

**Local People's View of Non-Benefiting from Murat River Projects: Examples of Bingöl, Elazığ and Muş Basins**

Murat Nehri Rehabilitasyon Projelerinden Faydalanmayan Yöre Halkının Görüşleri (Bingöl, Elâzığ ve Muş Mikro Havzaları Örneği)


Ersin KARAKAYA<sup>1\*</sup>, Semra ÇAMUKA<sup>2</sup>, Ahmet USLU<sup>3</sup>, Alaaddin YÜKSEL<sup>4</sup>, Şenol ÇELİK<sup>5</sup>,  
Bayram HOPUR<sup>6</sup>, Mehmet Emin YAŞAR<sup>7</sup>, Alperen MERAL<sup>8</sup>


**Abstract**

In Bingöl, Elazığ, and Muş, micro-basin projects have been implemented, but not all local residents have benefited from these initiatives. This study aimed to understand the views and experiences of those locals who did not benefit from the projects, assessing the potential impact on productivity and income. The study was conducted in the provinces of Bingöl, Elazığ, and Muş. Data was gathered between 16-25 August 2021. The primary sources of information were interviews with 168 non-beneficiaries, complemented by focus group discussions and key informant interviews. Findings showed that 75% of participants linked increased productivity to the projects, and all acknowledged an enlarged production area due to project activities. There was no significant difference in production area or income from agricultural sales based on gender or the presence of cash income. However, cash income holders reported higher earnings from both agriculture and livestock. Provincial disparities in income emerged: residents of Bingöl had 2.439 times the income of those in Muş, while Elazığ inhabitants earned 0.882 times less. Men's income surpassed women's by 1.209 times, and those with a history of cash income earned 4.037 times more than those without. Interestingly, owning land or cultivating high-value crops was associated with lesser income. Measures to counteract drought could enhance production areas and, consequently, local incomes. A significant barrier identified was the 20% contribution requirement, preventing some locals from project participation. Recommendations include adjusting project criteria to increase local engagement and benefits. The original value of this article is to reveal the impact of micro catchment projects implemented in Turkey.


**Keywords:** Bingöl, Elâzığ, Muş, Non-beneficiary local people, Project, Logistic regression analysis


<sup>1\*</sup>**Sorumlu Yazar/Corresponding Author:** Ersin Karakaya, Bingöl University, Faculty of Agriculture, Bingöl, Türkiye. E-mail: [karakayaersin@hotmail.com](mailto:karakayaersin@hotmail.com)  
 OrcID: [0000-0002-6734-4962](https://orcid.org/0000-0002-6734-4962)


<sup>2</sup>Semra Çamuka, Bingöl University, International Relations Office, Bingöl, Türkiye. E-mail: [scamuka@bingol.edu.tr](mailto:scamuka@bingol.edu.tr)  OrcID: [0000-0002-4966-9296](https://orcid.org/0000-0002-4966-9296)


<sup>3</sup>Ahmet Uslu, Bingöl Vocational School of Social Sciences Services and Secretariat Office, Bingöl, Türkiye. E-mail: [ahmetuslu@bingol.edu.tr](mailto:ahmetuslu@bingol.edu.tr)  OrcID: [0000-0003-0273-0069](https://orcid.org/0000-0003-0273-0069)

<sup>4</sup>Alaaddin Yüksel, Bingöl University, Faculty of Agriculture, Department of Soil Science and Plant Nutrition, Bingöl, Türkiye. E-mail: [ayuksel@bingol.edu.tr](mailto:ayuksel@bingol.edu.tr)  
 OrcID: [0000-0003-4760-1092](https://orcid.org/0000-0003-4760-1092)

<sup>5</sup>Şenol Çelik, Bingöl University, Faculty of Agriculture, Bingöl, Türkiye. E-mail: [senolcelik@bingol.edu.tr](mailto:senolcelik@bingol.edu.tr)  OrcID: [0000-0001-5894-8986](https://orcid.org/0000-0001-5894-8986)

<sup>6</sup>Bayram Hopur, General Directorate of Combating Desertification and Erosion, Ankara, Türkiye. E-mail: [bayramhopur@gmail.com](mailto:bayramhopur@gmail.com)  OrcID: [0000-0002-7443-8051](https://orcid.org/0000-0002-7443-8051)

<sup>7</sup>Mehmet Emin Yaşar, Bingöl University, Solhan Vocational School of Health Services/Medical Services and Techniques, Bingöl, Türkiye. E-mail: [meyasar@bingol.edu.tr](mailto:meyasar@bingol.edu.tr)  OrcID: [0000-0001-8137-2946](https://orcid.org/0000-0001-8137-2946)

<sup>8</sup>Alperen Meral, Bingöl University, Faculty of Agriculture, Department of Construction and Technical Affairs/Landscape Architecture, Bingöl, Türkiye. E-mail: [alperenmeral@bingol.edu.tr](mailto:alperenmeral@bingol.edu.tr)  OrcID: [0000-0001-6714-7187](https://orcid.org/0000-0001-6714-7187)

