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Quantifying the Contribution of Rural Residents' Participation in the Cultural Tourism Industry to Improve the Soil Erosion Control Effect in Ecologically Fragile Areas: A Case Study in the Shaanxi–Gansu–Ningxia Border Region, China

Yilun He [1,2], Shaowen Zhan [2,*] and Noshaba Aziz [3]

[1] School of management, Xi'an University of Architecture and Technology, Xi'an 710055, China
[2] School of Public Administration, Xi'an University of Architecture and Technology, Xi'an 710055, China
[3] School of Economics, Shandong University of Technology, Zibo 255000, China
* Correspondence: zxq123456@xauat.edu.cn

Abstract: Previous studies have paid little attention to the causal effect and mechanism between rural residents' participation in the cultural tourism industry and the effect of soil erosion control. To analyze this phenomenon empirically, this study employs the propensity scores matching (PSM) method and the mediating effect model to explore the impact and mechanism of rural residents' participation in the cultural tourism industry on the effect of soil erosion control in ecologically fragile areas. Using data gathered from 572 rural households from the Shaanxi, Gansu and Ningxia border region, China, the results show that: (1) Compared with non-participation, residents' participation in the cultural tourism industry positively influences the soil erosion control effect; if the residents participating in the cultural tourism industry did not participate, the soil erosion control effect would decrease to 2.715–2.844. (2) Considering the heterogeneity of residents' endowments and attributes of soil erosion technology, the effect of water erosion control is also heterogeneous. (3) Mechanism analysis confirms that residents' participation in the cultural tourism industry mainly affects soil erosion control through increased non-agricultural income, optimal allocation of labor, and improved environmental protection awareness. Finally, some valuable and promotable policy implications are put forward.

Keywords: soil erosion control; cultural tourism industry; ecologically fragile areas; propensity scores matching method; mediating effect model

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1. Introduction

Worldwide, AeroSystems have been challenging specific issues, including soil erosion [1]. Soil erosion accelerates land degradation and reduces soil-related ecological services [2]. In the context of China, the Shaanxi–Gansu–Ningxia border region is located in the Loess Plateau, one of the regions with the most severe soil erosion in the world. The soil erosion modulus in most areas of the Loess Plateau is higher than 1000 t/(km^2·a) [3]. Many studies have shown that, in addition to extreme seasonal precipitation, dry weather, sparse vegetation on the surface, and farmland reclamation, there is an essential human factor that causes severe soil erosion [4]. In the Loess Plateau area, rural residents reclaim more farmland to improve family welfare, but this leads to more severe soil erosion, and ultimately, soil degradation that reduces grain production and finally forms a vicious cycle of "the more cultivated, the poorer; the poorer, the more cultivated" [5].

Although soil erosion is relatively challenging to avoid, it can be controlled within an acceptable range using soil erosion control measures or technologies. According to Zhou's [6] studies, soil erosion control technologies are roughly divided into three categories: The first one is biological technologies aimed at controlling slope soil erosion,

mainly including afforestation, building terraces, and natural restoration of vegetation. The second group of technologies are named engineering technologies. They aim to prevent gully soil erosion, and mainly include the construction of check dams and ditch control. The third group includes the farming measures to control farmland soil degradation, and mainly includes land cover types such as straw mulching and no-tillage. Soil erosion control technologies are beneficial to reduce runoff and protect soil, improve land fertility and productivity, increase biodiversity, and conserve water [7,8]. In the existing literature, many experimental results show that engineering technologies, biological technologies, and tillage technologies efficiently control soil erosion [9–11].

In 2015, the Chinese government formulated the "Soil and Water Conservation Plan (2015–2030)", which clearly stated that by 2030 a comprehensive soil erosion prevention and control system would be established. The newly added soil erosion control area will be 320,000 square km, and the average annual loss reduction will be 800 million tons. Nevertheless, farmers have not widely adopted soil erosion control technologies [12,13]. Rural residents are the direct adopters and beneficiaries of soil erosion control technologies and are responsible for soil erosion control. Some scholars have conducted lots of research on residents' low adoption rate of soil erosion control measures or technologies and believe that the adoption rate is affected by various factors, including individual characteristics, such as residents' gender, age, education, and conservation awareness [14]. Residents' family status, such as family income, farm scale, and land transfer, also has a significant impact on the adoption of soil erosion measures [8,15]. Moreover, some studies have pointed out that residents with lower incomes may not adopt soil fertility improvement technologies because the short-term benefits of these technologies are not apparent [16]. Limited income encourages residents to over-cut forests and over-cultivate farmland, thereby aggravating soil erosion [17].

In recent decades, the tourism industry, with its characteristics of low investment, short profit cycle, low employment threshold, and broad industrial linkages, has been booming around the world [18]. The tourism industry is not only a service industry with solid cultural attributes but also a cultural industry with substantial economic benefits. Under the promotion of government policies and the optimized allocation of industrial factors, the relationship between culture and tourism has begun to change from a weak connection to a strong relation [19]. The Shaanxi–Gansu–Ningxia border region contains famous revolutionary sites in Chinese history and is rich in cultural tourism resources [20]. However, this area falls under the ecologically fragile area of the Loess Plateau, and its overall economic development level is low, belonging to a specific deprived area in China. In recent years, the local government has actively developed cultural resources and vigorously developed the cultural tourism industry. The cultural tourism industry, led by the government, provides stable non-agricultural employment opportunities for local rural residents, such as engaging in part-time jobs and operating related upstream and downstream industries. Meanwhile, stable non-agricultural income has attracted more family laborers to transfer from traditional agricultural production to non-agricultural employment, thus gradually changing the family labor distribution structure of rural residents. In addition, along with the improvement in the employment environment and income, residents' awareness of environmental protection has also been strengthened. Under such circumstances, rural residents are more willing to invest in governance of the local ecological environment government, such as soil erosion control measures or adopting technologies to feed back into a more prosperous tourism market, thereby obtaining more stable improvements in family welfare. Unfortunately, previous research has not yet focused on the causal relationship between rural residents' participation in the cultural tourism industry and the effects of soil erosion control. This study empirically analyzes the influence of rural residents' participation in the cultural tourism industry on the soil erosion control effect by using data gathered from the Shaanxi–Gansu–Ningxia border region of China.

The study is structured as follows: Section 2 builds a theoretical analysis regarding the relationship among rural residents' participation in the cultural tourism industry, increase in non-agricultural income, optimal allocation of labor, enhancement of environmental protection awareness, and soil erosion control effect. Section 3 presents the research methodology, including data, variable selection, and the empirical approach. Section 4 presents the empirical results regarding the influence of residents' participation in the cultural tourism industry on the soil erosion control effect. The effects of heterogeneity and mediating effects are also explored in this section. In Section 5, the results are discussed in depth. Finally, the main conclusions are put forward based on empirical results.

