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Predicting Behavioral Intention of Rural Inhabitants toward Economic Incentive for Deforestation in Gilgit-Baltistan, Pakistan

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Abstract: The conservation of forest in the northern areas of Pakistan is the major priority of the national environmental policy to fight against global warming. Despite the policy for the protection of forest, rural residents' behavior toward economic incentives for deforestation may undermine their conservation goals. Therefore, the purpose of this study was to understand the factors that affect the illegal behaviors related to deforestation in the northern areas of Pakistan. The present study applied the socio-psychological theory of planned behavior to predict the behavioral intention of rural residents toward economic incentives for deforestation. Correlations were explored between background factors toward motivations for deforestation based on positive and negative views through open-ended questions. Attitude and descriptive norm were found good predictors to perceive the behaviors. The findings of the study suggest that rural communities' support for compliance with policies is vital for the long-term efficacy and protection of the forest in the region. Further, change in the behaviors of inhabitants toward the ecosystem through training can be improved to manage the forest.

Keywords: forest conservation; forest management; rural residents; economic incentives; Pakistan

Citation: Ullah, S.; Abid, A.; Aslam, W.; Noor, R.S.; Waqas, M.M.; Gang, T. Predicting Behavioral Intention of Rural Inhabitants toward Economic Incentive for Deforestation in Gilgit-Baltistan, Pakistan. *Sustainability* **2021**, *13*, 617. https://doi.org/10.3390/su13020617

Received: 1 December 2020
Accepted: 6 January 2021
Published: 11 January 2021

1. Introduction

Globally, forests have been receiving ever-growing attention to fight against global warming. Forest not only conserves biodiversity but also provides necessary ecosystem services to society. Nevertheless, recently several studies have demonstrated that restrictions on the use of natural resources have negative behavior among the rural residents who rely on the forest for their livelihood, which creates a lot of hurdles for the management of forests [1–5]. The mountainous rural area resident's major source of income is from the forest resources; therefore, the economic incentive from forests directs rural residents toward deforestation [6–12]. Therefore, comprehensive attention is needed to understand the relationship between rural residents, economic incentives, and forest conservation.

Scientific literature has explored the relationship between rural residents and deforestation [13–16]. Such literature has helped to identify the preferences and beliefs of residents on conservation issues [17]. Therefore, the evaluation of plausible relationships with intentions is important to predict the actions that influence and change the behavior of rural communities [18–21]. In the past, many scholars have suggested incorporating the beliefs of rural residents toward the conservation of natural resources in global forest policy [22–25].

According to the National Forest Policy of Pakistan 2015, the lawmakers have taken steps to manage forests and improve public awareness of the ecological and cultural values of forests [26–29]. Nevertheless, forests have been weakly preserved in recent years and it is a challenging task in northern areas of Pakistan to apply strict rules of preservation due to the high reliance of peoples on the natural resources of forests [30–32]. In the scarcely facilitated area of Gilgit-Baltistan, resident depends on natural resources for their livelihoods [32,33]. According to Reference [32], porters cut trees for cooking, walking sticks, and fuel. This is because people have no source of income in the region, and they used natural resources to fulfill their basic needs; therefore, policies regarding the conservation of forests adversely affect the behavior of rural inhabitants. In the northern areas of Pakistan, rural resident's relationships with the forest authorities and continuous illegal activities to use fuel-wood are of particular concern for deforestation. This is due to the existence of strong (informal) links between the authorities, influential groups, and timber mafia [34,35]. The increasing level of illegal activities also negatively affects the rest of the areas. Deforestation in the developed countries is considered due to expansion in agricultural land [36–42]. While in the case of developing countries like Africa, deforestation is continued for subsistence agriculture farming and wood production for local markets [43,44]. Agriculture and charcoal production are the main causes of deforestation in Tanzania [45] and fuel-wood in Senegal [46]. In Turkey, the main causes of deforestation are rapid urbanization and industrialization [47].

Previous studies related to deforestation in Pakistan are mainly focused on timber production, conversion to agriculture, roadbuilding, and human-caused fire [48]. According to the studies of Ullah et al. [14,49] and Ali et al. [14,49], deforestation in northern areas is due to the construction of roads and high population growth in the last few years. However, to the best knowledge of authors, no research has so far been conducted to examine the behavior of rural residents toward deforestation, especially the study related to the economic motivation of rural residents. Therefore, the purpose of this study is to investigate the intention of people toward economic incentives to control deforestation and help the government institutes to make effective policies for the livelihoods of rural residents as for as law enforcement agencies.

To perceive human behavior, Ajzen's theory of planned behavior, an extension of the theory of reasoned action, has been used [50]. Nonetheless, few studies on forest biodiversity have utilized such frameworks to analyze multiple predictors of behavior. [18]. According to the theory, the behavioral intentions arise from an individual's attitude (ATT), norms, and Planned Behavior Constructs (PBC), which can further be predicted by actual behavior in question [50]. Furthermore, a number of background factors including socioeconomic, knowledge, education, and past experience of the individual can influence the ATT, Normative (N), and PBC. [51]. Contextual aspects such as rules and legislation of government may often interfere and evaluate a behavior [52]. Attitude is defined as the extent to which an individual has a favorable or unfavorable view of a particular behavior. Descriptive normative (DN) is defined as the opinions of the people rather than what approve or disapprove by others [18,53]. PBC is the perception of how an individual feels ease or difficulty to perform a specific behavior [50,54,55]. Understanding behavioral intent toward, and factors that affect, illegal behaviors can help managers emphasize their actions to enhance people's compliance with laws and protect forest within those areas.