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## Öz

Bu araştırma; Bingöl, Elâzığ ve Muş illerinde yer alan mikro havzalarda uygulanan projelerden faydalanmayan yöre halkının görüşlerinin belirlenmesi amacıyla yapılmıştır. Araştırmada; 16-25 Ağustos 2021 tarihleri arasında seçilen köylerde projeden faydalanmayan toplam 168 kişiyle yapılan anket çalışması, odak grup (OG) görüşmeleri ve kilit bilgilendirici (KB) görüşmeler birincil verileri oluşturmuştur. Araştırma sonuçlarına göre; Bireylerin %75'i verim artışının bir proje faaliyetiyle ilgili olduğunu ve bireylerin tamamı üretim alanında artışın bir proje faaliyeti ile ilgili olduğunu ifade etmiştir. Yapılan analizler sonucunda; cinsiyet ile ve nakit gelire sahip olma durumu bakımından üretim alanında istatistiki olarak önemli artış olmadığı sonucuna varılmıştır. Yapılan analiz sonucunda kişilerin cinsiyeti ve yaşadıkları iller itibarıyla tarımsal üretim ve hayvansal üretim satışlarından elde ettikleri gelirden istatistiki olarak önemli bir farklılık olmamıştır. Anket yapılan kişilerin nakit geliri olup olmamasına göre tarımsal üretim ve hayvansal üretim satışlarından elde ettikleri gelirden istatistiki olarak önemli farklılık olmuştur. Nakit gelire sahip olan yöre halkının nakit geliri olmayanlara göre tarımsal üretim ve hayvansal üretim satışlarından daha fazla gelir elde ettiği söylenebilir. Bingöl ilinde yaşayanların yüksek gelir elde etmesi, Muş iline oranla 2.439 kat daha yüksektir. Elâzığ ilinde yaşayanların ise yüksek gelir elde etmesi Muş iline nazaran 0.882 kat daha düşüktür. Erkeklerin elde edeceği gelir kadınlardan 1.209 kat daha fazladır. Önceden nakit geliri olanlar olmayanlara göre 4.037 kat daha fazla gelir sağlayacaklardır. Arazisi olanların olmayanlara göre 0.712 kat daha düşük ve yüksek değerli ürün yetiştirenlerin yetiştirmeyenlere oranla 0.422 kat daha düşük gelir kazanacağı sonuçlarına varılmıştır. Sonuç olarak; Kuraklıkla ilgili alınacak tedbirler üretim alanının artmasını sağlayacak ve üretim alanındaki artışla birlikte yöre halkının da geliri artacaktır. Projeden faydalanan bireylerden talep edilen %20'lik katkı payını karşılayamadığı için projeden faydalanamayan bireyler olduğu belirlenmiş bu konuda faydalanıcı olmak isteyen yöre halkına destek verilmelidir.

**Anahtar Kelimeler:** Bingöl, Elâzığ, Muş, Faydalanıcı olmayan yöre halkı, Proje, Lojistik regresyon analizi

## 1. Introduction

Watershed Rehabilitation (Improvement) projects are the projects prepared for the improvement of the land, agriculture, forest and pasture resources by watershed-based land modeling, and aim to develop the local people living in the watershed economically and thus to re-establish the corrupted natural balance (Gönenç, 2004; Anonymous, 2012; UHYS, 2015; Kuçukkaya, 2016). In other words, Watershed Integrated Rehabilitation Projects are carried out in order to manage natural resources such as forest, pasture, agriculture, water and soil at a watershed together with the local people of the region and to carry out improvement affairs. That is, Murat River Watershed Rehabilitation Projects (MRHRP); are carried out by OGM (General Directorate of Forestry), ÇEM (General Directorate of Combating Desertification and Erosion), IFAD (International Fund for Agricultural Development). When the MRWRP is examined, the most important reason for the support of this project by IFAD is the fact that it aims to improve water and soil resources of the individuals living in the upper micro-catchments with a sustainable and more intensive agriculture understanding, and in this way to increase the welfare level of the people of the watershed. Stopping the natural resource erosion at the micro-catchments in Elazığ, Bingöl and Muş provinces located in the Murat River precipitation watershed and reducing the poverty of the individuals living in the micro-catchments are among the most important objectives of the project. Thus, enabling improvement and diversification of income sources based on natural resources, supplying effective rehabilitation and sustainable management, ensuring development of human resources, setting a sample and assuring dissemination and investments in natural resources of the people living at the villages of the micro-catchments, and earning income from the maintenance and protection of those can be counted as the aims of the project (Yüksel and Eraslan, 2015; Bilinmiş, 2016; Baydaş et al., 2018; Danış, 2019).

As outsourced projects, Watershed Rehabilitation Projects have been applied in Turkey respectively broadly as follows: Eastern Anatolia Watershed Rehabilitation Project between 1991-2001, Anatolian Watershed Rehabilitation Project completed between 2005-2011, Çoruh River watershed Rehabilitation Project between 2012-2019 and Murat River Watershed Rehabilitation Project between 2012-2018 (Figure 1).



