Ondokuz Mayıs Üniversitesi Karadeniz Turizm Araştırmaları Dergisi,
Journal of Karadeniz Tourism Research

e-ISSN: 3023-6347, KATAD Temmuz 2024, 2(2): 97-116

Social and Economic Development of Mountain Basins: Case Study of Uzungöl Basin

Dağ Havzalarının Sosyal ve Ekonomik Gelişimi: Uzungöl Havzası Örneği

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Makale Bilgisi/Article Information

Makale Türü/Article Types: Derleme Makalesi/Review Article
Geliş Tarihi/Received: 02 Hazian/June 2024
Kabul Tarihi/Accepted: 08 Temmuz/July 2024
Yıl/Year: 2024 | **Cilt-Volume:** 2 | **Sayı-Issue:** 2 | **Sayfa/Pages:** 97-116

Atıf/Cite as: Ağıralioğlu, S., Ağıralioğlu, N. "Social and Economic Development of Mountain Basins: Case Study of Uzungöl Basin" Journal of Karadeniz Tourism Research, 2(2), Temmuz 2024: 97-116.

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SOCIAL AND ECONOMIC DEVELOPMENT OF MOUNTAIN BASINS: CASE STUDY OF UZUNGÖL BASIN

ABSTRACT

This study examines the social and economic development of the Uzungöl basin, situated in the Eastern Black Sea Region, which holds significant potential for tourism growth. By assessing the terrain, climate, and water resources of the basin, we will consider the factors influencing socio-economic development. The Uzungöl Basin currently lacks essential infrastructure such as roads, energy, educational, and healthcare services. There is a pressing need to provide adequate infrastructure, healthcare, educational, and skill development programs to enable residents to become self-reliant. To foster socio-economic advancement in this area, improvements are essential in key sectors such as demographic management, agriculture, animal husbandry, forestry, industry and mining, transportation, education, and healthcare. Economic progress requires attracting people to the region, thereby inhancing living standards. The basin has significant potential to develop highland, winter, and congress tourism. Additionally, winter sports and athletic training camps can be developed in the region. To facilitate these developments, transportation connections with neighboring areas should be, enhanced to ensure year-round safe access to the region. Furthermore, a natural gas heating system should be installed, and internet access should be improved. The educational and healthcare systems in the basin also need to be upgraded to the desired levels.

Keywords: Uzungöl Basin, Economic Development, Tourism, Forestry, Livestock.

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DAĞ HAVZALARININ SOSYAL VE EKONOMİK GELİŞİMİ: UZUNGÖL HAVZASI ÖRNEĞİ

ÖZ

Bu çalışma, Doğu Karadeniz Bölgesi'nde yer alan ve turizm potansiyeli taşıyan Uzungöl havzasının sosyal ve ekonomik gelişimini incelemektedir. Havzanın arazi, iklim ve su kaynakları değerlendirilerek sosyo-ekonomik kalkınma faktörleri ele alınacaktır. Uzungöl havzası şu anda yol, enerji, eğitim ve sağlık hizmetleri gibi önemli altyapı olanaklarından yoksundur. Bölge halkının kendi kendine yeterli hale gelebilmesi için yeterli altyapı, sağlık, eğitim ve beceri geliştirme programlarının sağlanması acil bir ihtiyaçtır. Bu bölgede sosyo-ekonomik gelişmeyi teşvik etmek için nüfus, tarım, hayvancılık, ormancılık, sanayi ve madencilik, ulaşım, eğitim ve sağlık gibi temel sektörlerde iyileştirmeler gereklidir. Ekonomik ilerleme,

insanları bölgeye çekmeyi ve böylece yaşam standartlarını iyileştirmeyi gerektirir. Özellikle havza, yayla, kış ve kongre turizmini geliştirme potansiyeline sahiptir. Ayrıca, bölgede kış sporları ve sporcu eğitim kampları kurulabilir. Bu gelişmeleri desteklemek için çevre yerleşimlerle ulaşım bağlantıları güçlendirilerek yıl boyunca güvenli erişim sağlanmalıdır. Ek olarak, doğal gaz ısıtma sistemi kurulmalı ve internet erişimi iyileştirilmelidir. Havzadaki eğitim ve sağlık sistemleri de arzu edilen seviyelere getirilmelidir.

Anahtar Kelimeler: Uzungöl Havzası, Ekonomik Kalkınma, Turizm, Ormancılık, Hayvancılık.

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1. INTRODUCTION

Although the world's resources are limited, the world population and the various needs of this population are increasing. For this reason, governments emphasize the more efficient use of mountainous regions. In last 30 years, the socio-economic evaluation of mountains in the world and especially in Europe, Asia and America has been focused on, and there have been continuous researches and publications on these issues.

Some of goods and services such as timber, mines and hydroelectric power obtained from mountain areas have a very important economic value (Kızıltan and Koday, 2021).

