gap from the demand side and bringing about positive changes to the environmental condition. Many studies have recognized that behavioural change is an effective solution of a lasting nature but at the same time there is a milieu of factors which have an important role to play in bringing about the desired change in behaviour. In psychology, various conceptual frameworks such as construal level theory [13], Theories of Reasoned Action [14], [15] and Planned Behaviour [2], [16], Norm activation model [17] and Value-Belief-Norm (VBN) theory [18] have been utilized to study environmental behaviour. The theory of planned behaviour (TPB) has received considerable attention and has been widely used to explain many environmental behaviours. TPB was chosen for the current study because of its wide applicability and extensibility.

In a meta-analysis of 187 empirical studies by Armitage and Conner [19], it was pointed out that TPB accounted from 27 % to 39 % of the variance in behaviour. Researchers agree that TPB may be further extended to include additional variables to increase its predictive power [20]. Many researchers have integrated TPB with other variables like habits, personality, self-identity and values [21], [22] to increase its predictive power.

Energy conservation is a conscious choice made by an individual and is governed by many personal and contextual factors. The current research is driven by the need to incorporate cognitive variables in the TPB framework to predict environmental behaviour. ECO, is an important cognitive variable which needs to be explored within the framework of TPB to evaluate its impact on actual behaviour. Environmental concern is a powerful predictor of environmental behaviour [23]–[25]. But the review of related literature shows mixed results for environmental concern. Many researchers have pointed out that self-reported concern for the environment fails to predict actual eco-friendly behaviour [10]. The relationship between environmental concern and pro environmental behaviour is mediated by many personal and social variables [26]. More research is required to understand the role of environmental concern in prediction of actual behaviour. Despite increasing research on environmental awareness, there is a lack of theory focused research to identify the predictors of pro-environmental behaviour.

Another potential variable which is related to environmental behaviour is future-orientedness. As behavioural changes, which help in protecting the environment, may not pay off immediately, one has to be more future-oriented to engage in such behavioural changes. Psychological distance is a subjective experience of distance of objects in relation to the present. There is a bidirectional relationship between abstraction and psychological distance. Events that are far away in time are represented more abstractly and abstract representations appear to be more distant [27], [28]. Individuals can have a distant or a proximal focus for psychological distance which acts like a temporal frame for thinking. Individuals with a proximal focus have a thinking orientation which focuses on the present and immediate consequences whereas individuals with a distant focus have a more future-oriented thinking [29], [30]. CFC is a construct that captures the temporal orientation of individuals. Individuals who focus on proximal needs tend to have lesser consideration of future outcomes of their behaviour. On the other hand, focus on distal needs can create an awareness that the present behaviour will have an impact on future outcomes [29], [31].

CFC has been associated with pro-environmental behaviour by many researchers. But there are very few studies which have studied TPB and CFC in an integrated manner. Moreover, there is a need for closer examination of these factors in the Indian setup. Findings from other

countries cannot be easily generalized due to social, economic and cultural differences. The aim of the current research is to investigate the role of the constructs of the theory of planned behaviour [2] and consideration of future consequences [32] in predicting pro-environmental behaviour (energy conservation).

2. THEORETICAL FRAMEWORK

2.1. Environmental Consciousness

Environmental consciousness (ECO), also referred to as environmental concern or environmental awareness across many studies primarily refers to the awareness about the effect of one's behaviour on the environment. Environmental consciousness influences a person's knowledge, attitude, behaviour, intentions and actions [33]. Within the framework of an attitude, environmental awareness may be understood as the predisposition to act towards the environment in a certain manner. Environmental awareness is an important predictor of pro environmental behaviour [33]. Environmental concern is a manifestation of an individual's sensitivity towards the environment and may be considered as a decisional precondition to consider the potential impact of decisions on environment. Environmental consciousness is based on the environmental worldview which comes from the individual's general beliefs about how humans are related to environment [34]. Knowing that an environmental problem exists and knowing what to do about it are important pre-conditions for pro-environmental behaviour. Besides its overall impact on general pro-environmental consumption tendency, literature also provides evidence regarding the effects of ECO on more specific behaviours in consumption process; Kim and Choi [35] found that ECO enhanced pro-environmental behaviours such as buying ecological products and avoiding products, which are harmful to other people and the environment.