Therefore, our study investigated the ATT, DN, PBC, and Behavior Intention (BI) of the rural inhabitants toward their economic incentive for deforestation. By applying the theory of planned behavior, the purpose of the present study was to (a) identify background factors that may influence the intention of rural residents; (b) identify inhabitants' attitudes, descriptive norms, perceived behavioral control toward economic incentives for deforestation; and (c) identify rural inhabitant's illegal behavior toward the economic incentives for deforestation.

2. Theoretical Model

2.1. Theory of Planned Behavior

Many contemporary studies have used intentions as a key component to understand the behavior in question [50,56–60]. In psychology, the theory of planned behavior is an attempt to shape an individual's behavioral intentions with a combination of three factors: attitudes toward the behavior, norms, and perceived behavioral control [51,61,62] as given in Figure 1.

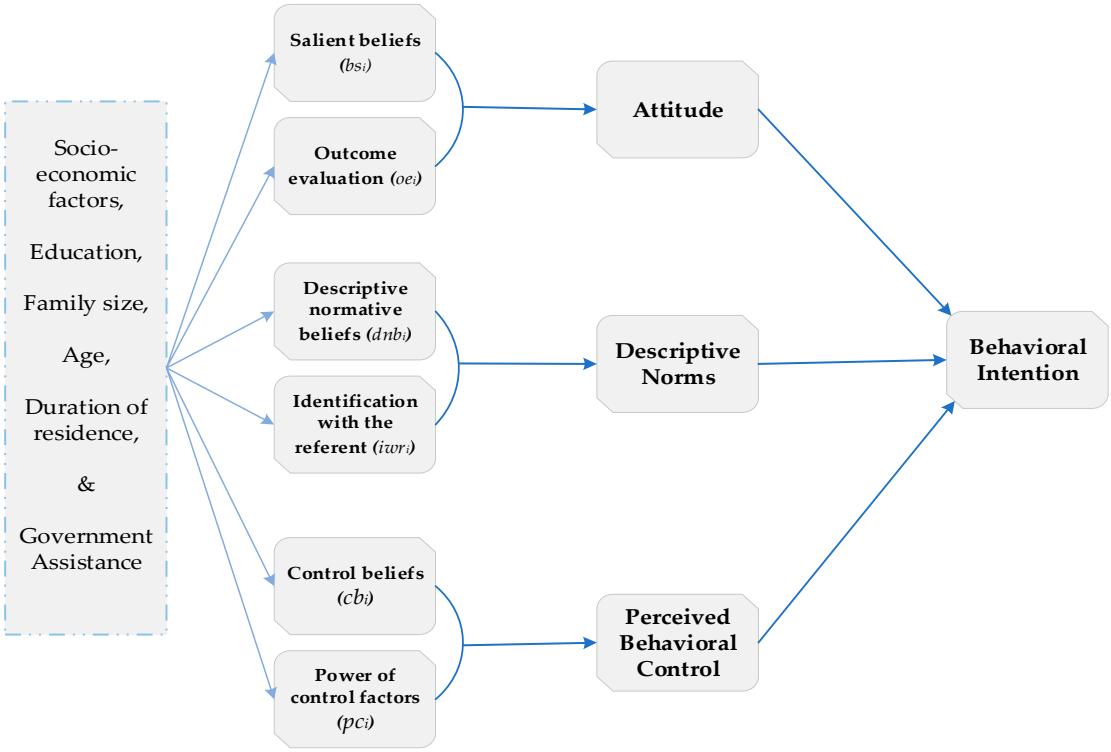

Figure 1. Factors affecting the Behavior Intention: Theory of Planned Behavior Model [50].

2.2. Expectancy-Value Model

The theory of planned behavior follows an expectancy-value model to predict the behavior of individual under question [50,51,63,64]. The beliefs-based measures are probably regarded to get a more accurate prediction of cognitive intention than its direct predictors alone.

The attitude is comprised of (silent beliefs -bs_i) and evaluation of the outcomes (oe_i) and it can be obtained according to the following formula:

$$ATT\ \alpha \sum bs_i\ oe_i \quad (1)$$

Strength of behavioral belief (bs_i) is described as a possibility that can produce a particular outcome by performing a behavior (i) and the outcome evaluation (oe_i) can be termed as the utility obtained if the result (i) occurs [50,51,63,64].

The descriptive norm (DN) describes the whereas descriptive norms refer to perceptions that others are or are not performing the behavior. Normative beliefs can be explored by assessing a person's identification with the referent (iwr_i), multiplying the measures of descriptive normative beliefs (dnb_i) regarding given referents by the corresponding identity measures, and then summing the normative belief by identity products [65,66]. A belief-based measure of the descriptive norm (DN) can be obtained according to the following formula:

$$DN\ \alpha \sum dnb_i\ iwr_i \quad (2)$$

Strength of descriptive norms is formed by considering multiple descriptive normative beliefs (dnb_i), or beliefs that behavior is normative for peers and individuals we look up to in social groups [65,66].

"Perceived behavioral control—This refers to a person's perception of the ease or difficulty to perform the behavior of interest. It consisted of personal control beliefs (cb_i) and the perceived strength of these specific control factors to facilitate or impede actions (power to affect—pc_i) [50,67,68].

$$PBC\ \alpha \sum cb_i\ pc_i \quad (3)$$

The strength of each control belief (cb_i) is weighted by the perceived power (pc_i) of the control factor to perform a specific behavior [50,51].

Behavioral intention (BI) refers to "a person's subjective probability that he will perform some behavior". BI is the function of three antecedents, namely, attitude, norms, and PBC. By incorporating the belief-based measures, BI can be calculated according to the following formula:

$$BI = \beta_1 ATT + \beta_2 DN + \beta_3 PBC + \varepsilon \quad (4)$$

β_1, β_2, and β_3 are the coefficients to evaluate each component, and (ε) is an error term.