The main reasons why mountains should be evaluated have been revealed recently (Edmond, 2019). Some indicators have been given by Batta to frame his assessment of the mountain range (Batta, 2006).

Some examples provide evidence that market-linked approaches to developing and transferring resources for the conservation and sustainable development of mountain ranges fall within the realm of possibility. This will help override the traditional view that "for not paying, protection doesn't happen"(Pratt and Preston, 1998).

Meanwhile, it has been explained why mountains are so important to Europe and every human being (Drexler et al., 2016).

The social and economic development of mountain areas is rather difficult to measure, since it is influenced by a number of factors. Most authors distinguish internal and external factors (Vorobyov and Bugai, 2019). Some of external factors are climatic conditions, soil condition, and geographical position. Some internal factors can be written as population, forestry, education, health, and infrastructures.

The mountains in the Eastern Black Sea region have important resources and potential in terms of forestry, animal husbandry, mining, tourism and recreation. Some flood and water resources studies have been carried out in the Solaklı basin, which is one of the basins in this mountainous region (Ayaz, 2009; Coşkun et al, 2010). It has been determined that some studies have been carried out in the Uzungöl basin, which is a mountainous sub-basin of the Solaklı basin, about the resources and natural disasters of the basin (Atasoy, 2010; Ağıralioğlu, 2015; Ağıralioğlu, 2016; Ağıralioğlu 2017; Ağıralioğlu, 2018; İnkaya 2019).

In this study, in the example of Uzungöl sub-basin of Solaklı basin, the development of resources such as soil, water and human resources of the mountains in the Eastern Black Sea region will be examined socio-economically by literature and observations.

2. STUDY AREA

Uzungöl basin is the area located in the upper parts of Solaklı basin and includes the catchment basin of Haldizen Stream Flow Observation Station. This basin is also sometimes referred to as the Haldizen Stream basin. Solaklı basin is located in Trabzon province in the Eastern Black Sea Region at 410 00' North latitude and 390 43' East longitude (Ağıralioğlu et al., 2009). It covers an area of 767.25 km2. The Solaklı Basin, Uzungöl sub-basin in Turkey are shown in **Figure 1**.

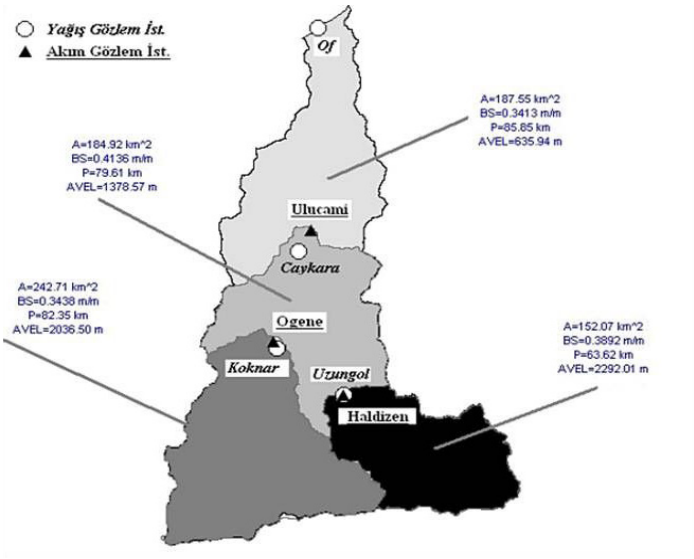

Figure 1. Solaklı basin and Uzungöl (Haldizen creek) watershed (Ağıralioğlu et al., 2009)

Accordingly, the 80 km long Solaklı basin will be evaluated in three sub-basins as Lower Solaklı Basin, Middle Solaklı Basin and Upper Solaklı Basin. The Lower Solaklı Basin is the part of the basin that starts from the town center of Of (Solaklı) on the Black Sea coast, continues for about 20 km and ends at the Ulucami Stream Observation Station (Ağıralioğlu et al. 2009; Agiralioğlu, 2015). Middle Solaklı Basin includes the area between Ulucami Sream Station and Uzungöl Stream Station. Uzungöl basin (or Haldizen creek basin) and Köknar basin as parts of Upper Solaklı basin are in mountain region.

3. TERRAIN, CLIMATE AND LAND COVERS/USES

3.1. Elevation

About one-third of the world's land is in mountainous regions, where trees grow that do not grow in lower elevations. These trees play an important role in balancing the climate of the region. They are also vital in preventing soil erosion, landslides and rockfalls as they absorb significant amounts of rainwater (Edmond, 2019). The elevation map of the Solaklı basin is given in **Figure 2** (Öz and Günek, 2021). Solaklı basin starts from sea level. The Uzungol basin starts from 1200 meters and goes up to 3385 meters. As seen in **Figure 2**, only a narrow and small area of the Uzungöl basin around Haldizen creek is at the level of 1200-1500 meters. Another large part of the basin is higher than 1500 meters (Öz and Günek, 2021).