2. Theoretical and Conceptual Framework

2.1. The Influence of Rural Residents' Participation in the Cultural Tourism Industry and Its Influence on the Soil Erosion Control Effect

Many scholars believe that the rise of non-agricultural employment does not negatively influence local agricultural development [21]. Residents with non-agricultural employment use part of their non-agricultural income to purchase agricultural inputs such as improved seeds, fertilizers, and irrigation systems. They will use non-agricultural activities to provide feedback on agricultural production [22]. Moreover, the development of the cultural tourism industry mainly relies on local cultural resources, so rural residents' participation in the cultural tourism industry is regarded as a local non-agricultural employment channel.

On the other hand, the ecological environment in rural areas is fundamental to boosting the cultural tourism industry, which means that the development of the cultural tourism industry requires continuous improvement in the local ecological environment [23]. In simple words, the development of the cultural tourism industry is likely to boost the local ecological environment. Theoretically, the value of ecological assets can be realized through the market, and protecting the natural environment is the process of adding value to biological value and natural capital. It will receive reasonable returns and economic compensation. These rewards and payments guide the market formation or transaction process of ecological products or services and, finally, cultivate the ecotourism industry [24].

Additionally, the participation of rural residents in the cultural tourism industry means that the cultural tourism industry's human capital increases, thus promoting the industry's ecological benefits. Meanwhile, the prosperity of the cultural tourism industry also means that more land is used to construct tourist landscapes. In other words, the development of the cultural tourism industry is likely to change land use, increase the area of forest land and grassland, and thus improve the effect of soil erosion control. Based on the above discussion, this paper proposes the following hypotheses:

H1. *The participation of rural residents in the cultural tourism industry has a positive influence on the effect of soil erosion control.*

2.2. The Mechanism of Rural Residents' Participation in the Cultural Tourism Industry on the Effect of Soil Erosion Control

Firstly, residents' participation in the cultural tourism industry can influence the effect of soil erosion control by increasing non-agricultural income. The relatively fragile ecological environment and long-term high-intensity farming in China's Loess Plateau region lead to the regional ecosystem's degradation [25]. The lack of superior natural resources, deterioration of the ecological environment, and alternating drought and floods caused by climate change make agricultural income unstable [26]. To reduce the uncertainty of agricultural income, household labor is squeezed into non-agricultural activities, and the stability and income of non-agricultural employment are relatively high compared to that of traditional agricultural operations. Cultural tourism industry in the sample area is a typical off-farm activity. Rural residents' participation in the cultural tourism industry can provide multiple guarantees for family income and improve total family welfare [27]. In addition to the employment opportunities provided by the cultural tourism industry,

leisure agriculture and service industries extended by the cultural tourism industry chain can increase the agricultural income of rural residents and provide non-agricultural employment and household income. Previous studies have found that residents with higher non-agricultural income are likely to spend more on seeds, fertilizers, plant protection, and labor employment [28]. Non-agricultural income provides buffer and protection for uncertain factors in agricultural production. It uses the non-agricultural income to "feed" agricultural production, disperse agricultural operation risks, and ultimately promote agricultural production sustainably [29]. Just as Reardon et al. [30] argued, income diversification strategies can minimize household income risks. Therefore, the following hypothesis is proposed in this paper.

H2. *Residents' participation in the cultural tourism industry positively and significantly impacts soil erosion control effect by increasing non-agricultural income.*

Secondly, residents' participation in the cultural tourism industry positively promotes the soil erosion control effect through optimizing labor allocation. When rural residents participate in the cultural tourism industry, a labor factor saving bias is generated, and surplus labor is transferred to non-agricultural sectors according to the feature of factor scarcity [31,32]. Moreover, rural residents are risk-averse, and the cultural tourism industry can provide stable employment opportunities and long-term and reliable non-agricultural employment income expectations. Therefore, rational residents choose to optimize the allocation of family labor and transfer young and middle-aged laborers to non-agricultural industries [33]. In addition, soil erosion control technologies requires more mechanization. The soil erosion control technologies adopted by residents can reduce the labor intensity of agricultural production, make female and aging laborers competent at producing agricultural output, and further enhance the enthusiasm of laborers to participate in the cultural tourism industry.

The cultural tourism industry drives the development of modern leisure agriculture. Compared with traditional agriculture, which relies on unconditional transfer payment support from the government, modern leisure agriculture changes the farming of agricultural products to ecological agriculture, facility agriculture, and experience agriculture, significantly increasing agriculture's added value. Therefore, the local surplus laborers can obtain agricultural and non-agricultural income from the modern leisure agriculture to pay more attention to the long-term stability and improvement in the local ecological environment. Based on the preceding debate, the following hypothesis is proposed:

H3. *Residents' participation in the cultural tourism industry positively and significantly influences the effect of soil erosion control by optimizing labor allocation.*

Finally, residents' participation in the cultural tourism industry positively and significantly influences the effect of soil erosion control through the enhancement of environmental awareness. Residents can obtain advanced environmental protection concepts and knowledge through experience of non-agricultural employment [34]. Some scholars believe that the income from cultural tourism can motivate residents to protect natural resources [35]. Thus, compared with traditional agricultural management modes, rural residents can obtain enough economic benefits from the cultural tourism industry and thus enhance their environmental awareness.

Specifically, on the one hand, the cultural tourism industry plays a "pull" role in motivating rural residents' environmental awareness, that is, to enhance rural residents' ecological awareness by improving their non-agricultural employment opportunities and economic income, finally reducing the tension between residents and land use. On the other hand, the cultural tourism industry is also a "push" to reduce the environmental damage activities of rural residents. When the cultural tourism industry provides economic benefits and employment opportunities for residents, local resource owners will act sustainably rather than damage the environment. The combination of the "pull" and "push" of the cultural tourism industry can increase the investment and labor of the local ecological environment and further improve the effect of soil erosion control. Based on the above discussion, this paper proposes H4 below. The theoretical framework used in the current study is also shown in Figure 1.

H4. *Residents' participation in the cultural tourism industry positively influences the soil erosion control effect by enhancing environmental protection consciousness*.