3. Materials and Methods

3.1. Study Area

The present study was conducted in the three districts (Skardu, Gilgit, and Astore) of Gilgit-Baltistan, Pakistan (Figure 2), where rural residents not only use forest resources to meet their livelihood but also generate substantial cash income through trade in forest products.

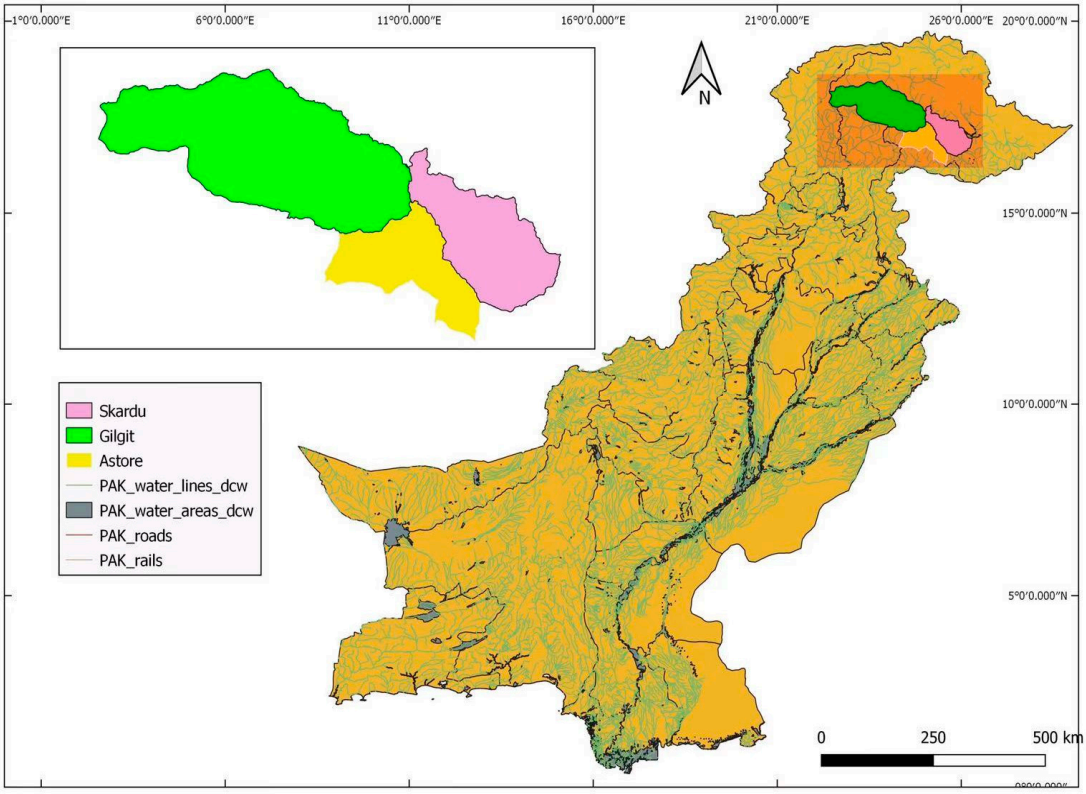

Figure 2. Study map.

3.2. Data Collection

For the present study, survey data were collected from January 2019 to April 2019 (Figure 3). Face-to-face interviews were conducted with the residents. All the meetings were scheduled with the consent of the participants and their privacy was ensured.

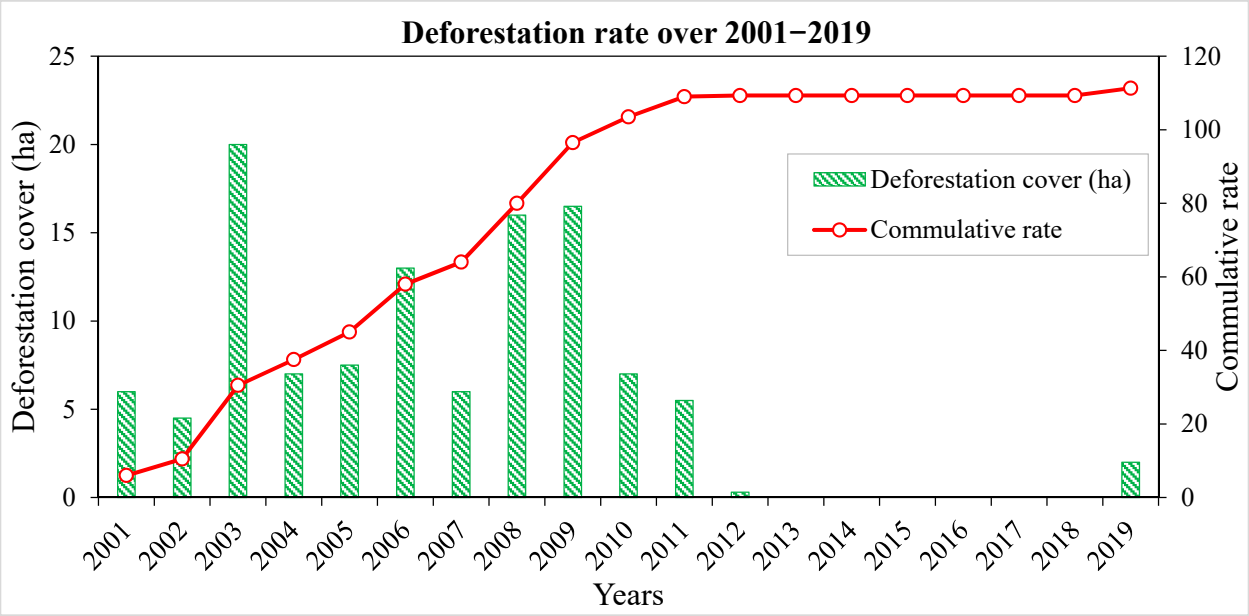

Figure 3. Continuous decline in forest cover area in northern Pakistan from 2001 to 2019. (Taken from https://www.globalforestwatch.org/dashboards/country/PAK).