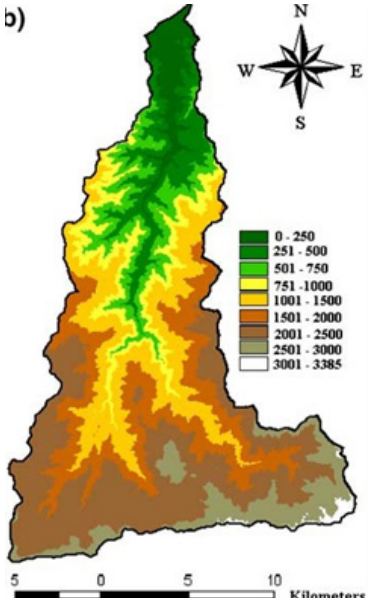

Figure 2. Digital elevation model of Solaklı basin (Öz and Günek, 2021)

3.2. Climate and Its Characteristics

3.2.1. Climate and Temperatures

In the Uzungöl basin, a temperate and cool climate prevails, but the average temperatures are 6-7 °C lower than the coastal part. In addition, a transitional climate is observed at very high elevations (mountain villages and plateaus). The monthly and annual temperature averages measured at Uzungöl and Of meteorology stations are shown in **Table 1**. It is known that the temperature decreases on average by 0.50 ^{0}C for every 100 m elevation in the region (Inkaya, 2019).

Table 1. Monthly and annual average temperatures (°C) of Of and Uzungöl stations.

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year
Uzungöl	-0.1	0.1	3.2	7.8	11.4	14.1	16.4	16.7	13.7	10.7	5.5	1.6	8.4
Of	6.7	7.2	11.7	12.4	16.6	20.1	22.1	21.8	18.6	14.9	11.3	8.4	14.3

Temperature data were taken from measurements covering the years 1965-1988 at Of station and 1991-2009 at Uzungöl station. According to these data, the annual average temperature is 14.3°C in Of and 8.4°C in Uzungöl. The month with the lowest average temperatures according to the stations is January. The lowest average temperatures are 6.7°C in January in Of, and -0.1°C in January in Uzungöl. Temperatures in the research area begin to rise as of April, with the highest average temperatures observed in July and August. The highest average temperatures are 22.1°C in July in Of, and 16.7°C in August in Uzungöl (Inkaya, 2019).

3.2.2. Rainfall and Runoff

Rainfall observations at Çaykara meteorology station started in 1957 and continued until the station was closed in 1998 (1957-1998). Rainfall observations at Uzungöl meteorology station started in 1969 and are still continuing. The monthly average precipitation heights at Uzungöl and Çaykara Meteorology stations are shown in **Table 2**. In addition, the variation of average precipitation heights at Uzungöl and Çaykara stations is compared. While the annual average precipitation in Çaykara is around 994.7 mm, the average annual precipitation in Uzungöl meteorology station is around 1121.7 mm (Şahin, 2007).

Table 2. Average rainfall at Uzungöl (1969-2005) and Çaykara (1957-1998), stations

Month	Rainfall at Uzungöl, mm	Rainfall at Çaykara, mm
Jan	171.9	82.9
Feb	77.1	76.9
Mar	80.0	73.7
Apr	98.7	73.3
May	105.8	79.7
June	101.1	92.2
July	67.5	70.8
Aug	71.1	68.3
Sep	69.1	83.9
Nov	101.0	106.8
Oct	98.9	102.0
Dec	79.5	84.2
Total	1121.7	994.7

The precipitation and flow heights measured in Uzungöl are given in **Table 3**. The mean monthly total precipitation and flow measurements at any location were evaluated graphically.

Table 3. Rainfall (mm) and Runoff (mm), and Flow rate (m^3/s) in Uzungöl

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year
Rainfall (mm)	75.5	76.8	79.4	97.1	105.7	101.5	67.3	70.7	68.9	105.1	100.3	79	1027.3
Runoff (mm)	24.43	22.42	37.3	111.5	200.1	181.19	98.41	49.03	31.58	39.96	38.16	30.71	864.82
Flow rate (m3/s)	1.4	1.41	2.14	6.6	11.47	10.73	5.64	2.81	1.87	2.29	2.26	1.76	4.3

For example, the mean monthly total rainfalls and the runoff depths are plotted in **Figure 3**. In the basin, the runoff depths are higher than the precipitation depths in the spring and summer months (April–July), and the opposite is observed for the remaining part of the year (August–March).