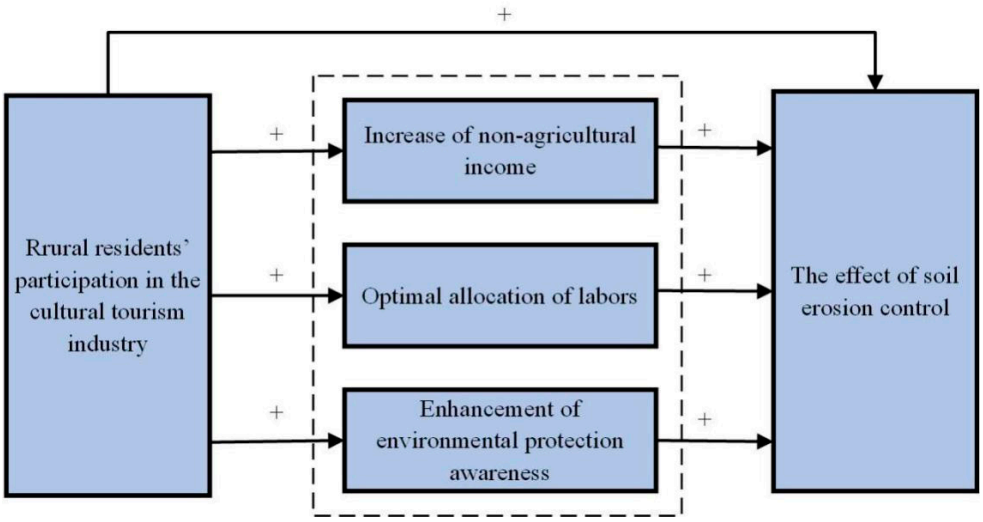

Figure 1. The theoretical framework used in the current study.

3. Data and Methodology

3.1. Study Site

The Shaanxi–Gansu–Ningxia border region is an essential part of the Loess Plateau region, located in the Yellow River's middle and upper reaches. Soil erosion is the main bottleneck for poverty alleviation, rural revitalization, and sustainable economic and social development in this region. Historically, the Shaanxi–Gansu–Ningxia border area is regarded as a strategic place during the Chinese Revolutionary War. It is located at 92°13′–111°15′ east longitude and 37°42′–39°57′ north latitude, with a total area of 129,000 square km (Figure 2). In recent years, the Chinese government has attached great importance to controlling soil erosion on the Loess Plateau. Promoting soil erosion control measures or technologies, actively building demonstration areas of soil conservation, implementing projects of soil conservation loans from the World Bank, and returning farmland to the forest have played a good guiding and promotion role in the improvement in soil conservation.

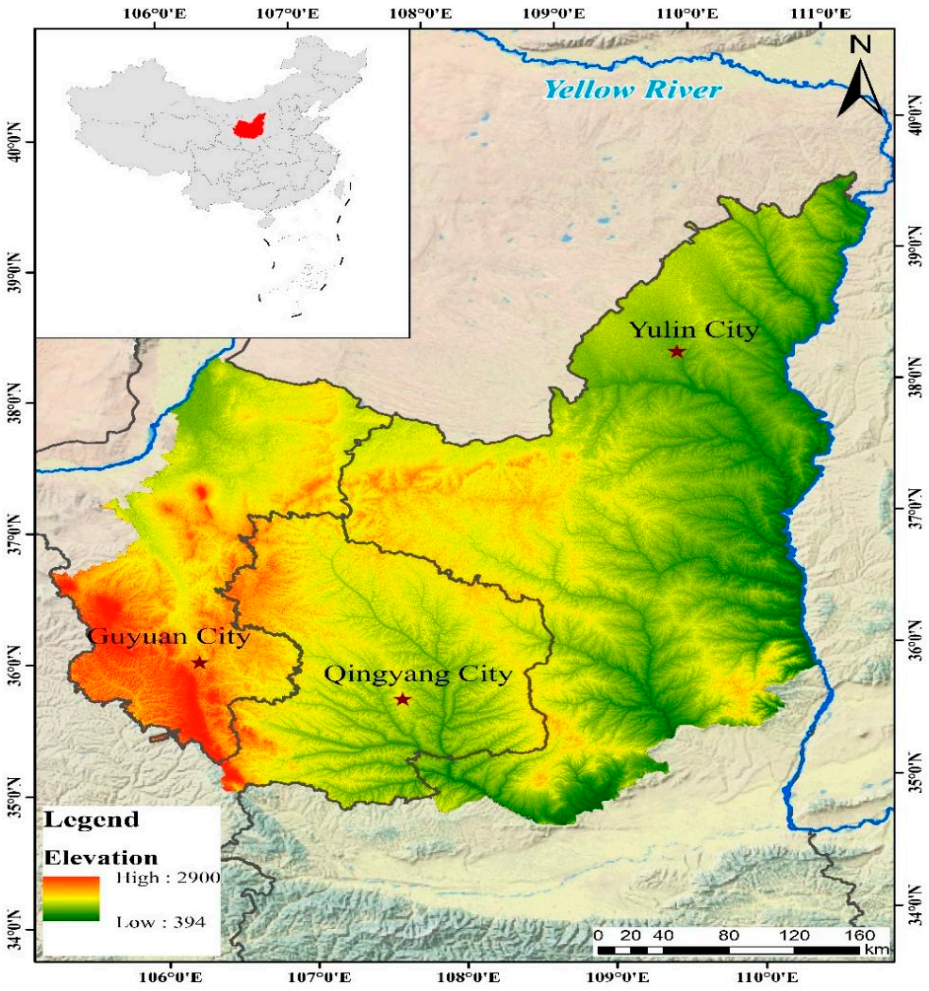

Figure 2. Map of the study area (Source: Arc GIS 10).

3.2. Sample Selection

The study data in this paper were gathered from a questionnaire-based survey from October to November 2021. The data were collected from Yulin, Guyuan, and Qingyang cities, which are located at the Shaanxi–Gansu–Ningxia border region. The specific reasons for choosing these areas are as follows: firstly, the large and famous cultural tourism resources in these regions are widely distributed and have generated good cultural tourism benefits. Additionally, these regions are affected by the monsoon, have a dry climate in winter and spring, heavy rains in summer and autumn, and sparse vegetation on the ground, making them one of the regions with the most severe soil erosion and the most vulnerable ecological environment in the world. Secondly, to reduce the impact of soil erosion on the sustainable economic and social development of these regions, the government has built prevention and demonstration zones for key soil conservation projects through the implementation of soil erosion control measures or technical training, ecological compensation measures, and cooperative organization norms and guidance. Finally, to eliminate the poverty of rural residents and improve family welfare, the government guides local cultural tourism enterprises to fulfill their social responsibilities, provide good jobs, and continuously increase residents' non-agricultural income. Therefore, selecting this area as the study area is typical and representative.