**Figure 1. Outsourced watershed rehabilitation projects implemented and being implemented in Turkey**

**Source: (Turkish Republic Ministry of Forestry and Water Affairs, 2016)**

Considering the large river watershed potential, it is planned to establish a monitoring system infrastructure in Turkey having 25 large river watersheds to ensure the effective use of natural resources and sustainable watershed management, and to monitor the data themes determined in coordination with the institutions operating at the watershed. It is aimed that the Watershed Monitoring and Evaluation System, which will be developed on a geographical basis, will reduce the cost of monitoring, take necessary measures by making fast and up-to-date monitoring, ensure the success of investments by effectively monitoring of the projects being carried out in the watershed, and provide significant gains in the balanced use and protection of natural resources. Interesting and important studies were found by using logistic regression analysis on the basis of agriculture and watershed (Neupane et al., 2002; Gobin et al., 2002; Tai-Yang et al., 2011; Mair and El-Kadi, 2013).

This research was conducted to determine the opinions of the local people who did not benefit from the projects implemented in the micro-basins of the provinces of Bingöl, Elazığ and Muş.

## 2. Materials and Methods

In the research; focus group (FG) interviews and key informative (KI) interviews conducted in selected villages between 16-25 August 2021 consisted the primary data of the survey. The surveys were conducted face-to-face with the heads of the households and interference and effect of them by others have been hindered. In addition, FG meetings and KI meetings were held with the headmen and notables of each village where the survey was conducted. In addition, secondary data (table, map, report, etc.) of micro-catchments were also utilised.

When the evaluation was made for 2021 in the research, although it was determined that the interest of those who did not attend the ask-and-solve meetings and who returned to the village due to the pandemic and other similar conditions was at a high level, it was difficult to reach the non-beneficiaries in almost all of the selected villages. The reason for this has been the fact that almost all of the households in the studied villages benefitting from the project activities, even if being small. Thus, the majority of household heads included in the project have been beneficiaries where project activities not started yet; however, the villagers being aware of the project activities and at the villages with crowded population. A total of 168 non-beneficiaries were surveyed.

The distribution of the answers given by the local people, who did not benefit from the project, to the questions was revealed by creating frequency tables for each question and drawing pie charts for some of them. In addition, "Non-Parametric Statistical Methods" were used to determine whether the opinions on some subjects differed according to gender, province of residence and cash income. For this purpose, Mann-Whitney U and Kruskal-Wallis tests were utilised. The correlations related to the factors affecting the poverty dimension of the local people participating in the survey were examined with the logistic regression model.

Logistic regression analysis (LRA), on the other hand, is an analysis that allows to establish a regression model without requiring assumptions such as normality, continuity, covariance and multivariate normality (Tabachnick and Fidell, 1996). LRA is an analysis in which the predictor variables can be continuous or discrete, continuous discrete predictor variables can coexist, and the predicted variable is discrete. If necessary, a continuous outcome variable can be transformed into a discrete variable in order to establish the LRA model (Tabachnick and Fidell, 1996). LRA shows similarities with some statistical analyses. Multiple linear regression analysis is an analysis similar to LRA in that its purpose is to establish a regression model, discriminant analysis is done with a discrete dependent variable, it is a kind of grouping analysis, cluster analysis is an analysis that divides data into groups. Multiple regression and discriminant analysis basically differ from logistic regression analysis by having assumptions, and cluster analysis differs by the number of groups and their membership not being known (Çokluk et al., 2010). LRA, which offers a more flexible structure compared to similar analyzes, is mathematically based on the logarithm of probability, odds and odds. Probability is simply the ratio of the number of outcomes of a particular type to the total possible outcomes. For example, the probability of rolling a 3 when a dice is rolled is 1/6. As there is only one '3' on the dice and there are six possible outcomes. This ratio can be expressed as 0.167 or 16.70%. In the LRA, odds is defined as the probability of an event occurring divided by the probability of that event not occurring. Odds has no upper limit, but its lower limit is 0. Odds removes the problem of probability estimation being within the range of 0-1, but there is still another problem to be solved, which is how to ensure that the odds ratio does not take a value below zero. This problem is solved by calculating the logit value. Logit is the natural logarithm of the odds ratio. By calculating the logit value, a metric variable that can always be reverted to a probability between 0-1 and can take positive and negative values is obtained (Cokluk et al., 2010; Mertler and Vannatta, 2005). In cases where the dependent variable is expressed on an ordinal scale, the Ordered Logistic Regression (OLR) model is often preferred due to its tendency to yield better results compared to linear and logistic regression models (Köksal, 2009; Şerbetçi and Özçomak, 2013; Özer and Özden, 2016; Terin, 2019; Ağır and Akbay, 2021).