2.2. Theory of Planned Behaviour (TPB)

The TPB suggests that intention is the most proximal influence on behavioural performance [2], based on the assumption that humans are rational, purposeful actors, and therefore a strong intention to achieve a particular goal should lead to the attainment of this goal even if this requires changing current behaviours [2], [36].

TPB is a widely used social-cognition theory for prediction and explanation of the role of intentions in behaviour [19]–[37]. It has been applied frequently to the understanding of voluntary behaviour. According to the theory, the intention to act is the closest determinant of action. In this model, three important constructs: attitude, subjective norm and perceived behavioural control (PBC) influence the intention to act [38], [2], [1]. **Attitude** refers to the expectations and overall positive and negative evaluation of performing a particular behaviour. **Subjective norm** refers to the perceived social pressure from significant others to perform or refrain from a particular behaviour. **PBC** refers to the extent of personal volitional control perceived by an individual in performing a particular behaviour. When PBC comes close to actual behavioural control, it can together with **intention**, directly influence behaviour.

TPB has been successfully applied to a large variety of voluntary behaviours such as sexual behaviour, driving, and health-related practices [19]. A variety of pro-environmental behaviours such as recycling [3], water conservation [39], organic consumerism [24], and waste water management [40] have also been explained using the constructs of TPB.

Several studies have demonstrated the value of behavioural intentions in predicting pro-environmental behaviour. For example, there was a clear link between intentions and behaviour with reference to recycling newspapers and actual recycling [41], consuming organic vegetables [42] and composting behaviour [43].

2.3. Consideration of Future Consequences (CFC)

Though TPB is an important model to understand the role of social and cognitive factors in voluntary behaviour, yet a lot of variance is not explained especially when it comes to long term behaviour. The link between strong intentions to behave and subsequent behaviour has been inconsistent and has resulted in a gap between intention and behaviour [44]. There is a possibility of other factors influencing the choices of humans. TPB and other social-cognitive models fail to adequately predict the intention-behaviour consistency because the models do not take into consideration when the individual is able to reap the benefits of a said behaviour. According to these models there is no difference between behaviours which provide immediate gains (e.g. eating provides pleasure) and behaviours which are beneficial in the long run (e.g. exercising). Temporal proximity is an important factor in considering the value of rewards [13], [45].

Just as it is important for the rewards to be temporally proximal, consideration of future consequences (CFC) presents another perspective on the consideration of temporal factors. CFC corresponds to "the extent to which individuals consider the potential distant outcomes of their current behaviours and the extent by which they are influenced by these potential outcomes" [46]. In a meta-analytic review, CFC has emerged as a strong predictor of environmental behaviour [47]. Research has identified temporal concerns as an important determinant of environmental behaviour. People do not show pro-environmental behaviour in situations where short-term personal interests are in conflict with collective long-term interests [48], [49]; [3].

Extensive research aimed at exploring the temporal concerns in environmental behaviour [32]; [50] points out that individuals who are future-oriented are more likely to act in a pro-environmental manner [49]. Earlier research using the CFC scale has linked high scores on the scale with higher levels of recycling [51]; preference for public transportation [51]; and preference for biofuels [51]. Lower scores on the scale have been associated with compulsive buying [52]. This kind of literature also helps to validate the relevance of including the construct of CFC in studying environmental behaviour.

3. RESEARCH MODEL AND HYPOTHESES

Pro-environmental behaviour has been explained in terms of awareness and willingness to behave in a manner which avoids harm and is beneficial to the environment. The current research draws upon environmental consciousness, TPB and CFC as potential predictors of pro-environmental behaviour.