This survey adopted typical methods, i.e., stratified and simple random sampling. Firstly, Yulin, Qingyang, and Guyuan were selected as areas with sound soil erosion control effects. Secondly, combining stratified and simple random sampling, two to three counties were randomly selected from each city, 10–15 villages were randomly selected from each county, and 10–15 residents were randomly selected from each village. A total of 600 questionnaires were distributed, and after removing the blank and contradictory questionnaires, 572 valid questionnaires were retained for empirical analysis, and the questionnaire recovery rate was 95.33%. Among them, 197 households were from Yulin, 189 were from Qingyang, and were are from Guyuan. Before the formal investigation, the research team also conducted a preliminary survey from Qingyang city to modify the questionnaire content accordingly.

3.3. Variable Selection

3.3.1. Outcome Variables

The dependent variable was the effect of soil erosion control, that is, the impact of soil erosion control technologies adopted by rural residents, and is a continuous variable. Soil erosion control technologies refers to the ecological restoration project that realizes soil erosion control and improves the technical efficiency of agricultural production through the implementation of engineering technology, biotechnology, and tillage technology. In terms of technical attributes, engineering technology, such as hillside protection, gully management, sand prevention and control, and the construction of reservoirs, are capital-intensive technologies; biotechnology, such as afforestation, grass, and sand prevention and fixation, are neutral technologies; tillage technology, such as furrow farming, sub-tillage, and no-tillage, are labor-intensive technologies. The effects of engineering technology, biotechnology, and tillage technology were obtained from subjective responses from residents, with values of "very bad = 1—very good = 5". Meanwhile, referring to the relevant studies of Huang et al. [36], the average values of three indicators are taken to measure the effect of soil erosion control.

3.3.2. Explanatory Variables

The core explanatory variable was rural residents' participation in the cultural tourism industry, a discrete binary variable with a value of 1 for participation in the cultural tourism industry and 0 for non-participation. In this paper, "whether family members work in cultural tourism enterprises" is used as the measurement index of their participation in the cultural tourism industry. According to the descriptive statistics in Table 1, there are 373 households whose family members work in the cultural tourism industry, accounting for 65.21% of the total sample, and about 199 households whose family members did not work in the cultural tourism industry, accounting for 34.79% of the total sample. Furthermore, the independent sample *t*-test results showed a significant difference in soil erosion control effect between the two groups (diff = 0.899 ***). The soil erosion control effect of residents participating in the cultural tourism industry was better than that of residents not participating in the cultural tourism industry.

Table 1. Descriptive statistics of residents' participation and non-participation in the cultural tourism industry.

Variables	Measurement	Total Sample	Participating Residents (A)	Participating Residents (B)	Mean Difference (A−B)
Soil erosion control effect	The mean value of each indicator	3.457	3.770	2.871	0.899 ***
Residents' participation in the cultural tourism industry	Whether family members work in cultural tourism enterprises (yes = 1; no = 0)	0.652	1	0	——
Gender	Gender of household head (male = 1; female = 0)	0.851	0.944	0.678	0.266 ***
Age	The actual age of the head of household (years)	54.652	53.845	56.166	−2.321 **
Educational level	Length of schooling (years)	6.336	6.745	5.568	1.177 ***
Family income	Total household income (ten thousand CNY)	3.651	3.675	3.605	0.070
Family labors	The number of laborers (people)	3.509	3.646	3.251	0.395 **
Cooperative participation	Whether residents participate in the cooperative (participation = 1; non-participation = 0)	0.434	0.520	0.271	0.249 ***
Collective action	Whether residents participate in rural collective public affairs? (participation =1; non-participation = 0)	0.624	0.786	0.322	0.464 ***
Peer effect	Are you affected by other residents' adoption of soil erosion control technologies? (very weak = 1—very strong =5)	2.231	2.332	2.040	0.292 ***
Relationship network	What is the number of contacts on your mobile phone? (people)	59.439	71.225	37.347	33.878 ***
Government subsidies	Have you received any ecological compensation from the government? (yes = 1; no = 0)	0.577	0.769	0.427	0.342 ***
Government publicity	Has the government conducted any promotion and publicity activities on soil erosion control technologies? (yes = 1; no = 0)	0.650	0.651	0.437	0.214 ***
Technical guidance	Have you received government technical training? (yes = 1; no = 0)	0.278	0.332	0.176	0.156 ***

Note: The significance level at 1% and 5% are represented by asterisk *** and **, respectively; Source: field survey (2021).

3.3.3. Control Variables

To avoid interference to the empirical results caused by other factors that may affect residents' participation in the cultural tourism industry and the effect of soil erosion control, this paper refers to Huang et al.'s study [37]. The household's gender, age, and education level were selected to represent the individual characteristics of residents. The family income and the number of laborers was chosen to represent the household characteristics. Cooperative participation, collective action, peer effect, and relationship network represent the characteristics of residents' organizations and society. Government subsidies, publicity, and technical guidance were set as policy conditions. The selected control variables cover as many factors as possible that affect whether residents participate in the cultural tourism industry and strive to avoid the bias caused by missing variables in the empirical estimation. Assignment and descriptive statistics of the above variables are shown in Table 1.

3.4. Empirical Estimation

3.4.1. Propensity Scores Matching (PSM) Method

The PSM method is employed to explore the impact of residents' participation in the cultural tourism industry on the soil erosion control effect. The main reasons are as follows: on the one hand, residents' involvement in the cultural tourism industry is influenced by their endowments and family characteristics, which is not random, but a "self-selection" behavior, and sample self-selection may lead to deviation of estimation results. The PSM method can solve the issue of sample "self-selection" [38]. On the other hand, control variables may not only affect the participation of rural residents in the cultural tourism industry, but also affect the effect of soil erosion control, so there is an endogenous problem. The PSM method can overcome the endogeneity issue [39]. For example, Salam and Sarker [40] used the PSM method and found that adopting a hybrid variety significantly impacted rice yield and technical efficiency. Xu et al. [41] employed the PSM method and confirmed that the ecological public welfare positions policy significantly increased farmers' wage level, planting income in Jiangxi Province, and husbandry income in Hubei Province after the elimination of selectivity bias. Xu et al. [42] used the PSM method and found that the experience of the COVID-19 pandemic will promote the recovery of farmers after the outbreak.

Under the control of the same external conditions, the experimental group (participating residents) and the control group (non-participating residents) were matched to explore the net effect of residents' participation in the cultural tourism industry on the soil erosion control effect. The research steps were as follows:

Firstly, the Logit model was used to estimate the conditional probability fitting value of residents' participation in the cultural tourism industry:

$$PS_m = Pr[L_m = 1|X_m] = Pr[L_m = 0|X_m] \quad (1)$$

where $L_m = 1$ represents the residents participating in the cultural tourism industry. $L_m = 0$ represents the residents who do not participate in the cultural tourism industry. m represents the m-th resident. X_m defines control variables such as residents' characteristics, family characteristics, organization and social characteristics, and policy conditions.