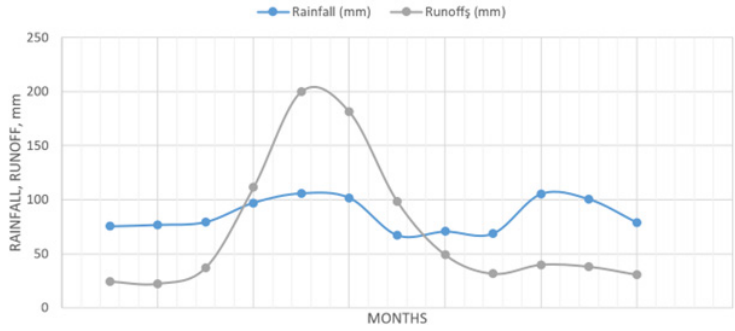

Figure 3. Monthly average rainfall and runoff values of Uzungöl

3.3. Land Use

In the Uzungöl basin, there are plateaus covered with meadows such as the Alpine type as at Sultanmurat, which is found after the altitude of 2000-2100 m, where the upper limit of the forest passes. Land use pattern of Solaklı basin is shown in **Figure 4**. Total area in Solaklı basin 75.882 ha. The land use of the total area is as follows: 70% forest, 17% agriculture, 11% pasture, and 2% residential area. In the Uzungol basin, there are coniferous forests at low elevations. As seen in **Figure 4**, the majority of the remaining areas are grasslands and pastures (Koralay et al., 2018).

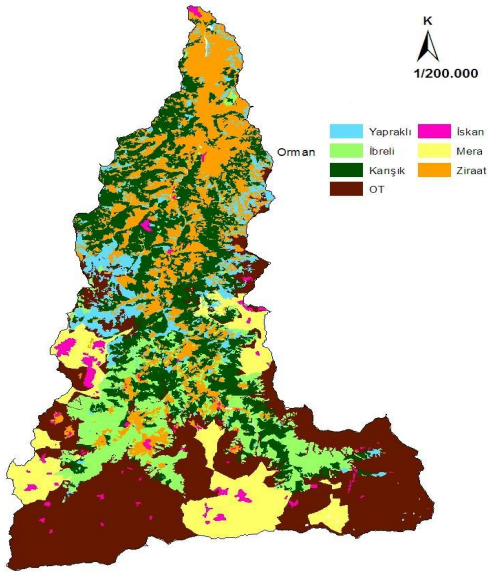

Figure 4. Land use pattern of Solaklı watershed (Koralay et al., 2018)

4. NATURAL HAZARDS IN UZUNGÖL BASIN

4.1. Avalanche and Rockfall

On the other hand, the measures that individuals can take before an avalanche, in areas where avalanches may occur, during avalanches, and after avalanches are published by the Disaster and Emergency Management Presidency (AFAD) in Turkey on the internet.

In order to protect Aşağı Demirkapı Neighborhood against avalanches and stone falls, a special Curse forest was planted at the head of the neighborhood centuries ago and is still protected. Necessary similar measures should be taken in areas where there is danger of avalanche and stone falling in the region (Ağıralioğlu, 2016).

4.2. Landslide

Areas susceptible to landslides in the Solaklı basin are given in **Figure 5**. The landslide potential of the lands in the Uzungöl basin is lower than the other sub-basins in the Solaklı basin.