For a response variable Y with two measurement levels (dichotomous) and explanatory variable X, let:

$$\pi(x) = p(Y = 1|X = x) = 1 - p(Y = 0|X = x) \quad (\text{E.q.1})$$

the logistic regression model has linear form for logit of this probability

$$\text{Logit} [\pi(x)] = \log \left( \frac{\pi(x)}{1-\pi(x)} \right) = \alpha + \beta x \quad (\text{Eq.2})$$

$$\text{odds} = \frac{\pi(x)}{1-\pi(x)} \quad (\text{Eq.3})$$

$$\text{odds} = \exp (\alpha + \beta x) \quad (\text{Eq.4}).$$

and the logarithm of the odds is called logit so,

$$\text{Logit} [\pi(x)] = \log \left( \frac{\pi(x)}{1-\pi(x)} \right) = \log[\exp (\alpha + \beta x)] = \alpha + \beta x \quad (\text{Eq.5}).$$

The logit has linear approximation relationship, and logit = logarithm of the odds. The sign of  $\beta$  indicates whether curve ascends ( $\beta > 0$ ) or descends ( $\beta < 0$ ), and the rate of change increases as  $|\beta|$  increases (El-Habil, 2012).

Multiple logistic regressions can be extending to models with multiple independent variables. Let  $k$  represents number of predictors for a binary response  $Y$  by

$x_1, x_2, \dots, x_k$ , the model for log odds is

$$\text{Logit} [P(Y = 1)] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k \quad (\text{Eq.6}).$$

and the alternative formula, straightly specifying  $\pi(x)$ , is

$$\pi(x) = \frac{\exp (\alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k)}{1 + \exp (\alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k)} \quad (\text{Eq.7}).$$

The parameter  $\beta_i$  refers to the effect of  $x_i$  on the odds that  $Y=1$ , controlling other  $x_j$ , to illustrate  $\exp (\beta_i)$  is the multiplicative effect on the odds of a oneunit increase in  $x_i$ , at fixed levels of other  $x_j$  (Chatterjee and Hadi, 2006). A decision was taken in terms of research ethics from T.R. Bingöl University Rectorate Social and Human Sciences Scientific Research and Publication Ethics Board with number 33117789/044/83126 for the study.

### 3. Results and Discussion

#### 3.1. Living Conditions

It was determined that 62 people who participated in the survey live in Bingöl, 28 people live in Muş and 78 people live in Elazığ. Men make up 82.1% of the responders, while women make up 17.9%. 35.14% of those surveyed said they did not have any sources of monetary income, compared to 64.9% who said they had. According to the MRWRP (2018) research, 81.5% of people had a source of cash income, compared to 18.5% who did not. In the MRWRP (2019) survey, 67.2% of the non-beneficiaries had a source of cash income, while the remaining 37.3% did not. The percentage of people who have a source of cash income was 67.2% in the MRWRP (2020) research. People pointed to the Covid-19 epidemic as the cause of the cash income source ratio falling below the figure observed in earlier surveys. 56% (94 participants) of the respondents said their income position was the same as it was last year, 36.3% (61 participants) said it was worse, and 7.1% (12 participants) said it was better. In MRWRP (2018), it was found that 10.6% of people had higher incomes, compared to 28.5% who had lower incomes and 60.9% who had unchanged incomes. In the MRWRP (2019) research, there were 2% more households with rising incomes, 85.7% more homes with stable incomes, and 12% more households with decreasing incomes. In the MRWRP (2020) study, 46.1% of respondents said their income had remained stable, while 39.4% said it had decreased. The Covid-19 epidemic was cited as the cause of this problem by those whose income-decrease rate was higher than that of previous studies. It was discovered that 67 (40.5%) got wages, 33 (19.6%) worked in the production and sale of animals, and 25 (14.9%) of them worked in other occupations. According to the MRWRP (2018) report, 58.7% of respondents cited salaries and earnings as their primary source of income, while 14.7% of them indicated agricultural and animal output as their primary source. In the MRWRP (2019) research, household income was primarily derived from earnings and salaries (51%). Animal products made up 27% of the total. According to a survey done in 2020, the top three sources of revenue for people were salary, animal production, and agricultural output. A total of 141 non-beneficiaries (or 83.9%) and 27 (16.1%) non-beneficiaries declared that they had no other source of income. In the MRWRP (2018) study, it was found that 44.3% of people had additional sources of income. In the MRWRP (2019) research, 45.3% of participants had a secondary source of income, compared to 54.7% who did not. In the MRWRP (2020) study, 81% of respondents said

they had no other source of income than their job. 37% of respondents made money from producing and selling animals, while 55.5% of respondents made money from selling agricultural products. In the MRWRP (2018) study, it was found that 22.7% of people worked in the animal production industry and 31.8% of people worked in the agricultural production industry. In the MRWRP (2019) research, 40.8% of them were involved in agricultural production, while 15% were involved in the production of animals.