Secondly, the difference in soil erosion control effect between the experimental group and the control group, namely the average treatment effect (ATT), was calculated to obtain the net impact of residents' participation in the cultural tourism industry on the soil erosion control effect:

$$ATT = E(D_{1m}|L_m = 1) - E(D_{0m}|L_m = 1) = E(D_{1m} - D_{0m}|L_m = 1) \quad (2)$$

where, D_{1m} represents the soil erosion control effect of residents' participation in the cultural tourism industry, and D_{0m} represents the soil erosion control effect if the residents did not participate in the cultural tourism industry. $E(D_{1m}|L_m = 1)$ can be observed directly, but $E(D_{0m}|L_m = 1)$ cannot be observed directly, so the PSM is used to structure substitution variables.

Thirdly, this paper matches the experimental group with the control group. To verify the robustness of matching results, nearest neighbor matching, radius matching, and kernel matching methods were selected to estimate the impact of residents' participation in the cultural tourism industry on the soil erosion control effect.

Finally, the accuracy of the model estimation results was verified by the standard support domain test and the balance test.

3.4.2. The Mediating Effect Model

This study further employed mediation analysis to examine the mechanism of residents' participation in the cultural tourism industry on the effect of soil erosion control. The mediating variables were the increase in non-agricultural income, optimal allocation of labor, and enhancement of environmental protection awareness, which are measured by

the proportion of non-agricultural income, the number of non-agricultural laborers, and the level of ecological protection awareness (very weak = 1–very good = 5), respectively. Additionally, referring to the mediating effect proposed by Wen and Ye [43], this paper adopts the stepwise hierarchical regression method to establish regression models of independent variables versus dependent variable, independent variables versus mediating variables, and independent and mediating variables versus dependent variable. The specific testing process is shown as follows:

$$Y_i = cX + e_1,\ M_1 = a_1X + e_2,\ M_2 = a_2X + e_3,\ M_3 = a_3X + e_4,\ Y_i = c'X + bM_1 + e_5,\ Y_i = c'X + bM_2 + e_6,\ Y_i = c'X + bM_3 + e_7 \quad (3)$$

where X represents residents' participation in the cultural tourism industry; Y_i represents the effect of soil erosion control; M_1, M_2, M_3 represent the proportion of non-agricultural income, the number of non-agricultural labors, and the level of ecological protection awareness, respectively. a_1, a_2, a_3, b, c, c' are the regression coefficient, and e_1, e_2, e_3, e_4, e_5, e_6, e_7 are the random error terms.

4. Results

4.1. Descriptive Statistics

According to the descriptive statistical analysis of variables in Table 1, when other economic and social characteristics are not controlled, the difference in soil erosion control effect between residents participating in the cultural tourism industry and those not participating is positively significant at the 1% statistical level. Meanwhile, the results of the parameter *t*-test also show that the residents participating in the cultural tourism industry are mainly male household heads with younger ages, better education levels, more family laborers, more active participation in cooperative organizations and rural collective public affairs, and more mobile phone contacts. Moreover, these residents have received government subsidies and training in soil erosion control technologies more frequently. Additionally, residents involved in cultural tourism industries are more susceptible to other residents adopting soil erosion control technologies.

4.2. Influencing Factors of Residents' Participation in the Cultural Tourism Industry and Its Influence on the Effect of Soil Erosion Control

This paper uses a Logit model to estimate the propensity scores of residents participating in the cultural tourism industry. The estimated results in Table 2 show that: (1) individual characteristics, such as gender and education level of the household head, are positively and significantly associated with decision-making regarding participation in the cultural tourism industry at a 5% significance level. If the household head is male, the effect of soil erosion control will increase by 0.291; if the length of schooling increases by one year, the effect of soil erosion control will increase by 0.010. However, age negatively and significantly influences residents' decision-making at the statistical level of 5%. If the age increases by one year, the effect of soil erosion control will decrease by 0.003. (2) The family characteristics reveal that family labors exert a positive and significant influence on residents' participation in the cultural tourism industry at a 1% significance level. If the number of family labors increases by one person, the effect of soil erosion control will increase by 0.028. (3) The organizational and social characteristics reveal that cooperative participation and peer effect positively impact residents' decision-making at the 5% statistical level. If residents join the cooperative, the effect of soil erosion control will increase by 0.076; if the peer effect increases by 1 unit, the soil erosion control effect will increase by 0.030. Relationship networks were also found to positively and significantly impact the residents' participation at the 10% statistical level. If the number of mobile phone contacts increases by one, the soil erosion control effect will increase by 0.001. (4) The policy conditions, such as government subsidies and technical guidance, have a positive and significant impact in influencing residents' participation in the cultural tourism industry at the statistical level of 1%. If residents receive government subsidies, the soil erosion control effect will increase by 0.208; if residents receive technical guidance, the soil erosion control effect will increase by 0.152. Government publicity also showed a positive and significant

impact on residents' participation in the cultural tourism industry at the statistical level of 5%. If the government promotes and publicizes the soil erosion control technologies, the soil erosion control effect will increase by 0.066.

Table 2. Analysis results of Logit model of residents' participation in the cultural tourism industry and its influence.

Variables	Decision-Making of Participating in the Cultural Tourism Industry (Coefficient)	Influence on the Control Effect of Soil Erosion (Marginal Effect)
Gender	2.295 *** (0.360)	0.291 *** (0.040)
Age	−0.025 ** (0.011)	−0.003 ** (0.001)
Educational level	0.075 ** (0.034)	0.010 ** (0.004)
Family income	−0.014 (0.025)	−0.002 (0.003)
Family labors	0.223 *** (0.082)	0.028 *** (0.010)
Cooperative participation	0.600 ** (0.249)	0.076 ** (0.031)
Collective action	0.714 (0.542)	0.217 (0.172)
Peer effect	0.236 ** (0.107)	0.030 ** (0.013)
Relationship network	0.004 * (0.002)	0.001 * (0.000)
Government subsidies	1.641 *** (0.248)	0.208 *** (0.027)
Government publicity	0.518 ** (0.241)	0.066 ** (0.030)
Technical guidance	1.198 *** (0.303)	0.152 *** (0.037)

Note: The significance level at 1%, 5%, and 10% are represented by asterisk ***, **, and *, respectively; the robust standard error is in parentheses.