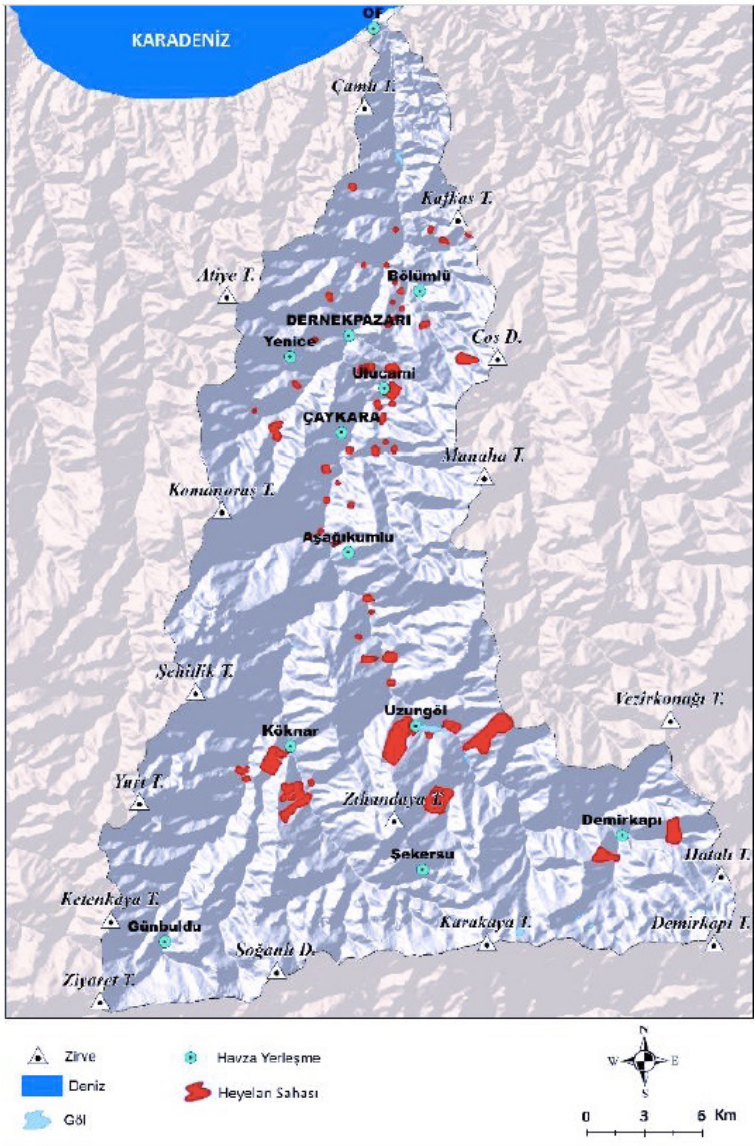

Figure 5. Landslide Susceptibility map of Solaklı Basin (Öz and Günek, 2021)

Landslide analyzes and evaluations made in the basin will contribute to the realization of landslide hazard management for local authorities. The increase in landslide studies in the basin is of vital importance for the future of the population in the basin.

4.3. Sediment Transported by Rivers

Due to landslides and soil erosion in the Solaklı basin, a lot of sediment is carried in the streams. However, the amount of solid sediment transported on Solaklı Stream is not known precisely because solid matter measurement is not carried out. However, the sediment yield of Haldizen Stream at the Uzungöl outlet is estimated to be 200 m^3/km^2 /year. In order not to fill Uzungöl with sand and gravel rapidly, two sediment dams were built on the upstream side of the lake. When these dams are full, the sediment that has accumulated in them must be emptied and transported to a place.

5. DEVELOPMENT OF ECONOMIC RESOURCES

5.1. Population

5.1.1. Historical Trend Of Turkey's Population Growth Rates

In order to examine the population changes in the Uzungöl basin, the population changes here will be compared with the population growth rate of Turkey on the same dates. Some of the Türkiye's population values between 1970-2021 are given in **Table 4.** The population of Türkiye, which was approximately 35,6 million in 1970, reached 84,68 million in 2021. To examine the population movements in the Eastern Black Sea Region during last 50-year period, the average annual population growth rates of the world population were calculated and added to **Table 4**. As seen from this table, between the years 1970-1975 and 1975-1980, the annual population increases were 2.53 and 2.09 percent, respectively. In a similar way for other years the average annual growth rate were calculated and shown in the same table.

Table 4. Estimated Türkiye's population and annual growth rate between 1970-2021

Year	Population (million)	Average annual growth (%)	Year	Population (million)	Average annual growth (%)
1970	35605176	-	2014	77695904	1.36
1975	40347719	2.53	2015	78741053	1.35
1980	44736957	2.09	2016	79814871	1.36
1985	50664458	2.52	2017	80810525	1.25
1990	56473035	2.19	2018	82003882	1.48
1995	58522320	0.72	2019	83154997	1.40
2000	67803927	2.99	2020	83614362	0.50
2011	74724269	0.89	2021	84680273	1.27
2012	75627384	1.21			

5.1.2. Population Trends in Uzungöl Basin in 1970-2021

The populations of 5 settlements in Uzungöl basin between 1970-2021 are shown in **Table 5** and **Table 6.** The total population of these settlements in each period was also determined and added to the table. Considering the population growth rates of Turkey, the total population of the basin was estimated and added to the table as (projected population). This calculation is based on the total population in 1970. (Ağıralioğlu & Ağıralioğlu, 2023).

Table 5. Predicted and projected population of settlements in Uzungöl basin between 1970-2021

Year	1970	1975	1980	1985	1990	1995	2000
Arpaözü	236	299	158	171	115	44	219
Demirkapı	461	434	383	312	258	120	129
Şekersu	68	108	330	196	163	167	168
Uzungöl	2406	2949	2549	2942	2797	2797	4192
Yaylaönü	343	309	347	303	294	201	167
Predicted	3514	4099	3767	3924	3627	3329	4875
Growth rate	-	1.03	1.02	1.03	1.02	1.007	1.03
Projected	3514	3982	4415	5001	5573	5776	6693

As seen from **Table 5** and **6**, the population of the settlement areas in the basin has been decreasing since 1970. Although the air and water of the basin are clean, there is a constant outward migration in the region due to economic reasons. It is almost as if the whole basin has become a summer residence only in summer (Bostan, 2016).

In order to increase the population in Uzungöl basin, the economic conditions of the region should be improved. With the increase in population in the region, the level of welfare should also be increased.