3.1. ECO

Eco-consciousness has been found to be positively associated with various indicators of pro-environmentalism such as attitude and beliefs [33]. Environmental consciousness is also known to strengthen the intentions to act in an environment friendly manner [53]. Based on the conceptual nature of environmental consciousness and previous research the following hypotheses were formed:

- H1: ECO will be positively related to attitude towards pro-environmental (energy conservation) attitude;
- H2: ECO will be positively related to subjective norms related to energy conservation behaviour;
- H3: ECO will be positively related to perceived behavioural control over energy conservation behaviour.

3.2. TPB and Environmental Behaviour

TPB is the chief framework used in the current study to predict users' actual pro-environmental behaviour of energy conservation. There is ample evidence to show the use of TPB to predict the antecedents of various behaviours including sustainable behaviours [1], [19], energy conservation [54], recycling [55], and environmental activism [56].

- H4: Intention to conserve energy has a positive influence on actual energy saving behaviour;
- H5: PBC on energy saving behaviour has a positive influence on intention to conserve energy;
- H6: Subjective norms of energy conservation have a positive influence on intention to conserve energy;
- H7: Attitude towards energy conservation has a positive influence on the intention to conserve energy.

3.3. CFC

Despite the popularity of TPB, many researchers have felt the need to add personal and contextual factors to increase the predictive ability of TPB [44]. The current research proposed to enhance the TPB by adding CFC to the model. Furthermore, resource conservation is often also associated with a "temporal trap" [57] as conservation behaviour is investment of time, money or efforts in the present with potential benefits to the environments only appear in the long run.

- H8: Consideration of future consequences has a positive influence on the intention to conserve energy;
- H9: Consideration of future consequences has a positive influence on energy conservation behaviour.

4. METHODOLOGY

4.1. Sample

The sample for the study was drawn from student population. Energy conservation can be achieved by investing in energy efficient solutions and/or by altering daily behaviours. College students in India rarely contribute in financial management of household and hence were not expected to be inclined towards energy conservation by investing in efficient solutions to save energy. Since the current study was based on day to day behaviours which led to energy conservation, it was justified to have a student sample who were using energy on a daily basis and study their energy saving behaviours.

The data were collected online from college going students. The online form was distributed randomly to 568 university students from different regions of Rajasthan. The researcher received 419 questionnaires. After screening for questionnaires for missing and incomplete

data, the researcher was left with 367 filled forms. To check whether the respondent was attentive while answering, the questionnaire had an embedded item which read: "To ensure that you are reading the statements, please choose Strongly Agree as your answer to this statement." Approximately one third of the questionnaires (135) failed this quality control, leaving 232 questionnaires that were complete in all respects. The 232 university students comprised 123 males and 109 females and were in the age range of 19–24 years. For the purpose of this study, informed consent was obtained from each respondent and participants were assured that their participation was voluntary and could be withdrawn at any point.

4.2. Tools

The survey method was used to test the theoretical model. A comprehensive literature review helped in the development of a comprehensive survey instrument. All tools, in accordance with the objectives of the current research have been briefly described:

- **Consideration of Future Consequences (CFC) Scale** [29] The CFC consists of 12 items, which can be answered on a Likert scale ranging from "extremely uncharacteristic" to "extremely characteristic". Five items assess the subject's concern for future consequences, for example: "I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes." Seven items measure the focus on immediate consequences for which reverse scoring is done;
- **New Ecological Paradigm Scale** (NEP; [57]). This 15-item measure is used to assess the degree of environmental consciousness. The items focus on the awareness of human impact on environment and the capability of the humans to disturb the ecological balance. Sample items include "Plants and animals have just as much right as humans to exist" and "Humans have the right to modify the natural environment to suit their needs" (reverse scored). Responses may vary from 1 (strongly disagree) to 7 (strongly agree). Some items are reverse coded and a total score is computed, with higher scores indicating more pro-ecological viewpoints. The internal consistency was 0.71 in the current study.