### **3.2. Property Rights**

It has been determined that 82 people (48.8%) have agricultural land and 86 people (51.2%) who do not have agricultural land. In the MRWRP (2018) study, it was found that 50.3% of the people had a title deed to agricultural land. According to the MRWRP (2019) research, 67% of them have their own agricultural land, compared to 32% who do not. According to the research done in MRWRP (2020), 53% of people do not have property rights on lands. A maximum of 20 decares were held by 70.7% of respondents, between 21 and 100 decares were held by 28%, and more than 500 decares were held by 1.3% of respondents. In the MRWRP (2018) study, it was found that 28.2% of people had a land between 21 and 100 decares, while 71.8% of people had a land less than 20 decares. According to the MRWRP (2019) study, 21% of it was agricultural land between 20 and 100 decares, and 78% of it was less than 20 decares. In contrast to the 51.2% who said they lacked fertile land, 48.2% of participants claimed to have it. It was discovered in the 2018 assessment that 42.6% of the population lived on fertile land. According to the research done in MRWRP (2019), 71.4% of the population was suitable for farming. In the MRWRP (2020) study, the percentage of people who had fertile land was 63.3%, and the percentage of people who didn't had fertile land was 36.1%. A rate of 28.2% was found for those with irrigated agricultural land under 10 decares, 54.6% for those with irrigated agricultural land between 10 and 40 decares, and 17.2% for those with irrigated agricultural land over 40 decares. In the MRWRP (2018) research, it was found that 20 decares or less of land is owned by 81.5% of those owning fertile irrigated agricultural land. According to a MRWRP (2019) study, 84.5% of the respondents had fertile irrigated agricultural land of 20 decares or fewer. The average area of irrigated agricultural land was found to be 36 decares in the study done in MRWRP (2020). Less than 10 decares of dry agricultural land were owned by 23.5% of people, 10 to 20 decares were owned by 61.7%, and more than 20 decares were owned by 14.8% of people. In the MRWRP (2018) study, it was found that 84.7% of the people possessed land assets for 20 or fewer periods. According to the MRWRP (2019) research, 60.5% of the population owned fertile dry agricultural property measuring 20 decares or fewer. The average dry agricultural land was estimated to be 9 da in the MRWRP (2020) study.

### **3.3. Agricultural Production and Irrigation**

It was discovered that 81 survey respondents (48.2%) only farmed the land for their personal purposes, 79 respondents (47%) did not cultivate the land, 6 respondents farmed the land for both their needs and sale, and 2 respondents farmed the land exclusively for sale. In the survey done in 2020, it was found that 48.3% of people farmed land for their own consumption. 161 individuals (97.5%) voiced unfavourable opinions on the increase in product yield compared to the prior year. 4.5% of respondents only said yes. 3.1% of the people said they had increased their products in the previous year in the 2018 study. In the 2019 study, 4% of respondents said they had increased their products in the previous year. In the 2020 study, 15% of participants claimed that productivity has increased from the previous year. The productivity improvement was attributed to a project activity by 75% of the respondents and not by 25% of the respondents, according to their responses. There was no rise in the production area, according to 164 respondents (97.6%), and there was, according to 4 respondents (2.4%). Everyone cited a project activity as the reason for the expansion of the production area. The primary cause of the extremely small growth in the production area was attributed by the general populace to the drought's effectiveness. In the study that was done in 2018, 6.7% of respondents said that the producing area had grown. In the 2019 study, 11.2% of the respondents said they had expanded their production space in the previous year. In the study conducted in 2020, 10% of respondents claimed to have seen a growth in their production area. The analyses carried out led to the conclusion that there was no statistically significant improvement in production in terms of gender and cash income (*Table 1*). Using the irrigation system, 45.8% of the participants employed drip irrigation, flood irrigation, etc. 2.4% of the interviewees said they have increased the amount of irrigated land. 33.4% of those surveyed claimed that a project activity was responsible for the expansion of the irrigated area. Despite the fact that 54 (32.1%) of the participants were involved in animal husbandry, it was found that 90.7% of cattle breeders and 9.3% of small cattle breeders were involved in livestock breeding. According to the study done in 2020, the majority of people were involved in cattle breeding. It was discovered that 18.6% of the



respondents said there had been an increase in the number of animals during the previous year, and that 50% of people believed that this increase was connected to any project activity. There are various statistical studies in which the production plan is evaluated according to the income of the farmers in the agricultural basins (Everest, 2021; Brown et al., 2014).

**Table 1 compares this year's rise in production area by gender, province, and having cash income to last year's increase.**

Variables	Number	Average rank
Gender		
Male	137	84.17
Female	30	83.22
Mann-Whitney U	2031.500	
Wilcoxon W	2496.500	
Z	-0.370	
Asymp. Sig. (2-tailed)	0.711	
Province		
Bingol	62	84.35
Elazığ	28	86.50
Muş	78	84.35
Kruskal-Wallis H	0.879	
Asymp. Sig.	0.644	
Having cash income		
Yes	109	84.19
No	59	85.08
Mann-Whitney U	3181.500	
Wilcoxon W	9176.500	
Z	-0.428	
Asymp. Sig. (2-tailed)	0.669	