4.3. The Net Effect of Residents' Participation in the Cultural Tourism Industry on the Effect of Soil Erosion Control

Table 3 shows the influence of residents' participation in the cultural tourism industry on the soil erosion control effect based on three matching methods. It can be found that the results of the three matching methods are relatively close, and the *ATT* (average treatment effect) values are significant at the 1% level. According to the estimated results of the experimental group and the control group, if the residents participating in the cultural tourism industry do not participate, the soil erosion control effect will decrease to 2.715–2.844. Suppose residents who do not enter the cultural tourism industry choose to participate. In that case, the soil erosion control effect will increase to 3.773, significantly increasing by 0.929–1.058 compared with those who do not participate. Therefore, the empirical results of the PSM method show that residents' participation in the cultural tourism industry has a positive promoting role in the soil erosion control effect, and hypothesis H1 is verified.

Table 3. The net effect of residents' participation in the cultural tourism industry influencing soil erosion control effect.

Variables	Matching Method	Treatment Group	Control Group	*ATT*	Standard Error
Soil erosion control effect	Before matching	3.770	2.871	0.899 ***	0.049
	K-nearest neighbor matching (K = 1)	3.773	2.715	1.058 ***	0.113
	Radius matching (R = 0.01)	3.773	2.731	1.042 ***	0.130
	Kernel matching	3.773	2.844	0.929 ***	0.109
	Post-match mean			1.010	

Note: The significance levels at 1% is represented by asterisks ***.

4.4. Heterogeneity Analysis of Influence of Residents' Participation in the Cultural Tourism Industry on Soil Erosion Control Effect

The economic structure and social relations of rural residents have substantial heterogeneity. Therefore, this study further takes the characteristics of residents' endowments and the technical effects of soil erosion control as classification criteria to explore the heterogeneity of the impact of residents' participation in the cultural tourism industry on the soil erosion control effect. In terms of endowment characteristics, age was divided into groups above and below the mean value; collective action and government subsidies are both discrete binary variables and were split into participation group and non-participation group, as well as subsidy-receiving group and non-receiving group. In terms of the technical effects of soil erosion control, this paper divides the different technologies into the above-mean group and below-mean group.

The results in Table 4 show that the soil erosion control effect of younger residents participating in collective action and receiving government subsidies is better than the older residents who do not participate in collective action and receive government subsidies. The possible reasons are as follows: the younger the rural residents are, the more robust human capital is, the more active they are in participating in collective actions, and they can take full advantage of information, technology, organization, and capital to reduce the cost of acquiring and adopting soil erosion control technologies and enhance the effect of soil erosion governance. Additionally, government subsidies can reduce the risk and expense of technology adoption, improve the ability of total transfer payment, and significantly improve rural residents' family welfare.

Further, the results in Table 5 indicate that if residents who participate in the cultural tourism industry adopt engineering technology, biotechnology, and tillage technology, the governance effects will be higher than for those who do not participate. Residents' participation in the cultural tourism industry has the most substantial promoting effect on engineering technology, followed by biotechnology and tillage technology. The possible reasons are as follows: engineering technology is a capital-intensive technology, and non-agricultural income plays the role of income source and expenditure guarantee in hillside protection, gully treatment, sand prevention and control, reservoir construction, etc., and the control effect of soil erosion is relatively apparent. As a neutral technology, biotechnology faces the double constraints of capital and manpower in afforestation and grass planting, and its construction period is extended. Hence, its soil erosion control effect is weaker than that of engineering technology. Tillage technology is labor-intensive, mainly relying on furrow farming, deep tillage, and no-tillage to reduce soil erosion. However, due to the constraints of terrain and slope, its application scope is limited, and the effect of soil erosion control is weaker than engineering technology and biotechnology.

Table 4. Estimates based on endowment heterogeneity.

Variables	Classification	Treatment Group	Control Group	*ATT*
Age	Above average	3.753	2.922	0.831 *** (0.191)
	Below average	3.794	2.952	0.842 *** (0.205)
Collective action	Participation	3.787	2.809	0.978 *** (0.117)
	Non-participation	3.708	2.788	0.921 *** (0.194)
Government subsidies	Receiving subsidies	3.777	2.857	0.920 *** (0.143)
	Not receiving subsidies	3.748	2.921	0.827 *** (0.248)

Note: The significance level at 1% is represented by asterisks ***; the robust standard error is in parentheses.

Table 5. Estimates based on technology heterogeneity.

Variables	Classification	Treatment Group	Control Group	*ATT*
Engineering technology effect	Above average	3.895	2.703	1.192 *** (0.313)
	Below average	3.740	2.815	0.924 *** (0.177)
Biotechnology effect	Above average	3.720	2.878	0.842 *** (0.149)
	Below average	3.621	2.859	0.762 ** (0.292)
Tillage technology effect	Above average	3.791	2.966	0.825 *** (0.190)
	Below average	3.345	2.733	0.612 *** (0.173)

Note: The significance level at 1% and 5% are represented by asterisks *** and **, respectively; the robust standard error is in parentheses.

4.5. Mechanism Analysis

The mechanism by which residents' involvement in the cultural tourism industry can affect the soil erosion control effect is still unexplored. To explore this phenomenon, and based on the theoretical analysis, this paper empirically tested the mediating effects of increase in non-agricultural income, optimal allocation of labor, and enhancement of environmental protection awareness (mediating variables) regarding the influence of rural residents' participation in the cultural tourism industry (independent variable) on soil erosion control effect (dependent variable). Theoretically, if the mediating variables play mediating effects, it indicates that the mechanism exists objectively. Specific test results are as follows:

4.5.1. Examine the Mechanism of Non-Agricultural Income Increase

Table 6 (1)–(3) shows that residents' participation in the cultural tourism industry and increase in non-agricultural income positively affect the soil erosion control effect, indicating that the partial mediating effect of increase in non-agricultural income on residents' participation in the cultural tourism industry affecting soil erosion control is 0.125. The proportion of the mediating effect in the total effect was 0.144, which shows that 14.4% of the promoting effect of residents' participation in the cultural tourism industry on soil erosion control effect is found through the mediating variable "increase in non-agricultural income", that is, residents' involvement in the cultural tourism industry can give full play to the impact of non-agricultural income increase and promote the effect of soil erosion control. Hence, hypothesis H2 is also verified.

Table 6. Results of mechanism analysis.