Questions were also framed for each of the latent variables of TPB, i.e. attitudes, subjective norms, perceived behavioural control, intention as well as the actual energy conservation behaviour. Each sub-division of the TPB framework received a score that was created by summing up the individual questions under that category.

- **Attitudes towards Energy Conservation.** Six items were used to measure the respondents' attitude towards energy conservation ("It is important to save energy"; "I don't need to worry about saving energy as the bill is paid by the University"; "It is wise to conserve energy"; "Energy conservation is very cumbersome"; "Energy conservation requires living a less comfortable life" and "One should make personal efforts to conserve energy"). The responses to items were given on a five-point scale ranging from "strongly agree" to "strongly disagree". Some items were reverse coded. The reliability alpha of the items in the current study was 0.78.
- **Subjective Norms.** Initially two reference groups were used, i.e. "my friends" and "my family members" to measure this variable. Four items were used to assess how the respondents evaluated the expectations of 'significant others' regarding energy conservation behaviour. All the items were answered on a five point Likert scale. Two items ("most of my friends/family members turn off the lights when not in use" and "most of my friends/family members shut down the computer when not in use") were answered from "never" to "always", and the remaining two ("my friends/family

members support my efforts to conserve energy" and "my friends/family members make efforts to conserve energy" were answered from "completely agree" to "completely disagree". The reliability alpha in the current study was 0.53 probably because the two reference groups were not homogeneous. The reliability alpha was calculated separately for the two reference groups. It was found to be 0.78 for family members and 0.81 for friends. In the current study, subjective norm was measured by using the scores on the four items with reference to 'friends';

- **Perceived Behavioural Control over Energy Conservation Behaviour.** This index was measured with the aid of two items ("I can reduce my energy use quite easily" and "My energy use behaviour has no impact on the community as a whole"). Each question in this index was coded on a five-point Likert scale. The reliability coefficient alpha for this measure was 0.66;
- **Behavioural intentions** were measured with three items: ''I intend to conserve energy during the next 6 months'' (1 extremely unlikely, 5 extremely likely); ''I intend to make some changes to my lifestyle which will help me to conserve energy during the next 6 months" (1 extremely unlikely, 5 extremely likely); and ''I intend to bring down my energy use over the next 6 months'' (1 extremely unlikely, 5 extremely likely). The reliability coefficient alpha for this measure was 0.63;
- **Energy Conservation Behaviour.** The dependent variable was self-reported energy conservation behaviour. This index was measured on the basis of responses given to energy use behaviour on a day-to-day basis. The items were answered on a five point Likert scale where 1 = 'never' and 5 = 'always'. The items were based on six daily behaviours ("I switch off my computer when not in use"; "I switch off the lights when I leave the room"; "I switch off the television when I leave the room"; "I unplug the electrical devices when not in use"; "I prefer to walk short distances"; "I prefer to travel by public transport"). The responses to these six items were highly correlated and were used as a single index to measure energy conservation behaviour

5. HYPOTHESIS TESTING

The current study was conducted with the purpose of studying the role of TPB factors and the consideration of temporal factors in energy conservation behaviour. Table 1 shows the means, standard deviation and correlation among the variables of the study. All the correlations obtained were in the expected direction.

In Table 1 correlation coefficients show a significantly positive relationship between environmental consciousness and TPB constructs. The results provide support for hypotheses H1, H2 and H3 where the following relationships were observed: ECO and attitude ($r = 0.369$; $p < 0.01$), ECO and subjective norms ($r = 0.354$; $p < 0.01$), ECO and PBC ($r = 0.337$; $p < 0.01$).