### 3.4. Access to Markets

While 80.4% claimed they were unable to do so, 19.6% of the participants claimed to make money through selling their livestock and other agricultural products. The revenue generated from the sale of agricultural and animal goods increased by 9%, remained constant by 60.6%, and declined by 30.4% as compared to the prior year. In the study conducted in 2018, it was found that the percentage of people whose income increased in the previous year was 14.1%, the percentage of people whose income declined in the same period was 25.4%, and the income of 60.6% of people did not change. While the income from agriculture and animal production climbed by 6.8% in the study done in 2019, it declined by 7.8% and changed by 85.4%. In the 2020 survey, 50% of the participants said that their income had remained unchanged. 60.6% of the respondents did not have a problem with production marketing, compared to 39.4% of those who did. In the 2018 study, 79.4% of respondents claimed not to have any marketing-related issues. 71% of respondents to the 2020 study said they did not have a marketing problem. The study revealed that there was no statistically significant gender difference in the earnings of those involved in agricultural production and animal production sales. The income of the survey respondents from sales of agricultural produce and animal production by the provinces they reside in has not increased statistically significantly. Depending on whether the respondents had cash income or not, there was a statistically significant difference in the revenue they received from sales of agricultural products and animal production. It can be claimed that locals with cash income generate greater income through sales of agricultural products and livestock than those without (Table 2).

### 3.5. Business Development and Employment

Only 4.8% of the households taking part in the survey run any businesses except farming and pet care. 160 members of the household, or 95.2% of them, work exclusively in agricultural and animal husbandry. According to the 2018 report, 6.1% of the participants owned a business unrelated to agriculture or animal husbandry. In the 2019 study, it was found that 4.1% of the participants owned a business that wasn't related to farming or animal husbandry. 164

respondents to the 2020 study stated that they were solely engaged in agriculture and animal husbandry. A new business for their household or an expansion of their current business was helped by the initiative, according to 62.5% of respondents, compared to 37.5% of people who claimed it had no effect on their ability to start a new business or grow an existing one. In the 2018 study, every participant claimed that the project had no impact on their ability to locate new jobs or improve their working conditions. Not all participants in the 2019 report claimed that the project did not help them find new jobs or improve their working conditions. When compared to other studies, the fact that there are people in the study who think project activities have an impact on starting a new business or growing an existing business might be seen as a positive outcome.

**Table 2. shows the association between gender, province, and having cash income and the status of earning revenue from agricultural output and animal production sales.**

Variables	Number	Average rank
Gender		
Male	136	88.93
Female	30	82.30
Mann-Whitney U	1877.000	
Wilcoxon W	11193.000	
Z	-0.990	
Asymp. Sig. (2-tailed)	0.322	
<hr/>		
Province		
Bingöl	62	89.73
Elazığ	27	78.85
Muş	78	81.23
Kruskal-Wallis H	3.009	
Asymp. Sig.	0.222	
<hr/>		
Having cash income		
Yes	109	89.01
No	58	74.59
Mann-Whitney U	2615.000	
Wilcoxon W	4326.000	
Z	-2.661	
Asymp. Sig. (2-tailed)	0.008	

### 3.6. Access to Natural Resources

While 61.9% claimed they were unable to do so, 38.1% of respondents claimed to have profited from the forest. 5 respondents (8%) said this benefit was infrequent, while 59 people (92%) said it was regular. In the survey that was done in 2018, it was found that 37.8% of the people who said they routinely benefited from the forests did so. 38 participants in the 2020 survey claimed to routinely benefit from the forest. In terms of their ability to benefit from the forest, 50 people (78%) saw an improvement, while 14 people (22%) did not. In the 2018 study, 85% of individuals who benefit from forests said their use has increased. In the 2019 study, 95.3% of respondents claimed that they were using forests more frequently. In the 2020 study, 51% of respondents said that their use of the forest had not changed from the year before. People claimed that they could not go out to the forests much because of the Covid-19 pandemic as the reason why they felt that the possibility to profit from forests has improved, which was significantly lower than the findings of the 2018 and 2019 studies. Regarding the increase in forest productivity over the previous year, 37 persons (58.6%) had negative attitudes and 27 (41.4%) had good ones. According to 79.6% of respondents, project activities have increased forest productivity compared to last year. According to a 2018 poll, 61.9% of respondents believe that forest productivity has increased and that the project has a bearing on this. In the 2019 study, 87.1% of respondents claimed that the project effect boosted forest productivity. It has been shown in both earlier research and this study that project activities have a favourable impact on forest productivity, which is universally acknowledged by people. It was found that 92 (56%) of the people did not benefit from the grazing land, while 74 (44%) of the people did. 38.5% of the people in the research from 2018 were found to have benefited from the pastures. In the 2019 study, 40.8% of respondents said that pastures had been beneficial to them. It has been determined that the majority of those