Variables	Non-Agriculture Income Increase Mechanism			Optimal Allocation of Labors Mechanism			The Environmental Awareness Enhancement Mechanism		
	Participation in the Cultural Tourism Industry	Non-Agricultural Income Increase	Soil Erosion Control Effect	Participation in the Cultural Tourism Industry	Labors Optimal Allocation	Soil Erosion Control Effect	Participation in the Cultural Tourism Industry	Environmental Awareness Enhance-ment	Soil Erosion Control Effect
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Participation in the cultural tourism industry	0.868 *** (0.063)	0.208 *** (0.049)	0.867 *** (0.064)	0.868 *** (0.063)	0.528 *** (0.130)	0.836 *** (0.063)	0.868 *** (0.063)	1.469 *** (0.115)	0.690 *** (0.070)
Non-agricultural income increase			0.603 *** (0.001)						
Optimal allocation of labor						0.361 *** (0.020)			
Environmental awareness enhancement									0.121 *** (0.023)
Control variables	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Constant term	2.635 ***	0.133 ***	2.635 ***	2.635 ***	0.476 ***	2.606 ***	2.635 ***	2.090 ***	2.382 ***
R^2	0.404	0.163	0.404	0.404	0.465	0.414	0.404	0.346	0.433
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mediating effect		0.125			0.191			0.178	
Mediating effect/total effect		0.144			0.220			0.205	

Note: The significance level at 1% is represented by asterisks ***; the robust standard error is in parentheses.

4.5.2. Examine the Mechanism of Optimal Allocation of Labors

As can be seen from Table 6 (4)–(6), residents' participation in the cultural tourism industry and optimal allocation of labor both positively affect the soil erosion control effect, indicating that the partial mediating effect of optimal allocation of labor on residents' participation of the cultural tourism industry influencing soil erosion control was 0.191, and the proportion of the mediating effect in the total effect was 0.220. This indicates that 22.0% of the promotion effect of residents' participation in the cultural tourism industry on soil erosion control effect is obtained through the mediating variable "optimal allocation of labor". The cultural tourism industry can reduce the number of agricultural laborers, reduce the cultivation intensity of the Loess Plateau, and improve the soil erosion control effect. Thus, hypothesis H3 is confirmed.

4.5.3. Examine the Mechanism of Enhancement of Environmental Awareness

According to Table 6 (7)–(9), residents' participation in the cultural tourism industry and the enhancement of environmental protection awareness both positively influence soil erosion control effect, indicating that the partial mediating effect of the enhancement of environmental awareness in residents' participation of the cultural tourism industry influencing the soil erosion control effect is 0.178. The proportion of the mediating effect in the total effect is 0.205. This indicates that 20.5% of the incentive effect of residents' participation in the cultural tourism industry on soil erosion control effect is through the mediating variable "enhancement of environmental protection awareness". Residents' participation in the cultural tourism industry can drive them to pay attention to soil and water loss, stimulate their enthusiasm and initiative to participate in ecological governance, and ultimately improve the effectiveness of soil erosion control. Therefore, hypothesis H4 is verified.

5. Discussion

5.1. Innovation in Theory and Practice

How to achieve industrial development without harnessing the environmental degradation is an urgent issue that needs to be solved generally and particularly in ecologically fragile areas of developing countries [8,44]. Theoretically, the core goal of industrial ecology is to promote the development of green industries and strengthen ecological construction to achieve incentive compatibility [45,46]. The cultural tourism industry has become one of the industries with the most significant development potential in China, and it plays multiple roles in promoting economic development, optimizing industrial structure, improving residents' welfare, and protecting the ecological environment. Therefore, the vigorous development of the cultural tourism industry can bring new opportunities to control soil erosion in ecologically fragile areas. In addition, under the government's strategy of ecological governance and high-quality development in the Yellow River Basin, industrial development should implement the concept of environmental priority and green development so that the cultural tourism industry and ecological civilization are mutually complementary. Specifically, on the one hand, soil erosion control can provide an excellent ecological environment for the development of the cultural tourism industry. Through watershed governance and environmental restoration, the interests of environmental protection and tourism development can be compatible. While creating ecological dividends, cultural and tourism resources can be revitalized to promote the sustainable development of the regional cultural tourism industry [47]. On the other hand, the cultural tourism industry can bring non-agricultural employment and income to local rural residents, stimulate the residents' initiative to participate in ecological restoration and afforestation, transform the ecological landscape into material wealth, form a virtuous circle of soil erosion control, and finally realize the unity of economic, social, and ecological benefits [48].

Consistent with previous studies such as Pan [47], residents' participation in the cultural tourism industry can positively affect their ecological behavior. This study contributes to the literature by providing a theoretical exploration and a beneficial attempt based on the micro-survey data at the empirical level. Theoretically, this paper analyzes the influence mechanism of residents' participation in the cultural tourism industry on the improvement in the effect of soil erosion control in ecologically fragile areas, which enriches the theoretical connotation of agricultural economics and industrial ecology. In practice, through microscopic survey data and empirical models, the causal relationship and transmission mechanism between residents' participation in the cultural tourism industry and soil erosion control effect were tested, and realistic evidence was obtained that residents' involvement in the cultural tourism industry can enhance the soil erosion control effect.

5.2. Analysis of the Influencing Factors of Residents' Participation in the Cultural Tourism Industry

Against the background of rural revitalization and poverty alleviation, participation in the cultural tourism industry is the primary method of non-agricultural employment for rural residents in the Shaanxi–Gansu–Ningxia border region. Consistent with Jia and Lu [48]'s study, our study confirms the dominant role of male heads of households in household livelihood decisions and off-farm employment. Male laborers go out for work while female laborers stay at home to take care of the elderly and children, which has become a typical social pattern in rural areas of developing countries [49,50]. Unlike Si et al. [51]'s study, our study did not confirm the inverted U-shaped relationship between age and residents engaging in non-farm employment, such as cultural tourism industries. The sample's average age of rural residents is nearly 55 years old, and the data present right-skewed distribution characteristics. Meanwhile, the demographic dividend diminishes with age, which is the main reason for the linear negative influence [52,53]. Consistent with many other studies, such as Danso-Abbeam et al. [44], Li et al. [54], and Zhao et al. [55], our study confirms the role of educational level in promoting rural human capital accumulation, household off-farm employment, and family income increase. Rural labors are the most crucial capital endowment of rural households, and the optimal allocation of labor is an essential

measure to increase non-agricultural household income [56,57]. Moreover, consistent with Liu et al.'s [58] study, our study confirms the vital role of cooperative participation in non-agricultural employment in cultural tourism industries. Cultural tourism enterprises in the sample area are mainly run in a cooperative organization mode. If rural residents join cooperatives, they will inevitably accept the employment information, skills, market services, supervision, and management provided by cooperatives and guide residents to actively integrate into the cultural tourism industry chain. Consistent with many studies, such as Gu [59] and Zhang et al. [60], our study found that the peer effect has become an essential incentive for rural residents' non-agricultural transfer. Household production decision-making has a strong tendency to follow the trend under the action of information asymmetry, risk avoidance, and bounded rationality. If other residents are involved in the cultural tourism industry, they will also choose to participate. As an essential component of social capital, relationship networks also play a crucial role in obtaining employment opportunities, improving information constraints, and reducing transaction costs [61–63]. The higher the degree of the relationship network, the stronger and more profound the enthusiasm and initiative of rural residents to participate in the cultural tourism industry. Consistent with Huang et al. [64], Tanti et al. [65], and Mgendi [66]'s studies, our study also confirmed the external environment strengthening role of government support measures such as government subsidies, promotion, and technical guidance in rural residents' production behavior.