A regression analysis was performed, and the results are presented in Table 2. The results provide support for hypotheses H4 and H7 and confirm the following influences: intentions to conserve energy on energy saving behaviour ($\beta = 0.547$, $p < 0.01$), and attitude on energy saving behaviour ($\beta = 0.208$, $p < 0.01$). CFC was integrated into the model and the results also provided support for hypothesis H9. CFC had a positive influence energy conservation behaviour ($\beta = 0.372$, $p < 0.01$).

TABLE 1. DESCRIPTIVE STATISTICS

	Mean (n = 232)	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Environmental Consciousness (ECO)	68.70	17.25	(0.81)	0.369**	0.354**	0.337**	0.407**	0.531**	0.334**
2. Attitude	18.43	4.65		(0.78)	0.487**	0.368**	0.473**	0.500**	0.452**
3. Subjective Norm	12.25	3.25			(0.81)	0.288**	0.239**	0.373**	0.271**
4. Perceived Behavioural Control (PBC)	6.02	1.54				(0.66)	0.284**	0.306**	0.279**
5. Energy Saving Behaviour	18.96	4.35					(0.61)	0.660**	0.639**
6. Intentions of Saving Energy	9.70	2.15						(0.63)	0.532**
7. Consideration of Future Consequences (CFC)	36.19	11.62							(0.85)

*$p < 0.05$; **$p > 0.01$

Note: Cronbach's alpha coefficients are shown in brackets () along the main diagonal.

TABLE 2. HIERARCHICAL MULTIPLE REGRESSION ANALYSIS PREDICTING ENERGY CONSERVATION BEHAVIOUR

Step	**Predictor**	***R* square**	**Adjusted *R* Square**	**R Square Change**	***F* Change**	**Significance**	**Step 1β**	**Step 2β**	**Step 3β**	**Step 4β**
1	ECO	0.165	0.159	0.165	26.361	0.000	0.407**	0.264**	0.059	0.049
	Attitude							0.377*	0.208**	0.123
2	Norms	0.292	0.270	0.127	7.760	0.000		0.059	0.102	0.002
	PBC							0.074	0.050	0.046
3	INT	0.473	0.453	0.181	44.383	0.000			0.547**	0.403**
4	CFC	0.565	0.545	0.092	27.066	0.000				0.372***

To test the model energy conservation behaviour was regressed onto environmental consciousness, TPB variables and CFC. ECO was entered at the first step, attitudes, subjective norms and PBC were entered at the second step, intentions were added at step 3 and CFC was added at step 4. ECO accounted for significant variance in energy conservation behaviour at Step 1 and Step 2. The addition of attitudes, subjective norms and PBC at Step 2 significantly increased the variance explained with an additional 12.7 % of variance explained. The addition of intentions at Step 3 further increased the explained variance by 18.1 %. Finally, the variance explained increased by another 9.2 % after the addition of CFC at Step 4. Together the variables predicted 54.5 % variance in energy conservation behaviour. ECO, intentions to save energy, attitudes towards saving energy and CFC emerged as significant predictors of energy conservation

6. DISCUSSION

The current study drew upon Ajzen's TPB [2] to explain energy conservation behaviour. The TPB model was found be a useful framework for predicting energy conservation behaviour, explaining 45.3 % variance. The addition of the additional variable CFC significantly increased the explanatory power of the TPB model. The revised model accounted for 54.5 % of the variance.

Environmental consciousness has a significant influence on energy conservation behaviour which is a rational behaviour willingly chosen by an individual. Awareness of human influence on the environment is an important prerequisite to behave in a more pro-environmental manner. This finding is in line with many previous research studies [59]. Surprisingly, environmental consciousness becomes insignificant at Step 3 when intentions to conserve energy were added to the model. This may be understood by the fact that environmental consciousness is a measure of general attitude towards environment whose function may be to differentiate between an environmentalist and a non-environmentalist [60]. The whole idea of pro-environmental behaviour is based on volitional actions driven by initiative.