Table 6. Predicted and projected population of settlements in Uzungöl basin between 1970-2021

Year	2011	2012	2014	2015	2016	2017	2018	2019	2020	2021
Arpaözü	63	51	177	116	108	104	196	129	112	106
Demirkapı	124	105	257	173	150	147	401	300	254	210
Şekersu	80	72	71	60	65	67	232	230	224	218
Uzungöl	1690	1554	1577	1556	1587	1587	1606	1510	1461	1497
Yaylaönü	117	103	97	85	82	84	377	261	290	163
Predicted	2074	1885	2179	1990	1992	1989	2812	2430	2341	2194
Growth rate	1.009	1.01	1.014	1.01	1.014	1.013	1.015	1.014	1.006	1.01
Projected	7378	7467	7672	7775	7881	7980	8098	8211	8256	8361

The estimated and expected population of Uzungöl basin is shown in **Figure 6**. As can be seen from **Table 5** and **6** and **Figure 6,** the total population of the 5 villages, which was 3514 in 1970, decreased to 2194 in 2021 and thus decreased by 37.5% in approximately 50 years. It is known that the reason for this decrease is migration to distant and close cities (Ağıralioğlu & Ağıralioğlu, 2023).

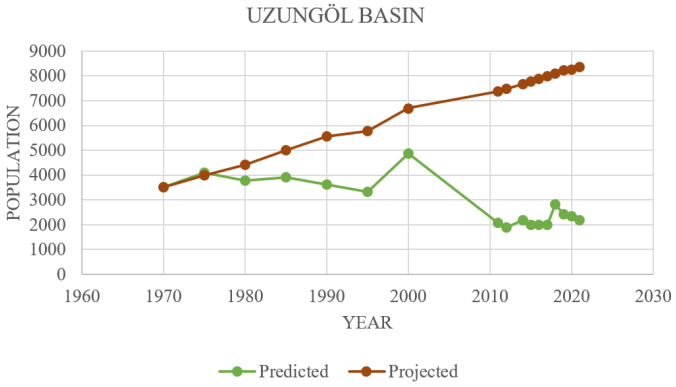

Figure 6. Polulation in Uzungöl Basin
(Arpaözü, Demirkapı, Şekersu, Uzungöl and Yaylaönü)

If the population of Uzungöl basin had increased as much as Turkey's average, the population which was 3514 in 1970 would have increased to 8361 in 2021. In other words, instead of decreasing 37.5%, it would have increased by 138%. These values show the magnitude of migration in the region. The reason for these migrations is mainly to achieve better economic conditions and to live a better quality of life.

5.2. Institutions

There are some non-governmental organizations (NGOs) such as Uzungöl Nature Sports Adrenaline Club Association, Uzungöl Tourism Survival Association and Uzungöl Tourism Professionals Association established for the Uzungöl basin. There is a need to establish some new cooperatives, non-governmental organizations such as tourism associations, sports clubs or foundations for socio-economic development in this basin.

5.3. Land Resources

5.3.1. Agriculture and Livestock

Due to the high altitude and short summer season, agricultural opportunities are weak in the basin. Before the 1970s, barley, wheat and potatoes were grown for the needs of the houses in the nearby lands around the villages and on the south and east facing slopes in the other 4 settlements outside Uzungöl. In the past, the livelihood of the people in the basin was based on animal husbandry. Before the 1970s, there were 3-4 sheep and 1-2 cows per capita in 5 settlements in the basin. Some families kept 1 pair of oxen and some families had 1 horse to carry loads.

In 1975, the total population in the Uzungol basin was counted as 4099 (**Table 5** and **6).** Since livestock is the livelihood in the basin, the number of cattle fed is estimated to be 4099, assuming that at least 5 cattle are raised in every 5-person family. In addition, if it is considered that those who come from the other sub-basins of the Solaklı Basin for transhumance are cattle, it is estimated that the total number of cattle is approximately 8000. Assuming that twice the number of cattle and sheep were kept in the Uzungöl basin in the 1970s, it is estimated that 16000 small cattle were raised in the Uzungöl basin during those periods. Today, this animal existence has decreased tremendously. However, most of the lands in the basin are covered with grasslands and meadows. A significant part of the grasses necessary for the animals to be fed in the barn during the winter months can be obtained from the meadows. Apart from those who live in the basin throughout the year, there are families from the lower villages of the Solaklı basin to graze their animals in the summer season.

Those who come to the basin for summer (for the highland) are counted in the censuses in the villages where they are in winter. Since the intermediate regions of the world are suitable for sheep breeding in the northern hemisphere, between 35 and 55 Northern hemisphere latitudes, and between 30 and 45 Southern Hemisphere latitudes, sheep breeding can be continued in the region. 10 sheep can be grazed on one acre of land. However, if we assume that 0.5-1.0 decares of pasture is

required for 1 sheep, approximately 50000 sheep can be fed in Uzungöl basin, since there is at least 30% pasture in the Uzungöl basin, which has an area of 153.5 km^2. Suitable environmental conditions for dairy cattle are defined as 13-18 °C temperature, 60-70% humidity and 5-8 km/h wind speed. If it is accepted that 3 acres of pasture is required for one cow, livestock can be developed to feed approximately 15000 cows in the pastures of Uzungöl basin.