From 2001 to 2019, Northern Areas lost 112 ha of tree cover, equivalent to a 0.23% decrease in tree cover since 2000. The survey also consisted of some close-ended questions of (a) socioeconomic factors: age, education, time duration to stay in the region, family size, and support from the government ("royalty" income offered to local residents for not utilizing the forest), (b) attitudes toward economic incentives for deforestation; descriptive norms defined in the study as the opinions of other people's behavior toward deforestation; perceived behavioral control as the respondent's views about the presence of law enforcement in the region; and behaviors toward economic incentives for deforestation. Moreover, an open-ended questionnaire has been used to explore the perceptions of the respondents on natural resources including the one where they lived. Categorization of these opinions was done according to the values of nature described by Kellert [69–71]. The opinions of the respondents were categorized into only two groups of natural values "(moralistic values, which represent a respect to the nature; and utilitarian values, which represents the material benefits that a person obtain from nature; Kellert, 2005)".

3.3. Measurement of Variables

Behavioral intention was defined for this research as the intention of rural residents toward the economic incentive of deforestation by replacing small-scale agriculture. The question was designed as follows: Do you have the intention to replace secondary forest with small-scale agriculture to get economic incentives? To evaluate the construct, a five-point bipolar Likert scale was used ranging from 4—very likely to 0—very unlikely.

Attitude was measured directly by utilizing five points "bipolar Likert scale ranging from very unlikely (0) to very likely (4)". For assessment of attitude, question was formed as follows: Do you think forest should be replaced with small-scale agriculture to get economic incentives? For the indirect assessment of belief-based items, (b) were measured on five points "Likert scale ranging from strongly disagree (0) to strongly agree (4)", while for (e) very important (4) to not very important (0). For the belief-based measures,

three behavioral beliefs were presented to the respondents concerning that rural residents think by replacing forest with small-scale agriculture will provide food for the family, increase livelihood, and increase tourism (see Table 1).

Table 1. Items used for evaluation of Theory of Planned Behavior constructs.

Behavioral Intention	Do you have the intention to replace secondary forest with small-scale agriculture to get economic incentives?	
Attitude	Do you think forest should be replaced with small-scale agriculture to get economic incentives?	
Descriptive Norm	Do you think that rural residents in the area replacing the forest with small-scale agriculture for economic incentives?	
Perceived Behavioral Control	In my view, law enforcement is sufficient in the regions to control rural resident's activities?	
Indirect evaluation of Theory of Planned Behavior constructs		
$ATT \propto \sum bs_i oe_i$	**Salient beliefs (bs_i)**	**Outcome evaluation (oe_i)**
	Rural residents think by replacing forest with small-scale agriculture will . . .	
	. . . provide foods for family	For me, food for family is . . .
	. . . increase livelihood	For me, revenue is . . .
	. . . increase tourism	For me, tourism is . . .
$DN \propto \sum dnb_i\ iwr_i$	**Descriptive normative beliefs (dnb_i)**	**Identification with the referent (iwr_i)**
	In my view people deforest in the region.	With regards to deforestation, I am not similar to people.
$PBC \propto \sum cb_i\ pc_i$	**Control beliefs (cb_i)**	**Power of control factors (pc_i)**
	I think legislation is insufficient to control people's activities in the region.	Without legislation, it is more difficult to control people's activities in the region.
	I think training of personnel is unsuited to control people's activities in the region.	Without proper training, it is more difficult to control illegal activities in the region.

Talking about the actions of others (descriptive norms) was found more comfortable for the respondent than perceived social pressure from others for an individual to behave in a certain manner (subjective norms). Descriptive norm was measured directly by utilizing a five-point unipolar Likert scale ranging from not at all (0) to a large extent (4). The item was designed as follows: Do you think that rural residents in the area replacing the forest with small-scale agriculture for economic incentives? The indirect assessment of belief-based items (dnb_i) was performed by using unipolar Likert scale, from 0—strongly disagree to 4—strongly agree, while for (iwr_i) "unipolar Likert scale was used ranging from 0—strongly disagree to 4—strongly agree".

For the measurement of perceived behavioral control, a five-point "unipolar Likert scale from (0) strongly disagree to (4) strongly agree" was used. The statement was formed as follows: In my view, law enforcement is sufficient in the regions to control rural resident's activities. For the indirect assessment of perceived behavioral control, control beliefs (cb_i) were assessed on a Likert scale ranging from (0) strongly disagree to (4) strongly agree, while p was measured on a scale ranging from (0) strongly disagree to (4) strongly agree.

3.4. Analysis Methods

Descriptive statistics were used to present the results, and "Pearson's correlation coefficients and regression analysis were chosen for interpretation". The Pearson correlation coefficients are used in statistics to measure how strong a relationship is between two variables. A value of 0 demonstrates that there is no correlation between the two variables. A value higher than 0 describes a positive relationship and a value less than 0 indicates a negative relationship. Regression analyses investigate the relationship between dependent and independent variables.

To determine the relationship between dependent variables (attitude, descriptive norms, perceived behavioral control, behavioral intention) and independent variables ($\sum bs_i oe_i$, $\sum dnb_i\ iwr_i$, and $\sum cb_i\ pc_i$), a linear relationship was presumed (as mentioned in the mathematical formulation of TPB). Therefore, a multiple linear regression technique was used to analyze the data. P-values were used to interpret the significance level of regression analysis and coefficients. β weights and t-values were used to interpret the results. R^2 was applied for the evaluation of the explanatory power of the regression analysis. F-test was used for the assessment of the overall significance level of the models. Data analysis was performed using "Microsoft Excel for Windows version 19 and SPSS ver. 25 software".