According to TPB, an individual's intentions to behave has a direct influence on actual behaviour. Intentions mediate the relationship between attitudes, subjective norms and PBC and behaviour. Results supported a strong influence of intentions to save energy on actual energy saving behaviour. Intention is the most proximal influence on behavioural performance [2], based on the assumption that humans are rational, purposeful actors, and therefore a strong intention to achieve a particular goal should lead to the attainment of this goal even if this requires changing current behaviours [2], [36]. The results are consistent with earlier researches where intentions predict behaviour with reference to organic food purchase [35] and sustainable behaviour at workplace [33].

The analysis found that attitudes towards energy conservation emerged as a significant predictor of energy conservation behaviour and the other two constructs at Step 2, i.e. PBC and subjective norms failed to emerge as significant predictors of behaviour. The influence of PBC and subjective norms were not validated because of the weak β coefficients. This result is consistent with previous research that demonstrated that attitudes towards specific behaviours can predict behaviour in a better manner as compared to general environmental attitude [2]; Armitage and Conner [19] have also conducted a meta-analysis and found that in comparison to subjective norms and perceived behavioural control, attitudes are strong predictors of behaviour. The reason for PBC not being able to predict behaviour may be linked to a weak association between perceived control over behaviour and actual control. This discrepancy may arise due to the inability of the participants to account for multiple other factors which may be internal (cognitive) or external (contextual/ environmental) which might have an impact on actual behaviour. Social pressure is not an important factor in deciding one's intentions towards energy conservation behaviour [61]. Alternative explanations within the framework of biases in decision making process may be more helpful in understanding this discrepancy.

The study added CFC to the original model of TPB. The variable added significantly and proved to be a strong determinant of energy conservation behaviour. The results are in line with previous research. Energy conservation behaviour results in giving up or sacrificing behaviours that might be convenient at the moment to save the environment. As any pro-environmental behaviour represents a temporal conflict (immediate vs. delayed consequences), individuals who are concerned about the future tend to choose pro-environmental behaviour when faced with a temporal dilemma [46]. Environmental solutions involve personal and social costs and benefits but also represent a conflict between short-term and long-term interests [49]. Accordingly, people who are focused on the future are more likely to comprehend the impact of present actions on future of the environment and hence be more likely to engage in more sustainable actions as compared to those who are more focused on the present or the past [62], [47]. Human behaviours are detrimental for the environment in the long run. One does noes easily realize the impact on the environment due

to "temporal myopia" (i.e. being able to only see the short-term impact). Intentions are a direct predictor of behaviour [63], [64]; [65] and the current study shows that future orientation significantly adds to the prediction of intentions.

7. CONCLUSIONS

The TPB model explained a significant amount of variance in energy saving behaviour. Behavioural intentions and attitudes were significant predictors of behaviour. Intentions are the closest proximal predictors of behaviour that indicate readiness to behave in a given direction. Attitudes are closely related to beliefs and subjective evaluation of a behaviour. The core idea of the TPB model stands supported that intentions are the closest antecedent of behaviour. The findings are suggestive that energy conservation programs should focus on the attitude towards conservation and should also work towards removing the barriers (actual and imagined) to improve such behaviour.

The addition of CFC to the TPB model helped to improve the variance explained in energy conservation behaviour. The focus on temporal dimension is an important aspect to be considered with reference to pro-environmental behaviour probably because environment friendly behaviour does not yield immediate results. One has to be aware that present actions (good or bad) are likely to have consequences in future. The ability to focus on the future consequences is an important predictor of current behaviour.

The results of the current research highlight some implications which may help in a better understanding of conservation behaviour. ECO, CFC, attitudes, subjective norms, PBC and intentions have a strong influence on behaviour with intentions having the strongest influence. It may be implied that raising consciousness of the people will help in setting their intentions to conserve energy. Also, presenting environmental loss as a concrete reality will also force individuals to engage in more environmentally-friendly and conservation-oriented behaviours.

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