who gain from the pasture have not changed all that much over time—nearly half. 119 respondents to the study conducted in 2020 claimed they had no advantage from the shared grazing land. In the study, 63 respondents (85%) said the benefit was regular whereas 11 respondents (15%) said it was irregular. In the 2018 survey, 96.7% of the participants who benefited from the pastures said they did so on a regular basis. All of the participants in the 2019 study claimed that the pastures had been beneficial to them. In the 2020 study, 57 participants claimed that grazing land regularly benefits them. The percentage of people who routinely benefit from the pastures was much smaller than that seen in the previous three trials, and those people explained that the Covid-19 epidemic prevented them from spending enough time in the pastures. 61 of the respondents said that the use of the rangeland has improved from the previous year. 13.6% of respondents said there had been no progress. In the 2018 study, 84.6% of the participants said that there are now more opportunities to profit from the pastures than there was the year before. In the 2019 study, 93.4% of respondents said there is now more possibility to gain from pastures. In the 2020 study, 59% of the participants said they had not noticed a change from the prior year in their ability to profit from pastures. People mentioned the Covid-19 epidemic as the reason they could not spend enough time in the pastures as a reason why the rate of people who enhanced their opportunity to profit from the pastures was lower than the findings of the preceding 2018 and 2019 investigations. The production of pastures has increased compared to the previous year, according to 30 respondents (40.5%). In comparison to the prior year, 44 persons (59.5%) claimed that productivity had not increased. 63 of the participants (85.1%) believe that the project activities are to blame for the development, compared to 11 participants (14.9%), who disagree. In the 2018 study, 21.2% of respondents believed that the initiative improved the effectiveness of the rangelands. According to 2019 research, 80.3% of respondents believe that project activities boost pasture productivity. More people than were discovered in the results of the prior study believe that the project's actions have a beneficial impact on pasture productivity.

### 3.7. Factors Affecting the Local Participants in the Survey's Poverty Dimension

Income from sales of agricultural and animal products is a dependent variable.

Independent variables: Gender, province (where he lives), cash income, land ownership, high value crops are not cultivated.

The impact of characteristics such as land ownership, cash income, gender, place of living, and high-quality product on sales revenue from agricultural and animal production is the goal.

**Table 3. Process summary**

Unweighted Cases <sup>a</sup>		Number	%
Selected Cases	Included in Analysis	165	98.2
	Missing Cases	3	1.8
	Total	168	100.0
Unselected Cases		0	0
Total		168	100.0

Table 3 shows that 165 data were used for the logistic regression analysis, and 3 data were excluded from the study because they lacked observations. The dependent variable's categories were coded as 1 for yes and 0 for no. Table 4 lists the categories of categorical independent variables.

Nargelkerke and Cox-Snell  $R^2$  values, which display the model's relevance by demonstrating the ability of the independent variables to account for changes in the dependent variable, in this case  $R^2$ , are listed in the model summary table. 15.8% of the change in the dependent variable is thus explained by the independent factors (Table 5). According to the Hosmer and Lemeshow test, the model is significant since  $p=0.413>0.05$  (Table 6). When the classification table was looked at, it was discovered that the model's accurate classification rate was 82.4% (Table 7). The significance of the model's variables Only the cash variable is significant at the 1% significance level when the (p) values are examined. The impacts of the factors on the dependent variable (income) can be understood using the  $\exp(B)$  values. The relationship between the independent and dependent variables is said to be negative if the  $\exp(B)$  value is less than 1, and positive if it is more than 1. The reference variable was the province of Muş. The high standard of living in Bingöl is 2.439 times more than it is in Muş. People in Elazığ make 0.882 times less money than those in Muş. The lower value is  $1-0.882=0.118$  (11.8%). Men make 1.209 times more money than women do. The income generated by people

with prior cash income will be 4,037 times greater than that of those without. It has been found that individuals with land will have incomes that are 0.712 times lower than those without, and those who grow high-value crops would have incomes that are 0.422 times lower than those without (*Table 8*).

**Table 4. lists the codes for reference variables and category variables.**

		Number	Parameter coding* (1)
Product	0	132	1.000
	1	33	0.000
Elazığ	0	88	1.000
	1	77	0.000
Gender	0	136	1.000
	1	29	0.000
Cash	0	58	1.000
	1	107	0.000
Land	0	84	1.000
	1	81	0.000
Bingöl	0	103	1.000
	1	62	0.000

\*0 and 1 are the values of the dependent variable, product 0: no product; product 1: yes product; land 0: no land; land 1: yes land

**Table 5. Model summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	147.725 <sup>a</sup>	0.100	0.158

**Table 6. Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	7.158	7	0.413

**Table 7. Classification table**

	Observed	Predicted Sales Revenue		Percentage Correct
		0	1	
Step 1	Sales Revenue 0	131	1	99.2
	1	28	5	15.2
Overall Percentage				82.4

a. The cut value is .500

**Table 8. Coefficients of the logistic regression model equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	Bingöl (1)	0.892	0.623	2.047	1	0.152	2.439
	Elazığ (1)	-0.126	0.639	0.039	1	0.844	0.882
	Gender (1)	0.190	0.609	0.097	1	0.755	1.209
	Cash (1)	1.395	0.488	8.181	1	0.004	4.037
	Land (1)	-0.339	0.467	0.528	1	0.467	0.712
	Product (1)	-0.862	0.513	2.824	1	0.093	0.422
	Constant	-1.861	0.855	4.738	1	0.029	0.155