5.3. Response to the Debate on the Relationship between the Culture Tourism Industry and Soil Erosion Control Effect

Previous studies have also discussed the relationship between the cultural tourism industry and soil erosion control effect. On the one hand, some scholars believe that the development of the cultural tourism industry can protect the ecological environment and promote economic growth [67,68]. However, the development of cultural tourism is a double-edged sword for the ecological environment. On the other hand, other scholars argue that cultural tourism speeds up energy consumption, natural resource exploitation, and solid waste pollution, which worsens the ecological environment [69]. It is worth noting that the development of cultural tourism causes pressure on the ecological environment, and the improvement in the ecological environment is a crucial guarantee for the development of the cultural tourism industry [70]. The conclusion of this study confirms that residents' participation in the cultural tourism industry has a positive and significant impact on soil erosion control effect. This can be further explained with relevant economic theories: firstly, residents' participation in the cultural tourism industry can increase non-agricultural income, enhance residents' ability to adopt soil loss control technologies, and ease household productive investment constraints. While residents integrate into the marketing of cultural tourism products, natural resources and cultural landscape are protected effectively, and the effect of soil erosion control is enhanced [71,72]. Secondly, residents' participation in the cultural tourism industry can promote the transfer of surplus rural labor to cities, provide employment opportunities for residents, reduce farmland tillage intensity, alleviate rural ecological pressure, improve ecological carrying capacity, and finally reduce soil and water loss [73]. Thirdly, residents' participation in the cultural tourism industry has a positive external effect. The cultural tourism industry is a green and potential industry. Additionally, rural residents' participation in the cultural tourism industry plays a role in educating and guiding the rural residents, strengthening public responsibility, strengthening residents' ecological protection awareness, enhancing the effect of soil and water loss control in ecologically fragile areas [74], and realizing the symbiosis and co-prosperity of the cultural tourism industry and the ecological environment.

5.4. Limitations

Of course, there are still some shortcomings in this paper. First, due to data acquisition limitations, this paper only measures the control effect of soil erosion from a subjective

questionnaire, and the selection of objective indicators was insufficient. Second, cost–benefit measurement remains the essential factor in smallholder decision-making. The lack of data regarding the cost of adopting soil erosion control measures or technologies by rural residents may affect the bias of the model estimates. Third, the attributes of engineering technology, biotechnology, and tillage technology are heterogeneous, and the impact of capital-intensive and labor-intensive technologies on residents' production factor allocation decisions is different. However, due to the difficulty of data collection, this paper does not consider the influencing factors of residents adopting different technologies separately.

5.5. Policy Implications

This paper has practical policy implications, aiming to promote the sustainable development of cultural tourism industries, improve the effect of soil erosion control in ecologically fragile areas, help residents get out of poverty, and improve rural family welfare. Sustainable planning should be developed to ensure the desired outcomes in developing economies [75,76]. Firstly, the government should enhance residents' awareness of environmental protection, strengthen the publicity concerning the hazards of soil erosion, and make them fully aware of the vital role of adopting soil erosion control technologies in improving the ecological environment, improving land fertility, and improving the output and quality of agricultural products. Secondly, the government should support the development of cultural tourism enterprises through fiscal and tax policies and enhance the market competitiveness of their products. Meanwhile, the government should encourage and guide local cultural tourism enterprises to expand employment opportunities and increase rural laborers' non-agricultural employment absorption capacity. Thirdly, the government should also strengthen the employment skills training of rural laborers, improve residents' cultural literacy, and encourage the orderly transfer of surplus rural labor to urban non-agricultural industries. Finally, the government should strengthen the technical guidance of soil erosion control for residents and encourage residents to adopt soil erosion control technology. Through regulating runoff, reducing hydraulic erosion, planting trees and grass to improve soil, increasing surface coverage, conserving water sources, and implementing conservation tillage technology, the soil erosion control effect will be significantly improved. These policy ideas can also be popularized and referred to when controlling soil erosion in other ecologically fragile countries and areas.

6. Conclusions

Soil erosion is an important cause of deep poverty in ecologically fragile areas. It is also a bottleneck factor for promoting rural revitalization in the Shaanxi–Gansu–Ningxia border region of China. Realizing the compatibility between industrial development and ecological protection is also a vital issue that developing countries have faced. Apart from the reverse causality between agricultural production and soil erosion, we focus on developing the rural cultural tourism industry to provide innovative ideas to solve their contradiction. This paper uses the PSM method and the mediating effect model to empirically analyze the influence and mechanism of residents' participation in the cultural tourism industry on the soil erosion control effect. The main conclusions are as follows:

Firstly, 65.21% of rural residents in the sample area have participated in the cultural tourism industry. Gender, education level, family laborers, cooperative participation, collective action, peer effect, relationship network, government subsidies, government publicity, and technical guidance are the main driving factors of residents' involvement in the cultural tourism industry. Secondly, residents' participation in the cultural tourism industry positively influences the soil erosion control effect. If the residents participating in the cultural tourism industry did not participate, the soil erosion control effect would decrease to 2.715–2.844. If residents who do not enter the cultural tourism industry chose to participate, the soil erosion control effect would significantly increase by 0.929–1.058. Thirdly, considering the heterogeneity of residents' endowments, if younger rural residents participate in collective actions and receive government subsidies, participation in the

cultural tourism industry will produce a better soil erosion control effect. Because of the differences in the technical attributes of soil erosion control, the effect of water erosion control is also heterogeneous (engineering technology > biotechnology > tillage technology). Finally, the mechanism analysis results show that residents' participation in the cultural tourism industry mainly affects the effect of soil erosion control through the increase in non-agricultural income, optimal allocation of labor, and enhancement of environmental protection awareness and the proportion of the mediating effect in the total effect was 0.144, 0.220, and 0.205, respectively.

In future studies, the research team will continue to obtain necessary questionnaire data, fully consider the attributes of soil erosion control technologies, and further quantify the contribution of rural residents' participation in cultural tourism industry on different technological effects, which can provide useful experience for global soil erosion control.

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