4. Results

4.1. Background Factors

The survey was conducted with 207 interviewers, 92 percent of whom were males and 8 percent were females. the detail of background factors is presented in Table 2.

Table 2. Demographic survey of rural residents in protected areas of northern Pakistan.

		Gilgit (n = 65)	Skardu (n = 73)	Astore (n = 69)	Total (n = 207)	Chi-Square Value (X^2)	*p*-Value
Age	Less than 22 years	11%	21%	14%	15%	$X^2 = 6.62$	0.577
	23 to 35 years	14%	16%	19%	16%		
	36 to 50 years	38%	25%	32%	32%		
	51 to 65 years	17%	18%	22%	19%		
	66 and Above	20%	21%	13%	18%		
Duration of Residence	0 to 20 years	15%	22%	19%	19%	$X^2 = 2.01$	0.732
	21 to 40 years	51%	51%	45%	49%		
	41 and above	34%	27%	36%	32%		
Education	Less than Primary	35%	24%	22%	27%	$X^2 = 19.33$	0.012 *
	Primary	16%	30%	12%	19%		
	High School	19%	13%	24%	18%		
	Middle	23%	18%	35%	26%		
	College	7%	15%	8%	10%		
Family Size	1–4 person	15%	15%	22%	17%	$X^2 = 4.21$	0.377
	5–10 person	60%	54%	45%	53%		
	11 and above	25%	31%	34%	30%		
Government Assistance	Yes	20%	36%	25%	27%	$X^2 = 4.55$	0.102
Profession	Small-scale Agriculture	83%	77%	83%	81%	$X^2 = 1.14$	0.565

* $p < 0.05$.

Based on the feedback of the open-ended question about the participants' opinions on deforestation, 86% of participants reported negative beliefs, including 42% people cannot work, 20% people claimed that government does not pay a royalty for the properties, 11% think an increase in unemployment, and 10% thinks that usage of firewood is prohibited. Only 14% mentioned just negative values. Respondents' beliefs categorized into negative values including restrictions and positive values including forest protection, relationship between education and profession, education and government assistance, Duration of Residence and government assistance, Age and government assistance, and found that the regression relationship is significant and multicollinearity is less than 5. So, these re-

sults indicate that there is an influence of these variables regarding deforestation if it is from the government sector or local communities [72].

4.2. Components of Theory of Planned Behavior

4.2.1. Components of Behavioral Intention

The majority of the participants (46%) had thought to carry out the behavior in question, while 23% of them declared that it is an illegal activity to deforest. Attitude toward performing behavior was 59%. At the same time, descriptive norms for the respondent's views toward other people were 42% that were engaging in illegal activities. As far as PBC is concerned, 47% of respondents were not satisfied with the performance of law enforcement.

4.2.2. Components of Attitude

Most of the participants (61%) believed that the replacement of forests with small-scale agriculture will provide food for the family (agree and strongly agree on the "*bipolar Likert scale*"). With regards to other important beliefs that categorized the respondents are livelihood (82%), however, respondents' beliefs toward replacing forest with tourism were adverse (Figure 4a). As far as outcome evaluation is concerned, 94% of the participants perceived that provide food to the family is important or very important "*3 and 4 on the bipolar Likert scale*", while only 28% of the respondents stated that, for them, increase livelihood is of some importance.

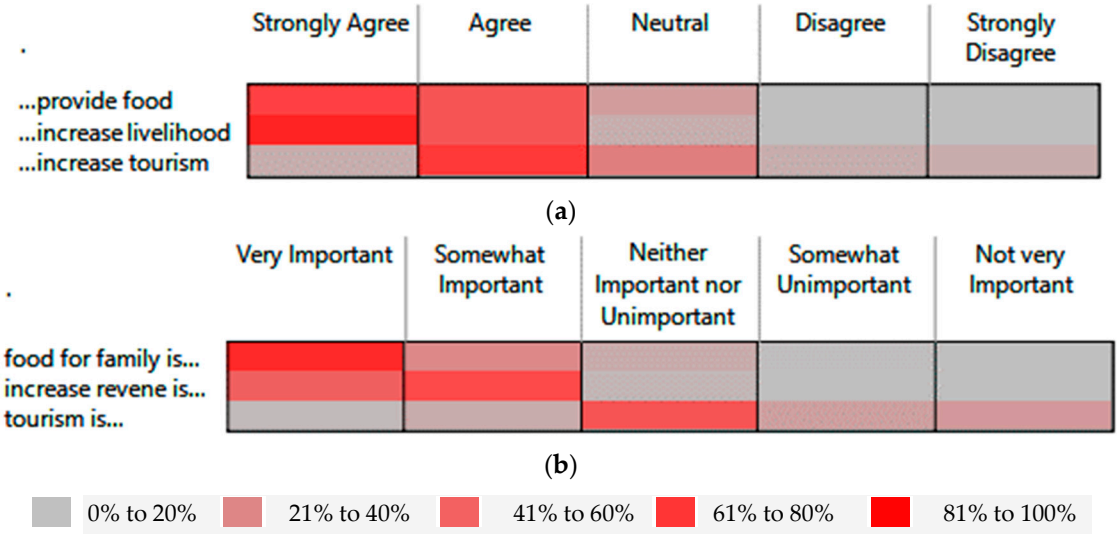

Figure 4. (**a**,**b**) Evaluating the percentage of components of attitude (behavioral belief and outcome evaluation).