5.3.2. Forests

In the Uzungöl basin, the forests start at the Uzungöl settlement level and end at 2100-2200 m at the upper limit. Above this level are meadows and pastures. Above 2500-2600 m is generally rocky and these areas are partially covered with snowdrifts until July. A significant part of the land in the Uzungöl basin is covered with forests. Pine and birch-dominated forests close to the settlements, such as Kayinlık, are constantly protected by the local people and the state. All forests above Uzungöl level are operated by the state. However, the facilities to process the forest products obtained from these forests have not been established in the region (Koralay et al., 2018).

5.3.3. Mining

In the past, since the Uzungöl basin was closed to the outside, especially in winter, people had to meet many of their needs from within the valley or make long-term storage. Between Haldizen and İspil villages, 200 meters above the İpsil Stream junction, on the side of the old pedestrian road and today's driveway, there are mineral slags in a large area within the pine forests.

It is possible to see them now. These slags are estimated to belong to the furnace used to obtain iron from the pyrite (iron sulfide) ore, which is abundant in the region. Already on the northern slopes of Küçükyayla, a very dense pyrite ore, shining yellow, can still be found today. The sources and quantities of the mines in the region have not been determined yet. The quality and capacity of the mines and stones in the basin should be revealed.

5.4. Water Resources and Fishing

5.4.1. Streams and Trouts

The majority of the world's fresh water, and the drinking water of many cities, comes from the mountains. These waters are also used to generate electricity in many places (Edmond, 2019). The snow accumulated in the winter on the peaks of the mountains in the Uzungöl basin melts in the spring and summer and feeds the stre-

ams. The snowy mountains in Demirkapı village in July can be shown as an example of the mountains accumulating their waters like water tanks and melting in summer.

8 creeks merge in Uzungöl basin and take the name of Haldizen Stream. All of these streams are fed by the snow of the peaks where they were born, and most of them are named after the lakes above them. These 8 creeks are: 1. Demirkapi Stream; 2. Batır Creek; 3. Sarıçiçek Stream; 4. Aygır Lake Stream; 5. Balık Lake Stream; 6. Küçükyayla Creek; 7. İpsil Creek; 8. Muldat Creek.

There are also some small streams that mix with these eight streams. In addition, there are hundreds of cold water springs in the basin. As you can see, all these streams flow into Haldizen Creek. Trouts live in abundance in each of these cold water streams. There are no pollutants in the recharge basins of these streams.

5.4.2. Lakes

The most important lake found in the region is Uzungöl, which is known to have been formed as a result of landslides. Trout grows naturally in this lake. There are seven lakes named Balık Lake, Aygır Lake, Sarıçiçek Lake, Karagöl, Küçükgöl, Pirömer Lake and Karagöl located in Muldat plateau, at an altitude of 2600 - 3000 meters above the streams in the basin.

For this reason, the region was named Seven Lakes Region. Only in the first of these seven lakes fish can live in it. In addition to these, there are many glacial lakes ranging in width from 100-1900 m^2, usually over 3000 m.

5.4.3. Mineral Waters

It is known that there are some mineral waters in Demirkapı Büyükyayla locality and Çatma locality in the basin. These mineral waters are not evaluated yet. It is imperative that the water resources of the Uzungöl basin, and especially the streams and lakes, be protected from detergents and all other kinds of pollution and waste.

5.5. Energy

The people of Uzungöl basin are used to burn wood to meet their heating needs. Since forests are confiscated by the state, people do not meet their energy and fuel needs. For this, at least some tourism centers must be provided with natural gas connection.

Safe, clean and efficient energy would be provided in the Uzungol basin. Natural gas connection should be provided for the energy need of the region, especially for the fuel consumption of the settlements opened to tourism.

5.6. Recreation and Tourism

There are important water places such as Uzungöl in terms of tourism potential in the basin. Apart from hundreds of springs, the basin has rushing streams, glacial lakes and snowdrifts that do not melt even in August. Uzungöl basin has been increasingly used for recreation and tourism in recent decades. In Trabzon, which has many touristic values, including Uzungöl and Sümela Monastery, which are important in terms of nature and faith tourism, 19.9 million, 3.9 million of whom are foreigners, stayed in the last 19 years between 2001-2020.

Especially if we focus on last 10 years Trabzon, where Turkey's and the world's important tourism values such as Uzungöl and Sümela Monastery are located, hosted 15.5 million, 12.1 million domestic and 3.4 million foreigners in the 2010-2019 period. These figures show the growth potential of the region in tourism.