Only livestock population and male membership in a local Non-Governmental Organization had a consistently favorable and substantial effect on agroforestry adoption by both project and non-project households in a study on the adoption of agroforestry of independent variables (Neupane et al., 2002). In another study on logistic regression analysis, the percentage to predict agricultural land use determinants of correctly classified fields (95.7%) was highest at a threshold probability of 0.5 in southeastern Nigeria. Four fields were false positive and nine fields were false

negative with the same probability. The model was applied to the validation set of 88 fields, with a threshold probability of 0.5. The percentage of correctly categorized fields was 89.9%, with three false positive and six incorrect negative classifications (Gobin et al., 2002). For each target contaminant and subgroup of contaminants, Mair and Al-Kadi (2013) created a set of multiple-variable Logistic Regression models based on combining hydrogeology, land use, and well geometry and location factors. Overall, the data showed a high correlation with agricultural land use. Tai-Yang et al. (2011) investigated the effect of access on agricultural land loss in a low-lying region in Southeast China. The results of the models utilized in the authors' work revealed that whether the parcel was converted or not was directly related to geographical characteristics such as height, location, and accessibility. Elevation had a detrimental impact on farm land conversion since it increased development costs. In the model, the elevation coefficient was 0.0025. The odds ratio can be determined based on the coefficient using the relationship between the odds ratio and the regression coefficient. In the model, the odds ratio for elevation was 0.9975, which suggests that for every 1 m rise in elevation, the likelihood of being converted decreased 0.9975 times. The estimated odds ratio for an increase of 100 m in height was 0.7788, indicating that the likelihood of being converted reduced 0.78 times for every 100 m increase in elevation. The distance between the road and the town also had a detrimental impact on conversion.

#### **4. Conclusions**

Everyone cited a project activity as the reason for the expansion of the production area. The primary cause of the extremely small growth in the production area was attributed by the general populace to the drought's effectiveness. The analyses conducted led to the conclusion that there was no statistically significant rise in the production area for either gender or having a cash income. According to the research, there were no statistically significant differences between people's income from sales of agricultural and animal products by gender or where they resided. Depending on whether the respondents had cash income or not, there was a statistically significant difference in the revenue they received from sales of agricultural products and animal production. It can be claimed that locals with cash income generate more income through sales of agricultural products and livestock than do those without. 95.2 percent of the households who took part in the survey have no businesses except from farming and raising animals. 62.5% of respondents claimed that the programme has assisted them in starting a household company or growing an existing one. When compared to other studies, the fact that there are people in the study who think project activities have an impact on starting a new business or growing an existing business might be seen as a positive outcome. Although it was found that most respondents (61.9%) were unable to benefit from the forest, it was also found that 50 respondents (78%) had improved opportunities to do so this year compared to last year, while 14 respondents (22%) had not. The use of grazing land benefits 44% of people. It has been determined that the majority of those who gain from the pasture have not changed all that much over time—nearly half. The inability to venture out into the forests too often as a result of the Covid-19 pandemic can be demonstrated as one of the reasons why the percentage of people who believe that the potential to gain from forests and pastures has improved is rather low. The model was found to be significant and the independent variables in the model explained 15.8% of the change in the dependent variable as a result of the logistic regression analysis. The model's accurate classification rate was found to be 82.4%. At the 1% significance level, it was found that only the cash variable was significant. The high standard of living in Bingöl was 2.439 times more than it was in Muş. People in Elazığ made 0.882 times less money than those in Muş. Men made 1.209 times more money than women do. The income generated by people with prior cash income has been 4,037 times greater than that of those without. It has been concluded that those who have land will earn 0.712 times lower income than those who do not, and those who grow high-value crops will earn 0.422 times lower income than those who do not. In light of these findings, it can be said that the project's implementation led to good developments in the villages and a major contribution to rural development based on the information collected from the participants. Additionally, it has been noted that people have begun to regularly live in the villages and that income-generating activities have developed in the communities with the help of project activities. It was determined that the MRWRP actions resulted in a reduction in the pressure on the union's forest vegetation. It has been determined that the advancements made in the pasture regions significantly benefit animal husbandry. The steps to be done in response to the drought will expand the production area, and as the production area expands, so will the locals' income. Support should be provided to the locals who want to benefit from this issue but who have been identified as persons who are unable to do so because they are unable to provide the 20% payment required of the recipients. According to the available data, it can be concluded that the project is a significant driver of the region's development and that in the years to come, this degree of development will become more apparent.

### **Ethical Statement**

This study was prepared a decision was taken in terms of research ethics from T.R. Bingöl University Rectorate Social and Human Sciences Scientific Research and Publication Ethics Board with number 33117789/044/83126 for the study.

### **Conflicts of Interest**

We declare that there is no conflict of interest between us as the article authors.

### **Authorship Contribution Statement**

Concept: equal author contribution; Design: equal author contribution; Data Collection or Processing: equal author contribution; Statistical Analyses: Şenol Çelik and Ersin Karakaya; Literature Search: equal author contribution; Writing, Review and Editing: Şenol Çelik, Ersin Karakaya, Ahmet Uslu and Semra Çamuka.

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