The results obtained from Pearson correlation coefficients described that belief-assessment (b_ie_i) had a relatively strong association with the direct measurement of attitude (the values of Pearson coefficient lie between 0.2 and 0.4), with the notable exception of increasing tourism (see Table 3). The regression analysis verified the relationship between endogenous variable attitude and the exogenous variables b_ie_i: the β-tourism coefficient was not found significant, whilst the β-coefficient for all other exogenous variables was significant.

Table 3. Regression analysis to predict Attitude (dependent variable) from beliefs—evaluation (independent variables) Pearson correlation coefficients between b_ie_i and Attitude (F = 14.671, R^2 = 0.178 and significance level = 0.000).

Beliefs × Outcome Evaluation (Biei)	Correlations Coefficients (r)	B—Coefficients	t-Values
Provide food × food for family	0.396 **	0.297 **	3.838
Increase livelihood × increase revenue is	0.327 **	0.138 **	1.767
Increase tourism × tourism is	0.223 *	0.069	0.984

** significant for $p \leq 0.01$. * significant for $p \leq 0.05$.

4.2.3. Components of Descriptive Norm

With regards to the perception of other people, it was perceived (78%, say Yes) rural inhabitants replace the secondary forest with small-scale agriculture. Respondents generally confirmed their most people (85%) have illegal activities in the forest (Figure 5).

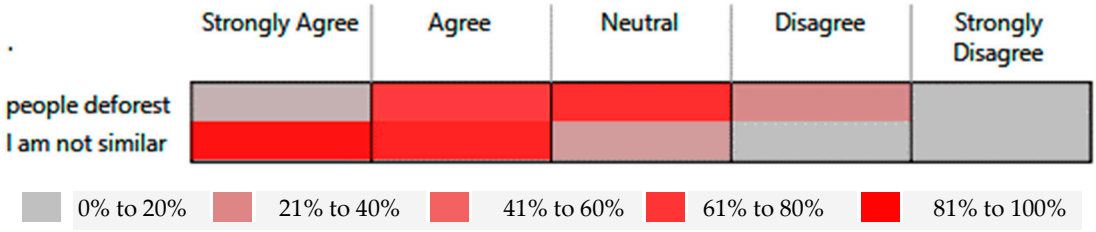

Figure 5. Percentage distribution of descriptive beliefs on the protection of forest.

By assessing correlation coefficients of descriptive normative beliefs (dnb_i) and identification with the referent (iwr_i), the descriptive norm was found correlated with these two products. The regression results demonstrated 20 percent of the variation in descriptive norm that confirmed illegal activities of the people in the region (Table 4).

Table 4. Multicollinearity among variables.

Model	B	t	Sig	R^2	Multicollinearity
Duration of Residence and Age	0.801	12.779	0.000 *	0.642	VIF < 1
Govt Assistance and Agriculture	0.789	12.252	0.000 *	0.623	VIF < 1
Education and Agriculture	0.661	8.411	0.000 *	0.437	VIF < 1
Education and Govt Assistance	0.663	8.445	0.000 *	0.439	VIF < 1
Duration of Residence and Govt Assistance	0.797	12.582	0.000 *	0.635	VIF < 1
Age and Govt Assistance	0.789	12.252	0.000 *	0.623	VIF < 1

* $p < 0.000$.

4.2.4. Components of PBC

The statement on unsuitable legislation was supported by a majority of respondents, while the power of this belief to impede law enforcement was also perceived as high. Majority of respondents agreed without suitable training illegal behavior of residents would not stop (Figure 6a,b).

With regards to the evaluation of control belief x perceived power to influence products (cb_ip_i), it was found that both products were correlated with the PBC (see Table 5). However, insufficient legislation demonstrated a major factor affecting the perceived power of control. Both the Pearson correlation coefficient and the regression analysis results demonstrated that insufficient legislation as well as unsuited training significantly predicted PBC.

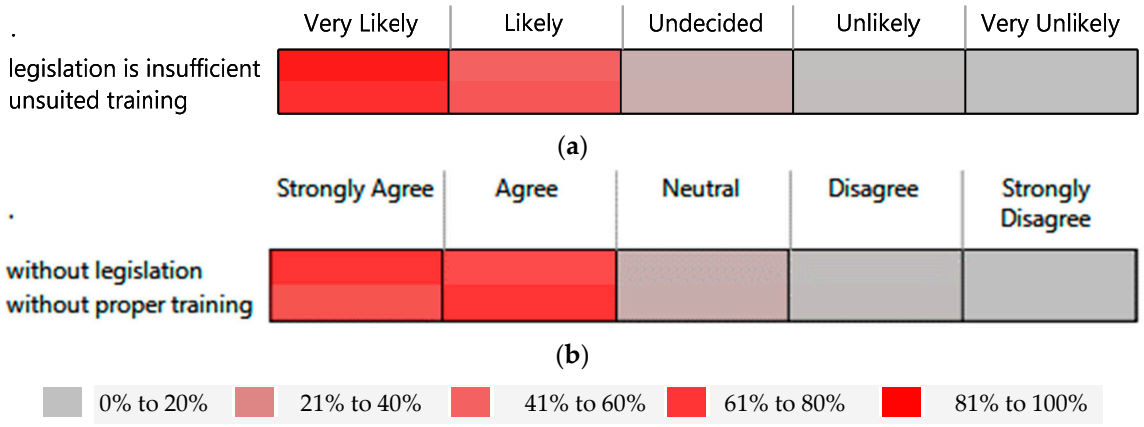

Figure 6. (**a**,**b**): Percentage distribution of control beliefs (**a**) and compliance with the beliefs (**b**) in law enforcement to protect the forest.