Although the basin has a high tourism potential, its tourism needs to be developed. As touristic facilities, new opportunities can be developed in many fields such as accommodation, water sports, mountain walks, mountain climbing, bicycle tours. Besides highland tourism, winter tourism can also be developed.

5.7. Transportation and Infrastructure

Today, there is only one main transportation connection in the Uzungol basin. This highway connects Of to Çaykara and Çaykara to Uzungöl. The transportation system in the region is inadequate. It is not only the connection of the region with the coast, but also the establishment of a standard road transportation system with the surrounding plateaus and settlements.

The most important transportation issue in the region is that a connection road that reaches the basin from the south cannot be kept open in winter. Traffic density is the biggest problem of Uzungöl basin during the tourism season. Alternative routes and systems should be planned to reach the basin. A smart, green and holistic transportation system should be established in the Uzungol basin.

5.8. Education and Health

In order to develop the Uzungöl basin economically and socially, it would be appropriate to develop an education and health system appropriate to the needs in the region. Necessary education and health institutions for the local people to stay in place and for the development of tourism are to be established in Uzungöl basin.

5.9. Basin Protection

The highest peak of Trabzon is here and it is Demirkapı Mountain with 3376 meters. These mountain peaks and slopes have wild-looking and craggy cliffs. Deer and roe deer can be found on these rocks from time to time. It should be planned to protect all these mountains, streams and lakes in terms of ecological balance.

Uzungöl Nature Park (Uzungöl Special Environmental): Trabzon Province, Area 1.642.01 ha, area within the basin: 1.642.01 Date of announcement: 03.10.1989 (TÜMAŞ, 2019).

Protection Area: Trabzon Province, Area: 1,491.20, area within the basin 1,491,20; Announcement date: 07.01.2004

There are two natural protected areas in the Uzungöl basin. These are: 1. Trabzon, Çaykara, Arpaözü Village III. Degree Natural Protected Area, 2nd Trabzon, Çaykara, Uzungöl Town and Surrounding Villages I and III. Degree Natural Site. On the other hand, the protection of mountainous regions is another important issue. In this regard, the natural beauties of the Uzungöl basin should be protected. The legal infrastructure of environmental protection measures should be established and implemented. In addition, arrangements should be made to protect forests and waters.

6. CONCLUSIONS

The following results were obtained in this study for the socio-economic development of the Uzungol basin.

1. Natural Disasters: From time to time, natural disasters such as landslides and avalanches occur in the region. Areas at risk of landslides and avalanches should be identified and necessary measures should be taken to prevent or reduce these disasters.
2. Institutions: Since 1970, the population of the settlement areas in the basin has been decreasing. Although the air and water of the basin are clean, there is a continuous outward migration in the region due to economic reasons. It is almost as if the whole basin has become a summer residence only in summer. In order to increase the population in Uzungöl basin, the economic conditions of the region should be improved. With the increase in population in the region, the level of welfare should be increased. In addition, some public and non-governmental organizations should be established in the basin.
3. Soil Resources: Basin lands should be used productively. Some of the lands in the basin are forest, some are rocky; Most of the rest is covered with

grasslands. Since Uzungöl basin is at 1200-3376 m levels and does not have large lands suitable for agriculture, it is considered economically suitable for animal husbandry and especially for small cattle breeding. It is known that approximately 2000-3000 cattle and approximately 10.000 sheep and goats were raised in this area in the past. Plant diversity is abundant in the region. There are endemic species in the higher parts of the basin and they are not evaluated productively. In particular, food security, sustainable agriculture and forest existence should be taken as a basis in the region.

4. Water Resources: Water resources such as springs, streams, lakes, mineral waters and snowdrifts, which are abundant in Uzungöl basin, should be evaluated. The water resources in the basin are very clean and suitable for use as drinking water. The snow piled up on the mountains in winter is like the water tanks of this region, and they start to melt from the spring and feed the waters of the streams.

5. Energy: In order to provide safe, clean and efficient energy in the Uzungöl basin, at least a natural gas connection should be made to the Uzungöl settlement center.

6. Tourism and Recreation: The development of accommodation and social facilities should be encouraged for the development of tourism.

7. Transportation and Infrastructure: Uzungöl basin needs a transportation system that works in all seasons with the surrounding settlements and especially with the city center of Bayburt. In addition, the traffic issue should be resolved and some communication lines such as the internet should be made more secure and efficient.

8. Education and Health: Education and health infrastructures in the basin are very weak. It is essential to reorganize them according to the conditions of the day.

9. Protection of the Basin: In order to protect the watershed and its resources from an environmental and ecological point of view, well-founded systems should be established.

Author Contribution Rates

Design of Study: SA(%50), NA(%50)

Data Acquisition: SA(%50), NA(%50)

Data Analysis: SA(%50), NA(%50)

Writing Up: SA(%50), NA(%50)

Submission and Revision: SA(%50), NA(%50)

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