Table 5. Regression analysis to predict perceived behavior control (dependent variable) from beliefs—evaluation (independent variables) Pearson correlation coefficients between biei and attitude (F = 37.679, R^2 = 0.270 and significance level = 0.000).

Control Beliefs (cb_i) × Power of Control Factors (pc_i)	Correlations Coefficients (r)	B—Coefficients	t-Values
Legislations insufficient × without legislation	0.501 **	0.401 **	5.425
Training of personnel unsuited × without proper training	0.405 **	0.170 **	2.305

** significant for $p \leq 0.01$.

4.3. Factors Predicting the Rural Residents' Motivations Towards Deforestation

The components of the theory of planned behavior—attitude, DN, and perceived behavior control—had shown strong associations with behavioral intention. Furthermore, the sums of all three products ($\sum b_i e_i$, $\sum nb_i mc_i$, and $\sum cb_i p_i$) had a positive correlation with behavioral intention. Since all the variables had positive Pearson 's correlation coefficients with behavioral intention (significant level of all variables = $p \leq 0.01$), none of the variables was excepted from the linear regression analysis that was proposed to explain the behavioral intention (Table 6).

Table 6. TPB (Theory of planned behavior) model explaining the Pearson's correlation coefficients.

	Mean	Standard Deviation	BI	ATT	$\sum bs_i oe_i$	DN	$\sum dnb_i irw_i$	PBC	$\sum cb_i pc_i$
BI	3.32	0.740	1.000						
ATT	3.53	0.621	0.611 **	1.000					
$\sum bs_i oe_i$	11	2.388	0.276 **	0.413 **	1.000				
DN	3.14	0.770	0.511 **	0.326 **	0.222 **	1.000			
$\sum dnb_i irw_i$	10.00	4.211	0.508 **	0.359 **	0.333 **	0.455 **	1.000		
PBC	3.29	0.785	0.539 **	0.334 **	0.113 *	0.391 **	0.204 **	1.000	
$\sum cb_i pc_i$	11.442	3.067	0.458 **	0.291 **	0.310 **	0.197 *	0.381 **	0.508 **	1.000

** significant for $p \leq 0.01$. * significant for $p \leq 0.05$.

Through the evaluation of multiple linear regression, all possible models to explain behavioral intention were examined. (Table 7). "The standardized regression coefficients (and t-values) of so-called basic model, having as explanatory variables attitude, descriptive norm, and perceived behavioral control, demonstrated that all of three variables had high explanatory power in behavioral intention variation. The basic model was also statistically significant ($p \leq 0.01$) and explained 56% (R^2 = 0.552) of the total variation of the intention".

Table 7. Regression analysis explaining the economic motives of rural residents toward behavioral intention (t-values and β -coefficients).

Variables	β -Coefficients (t-Values)						Model Features
	ATT	DN	PBC	$\sum bs_i oe_i$	$\sum dnb_i irw_i$	$\sum cb_i pc_i$	
Basic model	0.436 ** (8.390)	0.256 ** (4.887)	0.295 ** (5.623)	-	-	-	F = 83.455 Significance Level = 0.000 R^2 = 0.552
Model 1	0.429 ** (8.333)	0.318 ** (6.339)	-	-	-	0.270 ** (5.447)	F = 82.201 Significance Level = 0.000 R^2 = 0.548
Model 2	0.452 ** (8.460)	-	-	-	0.259 ** (4.691)	0.228 ** (4.227)	F = 71.000 Significance Level = 0.000 R^2 = 0.512
Model 3	0.388 ** (7.592)	-	0.348 ** (7.153)	-	0.297 ** (6.047)	-	F = 91.905 Significance Level = 0.000 R^2 = 0.576
Model 4	-	0.321 ** (5.428)	0.395 ** (6.810)	0.160 * (2.927)	-	-	F = 49.282 Significance Level =0.000 R^2 = 0.421
Model 5	-	0.426 ** (7.554)	-	0.073 * (1.248)	-	0.351 ** (6.079)	F = 44.861 Significance Level = 0.000 R^2 = 0.399
Model 6	-	-	-	0.059 * (0.955)	0.375 ** (5.915)	0.297 ** (4.717)	F = 35.313 Significance Level = 0.000 R^2 = 0.343
Model 7	-	-	0.449 ** (8.553)	0.098 * (1.791)	0.384 ** (6.925)	-	F= 58.583 Significance Level = 0.000 R^2 = 0.464

** significant for $p \leq 0.01$. * significant for $p \leq 0.05$.

However, attitude was the most powerful component to explain the behavior intentions with highest β = 0.436, followed by descriptive norms β = 0.256 and perceived behavioral control β = 0.295 (Figure 7).

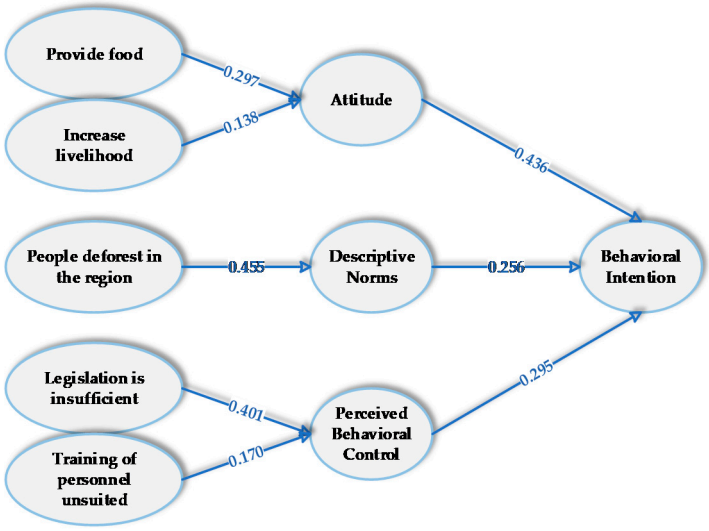

Figure 7. β-coefficient explaining the factors affecting behavioral intention.

Other analyzed models had the explanatory power in explaining the total variation of the behavioral intention (R^2 ranking between 0.576 and 0.343).

5. Discussion

Ajzen's theory of planned behavior suggests that attitude, norms, and perceived behavioral control are better predictors to explain an individual's behavior [51]. In this research, a preliminary exploration of behavior toward economic incentive for deforestation in the study region was conducted using the theory of planned behavior as a framework for structuring our analysis. The findings of the study suggest that the level of education influenced respondent's behavioral intention to deforest for economic incentive. The present study explored that attitude, descriptive norm, and perceived behavior control may be good predictors to investigate the behaviors.

The analysis of the regression models has demonstrated that attitude was the major factor to explain behavioral intention. Perceived behavioral control was followed closely by descriptive norms, which verified the high power of influence. The PBC generally has the characteristic of high power, which is confirming by the other studies [73–79]. Besides these components, intention to deforest with small-scale agriculture was also high because of unsuited law effort in the region.

With regards to belief-based evaluation, the major item explaining the attitude was food for family, followed by an increased livelihood. In the context of Pakistan, the influence of these two factors is due to rural residents' reliance on natural resources. Interestingly, *tourism* was not perceived as an important factor. This could be due to mostly residents want to focus on agricultural activities and especially on family food. Descriptive norms were highly influenced by the respondent's behavior toward other people. Unlike other studies that stated perceived behavioral control might be a good predictor of behavior (e.g., [80–83], we found that people's perception of law enforcement did not affect their behavior. Rural resident's view of law enforcement might not be sufficient to avoid negative behavior, as the activities carried out involve the use of resources vital to the livelihoods of local communities [9,84–86].

Regarding that most rural residents are involved in agrarian activities, their main complaint was that they were prohibited from substituting secondary forests for small-scale agriculture, which impeded their work and livelihood. This feeling was expressed in

negative attitudes toward forest conservation, as well as negative behavior, as some of the residents replacing secondary forests with small-scale farming.

Deforestation by residents of the area is a great challenge for forest management because reconciling land use and preservation of ecosystems inside the region requires a preventative measure to ensure the protection of remaining fragments without affecting the livelihoods of inhabitants.

The current research did not deal with all of the theory of planned behavior components (particularly, exclude the actual behavior and SN and explore the general element of PBC and DN related to the economic incentive for deforestation), attempting to prevent the use of the basic theory of planned behavior framework and complete analysis of structural equations modeling or multivariate regression. However, it identifies areas to be addressed by forestry managers to change the behavior of residents in relation to important conservation issues of deforestation.

There should be a prosecution of corrupt government officials in charge of the forestry laws and policies along with illegal loggers. Environmental awareness should be made accessible to the general public about the devastating consequences of deforestation on people and society at large. The government should embark on a program of tree planting by enlightening the public to fathom that we have only one earth. Government, Non-governmental organizations, and spirited individuals should organize an enlightenment program on the impacts of climate change. The government should add more effort to the poverty eradication program, and the educated unemployed youths should be accorded employment. To curb the rate of deforestation, a skills training system should be coordinated for rural women dwellers and the uneducated youth. In conclusion, therefore, it is necessary to recognize and introduce successful ways of addressing the daily needs of the communities. The emphasis needs to be placed on seeking alternative energy sources, sustainable agricultural practices, diversifying income sources, and supporting rural development for young people and disadvantaged community members. In order to allow communities to engage actively in decision-making processes aimed at conserving the forest and improving the livelihoods of rural communities, forestry education and extension should be geared toward institutional strengthening at the local level.

6. Conclusions

The economic benefits include the provision of subsidies for forest products, an enhanced system of taxes on exploited forest goods, the procurement of well-monitored hunting licenses, alternative job opportunities, credit provision, and a limited ban on round log exports in northern areas of Pakistan. The study suggests that the level of education influenced the respondent's behavioral intention to deforest for economic incentive. The attitude, descriptive norm, and perceived behavior control may be good predictor to investigate the behaviors. Besides these components, the intention to deforest with small-scale agriculture was also high because of unsuited law efforts in the region. As far as outcome evaluation is concerned, 94% of the participants perceived that provide food to family is an important or very important component of livelihood. Socio-economic factors that affect the forest, such considerations are profoundly rooted in the everyday needs of the communities as regards forest products that meet the increasing population rather than knowledge of the degradation and its implications of forest resources.

However, insufficient legislation demonstrated a major factor that is affecting the perceived power of control. Both the Pearson correlation coefficient and the regression analysis demonstrated that insufficient legislation as well as unsuited training demonstrates that Human activities are environmentally hazardous in combination with our daily work and actions at home, in industry, and even in agriculture, endanger the stability of the climate and the ecological balance. All these human actions endanger nature. Adequate economic incentives can be an important tool for reducing deforestation.

Author Contributions: S.U., A.A., R.S.N. and M.M.W. conceptualized the idea of the study design; R.S.N. and W.A. contributed to data collection and formal analysis; S.U., A.A. and R.S.N. performed the statistical analysis and wrote the manuscript; S.U., R.S.N. and M.M.W. edited and reviewed the manuscript; T.G. supervised and gave the conceptual insight. All authors have read and agreed to the published version of the manuscript.

Funding: This study has not received any funding.

Acknowledgments: Authors acknowledge the efforts of Central Karakoram National Park and staff for helping in data collection.

Conflicts of Interest: The authors declared no conflict of interest.

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