

Analysis of the Effects of Environmental Factors on Rural Rice Producers in the Context of Gender: Çeltikdere Case Study in Turkey

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Abstract

Despite the increasing need for food parallel to the increasing population, Turkey is a country where agricultural production is gradually declining as a result of erroneous agricultural policies that are carried out in rural areas. This is exacerbated through the effects of climate change. From all these dynamics, women are affected the most in rural areas.

Rice is an important species that meets the carbohydrate needs of the growing population. In rice production, women participate more actively in the workforce than men and have a lot of local knowledge about production.

This study discusses the case of Çeltikdere village, which produces rice in Bolu province. During the research process, qualitative techniques were used, and the dynamics of rice production and regular emigration from rural areas were discussed in focus groups from a gender perspective. The results show that while women are more active in the labor force in the intensive periods of rice production, in today's declining production conditions, gender roles have a more egalitarian structure and production is made by both sexes, however, product sales and land management decisions are still male-dominated. As a result of the study, it is observed that the producers in Çeltikdere village experienced the effects of climate change with droughts and floods, but the most intense effect was due to the loss of water resources with 2 HEPPs established on the stream feeding the village in 2013. Climate change and energy projects are taking the power of managing local resources away from women.

Keywords: Rural sociology, Gender, Rural migration, Social Effects of Hydropower plants, Environment, Rice production

1. Introduction

Rice is the most commonly used grain product after wheat in human nutrition around the world. Rice alone is the main nutrient of about 2.5 billion people worldwide (FAO, 2004b). Rice, rich in amino acids required for nutrition, ranks first among the nutrition of more than half of the world's population and constitutes one of the main nutrients of millions of people, especially in Far East and South Asian countries (Taşlıgil and Şahin, 2011; TMO, 2016). From edible plants, rice, maize and wheat account for almost 60% of the calories and protein required for human life (FAO, 2004a). Rice cultivation is carried out in about 10% of the agricultural areas where plant production is carried out in the world, and 87% of these areas are located in Asia and about 90% of production is carried out in these lands (TMO, 2016).

It is estimated that the origin of rice, which has been part of agriculture for 5000 years, is India and China in Southeast Asia (Taşlıgil and Şahin, 2011 and TMO, 2016). Rice began to be cultivated in Europe around 700 AD, and in the United States in the late 17th century (TMO, 2016).

Rice is the only grain that can be germinated in water. Temperature and precipitation are the most important factors affecting the agriculture of rice, which is the natural vegetation of tropical and subtropical regions. During germination and development stages, rice utilizes dissolved oxygen in the water via its roots, and it is a plant species growing mainly in rainy and warm regions. However, air temperature and water temperature influences production (Taşlıgil and Şahin, 2011; TMO, 2016).

Rice is not a selective plant in terms of the soil it is grown in, it can grow in every soil that can hold water. However, in order to obtain a high yield from rice farming, the soil must be rich in plant nutrients; and it should have a soft and waterproof clayey structure (Taşlıgil and Şahin, 2011).

Because of traditional eating habits, climatic conditions and population sizes, more than half of total rice production and consumption takes place in Asia. 17 of the 25 countries that produce the most rice in the world are located in the South and Southeast Asia region (Taşlıgil and Şahin, 2011). Especially in India and Indonesia, rice planting and harvesting can be carried out throughout the year.

1.1 Rice Production in Turkey

While it is known that Anatolia has a history of about 500 years of rice farming, there is no definite evidence of where and when rice agriculture first began. It is claimed that the first rice seeds entered Turkey from Plovdiv in the north and Egypt in the south in the 15th century, and the first rice farming was carried out in the Tosya province of Kastamonu in the 1750s (Taşlıgil and Şahin, 2011 and TMO, 2016).

In Turkey, the average temperature in summer is around 25 °C, which is the right temperature for rice cultivation, allowing rice cultivation to be carried out during the summer months. However, since the precipitation values in Turkey are not suitable for rice production, rice farming is mostly carried out by irrigation on the delta plains of the rivers and on the valley

bottoms (TMO, 2016).

According to 2015 data, there are 45 rice varieties in Turkey. Only 10-15 of these varieties are used in production. Approximately 70% of the rice cultivation areas throughout the country are cultivated with the rice variety called "Osmancık" (TMO, 2016). While rice consumption per capita in Turkey was 3.2 kilos in 1980, this figure reached 9 kilos in 2012 (zmo.org.tr, accessed in November 2017).

Table 1. Cultivated Area, Production, Yield, Imports and Exports of Rice in Turkey over the Years

Year	Cultivated (Decare)	Area	Production (Ton)	Yield (Kg/Decare)	Import (Ton)	Export (Ton)
2007	939 000		648 000	690	6.016	157
2008	995 000		753 325	757	45.307	235
2009	967 541		750 000	775	63.203	199
2010	990 000		860 000	869	409.199	307
2011	994 000		900 000	905	277.083	834
2012	1 197 247		880 000	735	227.539	363
2013	1 105 924		900 000	814	164.537	108
2014	1 108 844		830 000	749	299.966	341
2015	1 158 561		920 000	794	188.905	437
2016	1 160 563		920 000	793	202.464	49

Source: TURKSTAT Plant Production Statistics - Cereals, 2017

According to Turkish Statistical Institute data, rice yield between 2000 and 2013 increased by 35% compared to previous years. Despite this increase, production has been declining in Turkey in recent years and exports are only 49 tons despite the import of over 200 thousand tons. In Turkey, the great majority of rice imports in recent years are from the US, Russian Federation, Bulgaria, Portugal and Spain (TMO, 2016).

Rice has a share of 1.1% in total grain cultivation areas in Turkey while it has a share of 2.6% in production. As of 2016, rice is being cultivated in a total of 1,160 thousand decares of farmland in 27 cities. Rice cultivation areas show an irregular distribution in our country; however rice cultivation seems to concentrate in the coastal regions. Rice farming is practiced in almost all regions of Turkey except for Aegean Region and a large part of Eastern Anatolia. While Marmara Region comes first with 71% in terms of cultivated area and production, Black Sea Region comes second with 24%. The production of rice in these two regions constitutes 95% of the rice production in Turkey. The remaining 5% is composed of Central Anatolia (3%), Southeastern Anatolia (1%) and other regions (1%). The rice plant is a plant, which can be grown in certain cities or even just one or several provinces of these cities, due to climate conditions, soil structure, and water quality and quantity required during its growth

and development stages (TMO, 2016).

Table 2. Rice Production in Different Cities in Turkey in 2016

Rank	Cities	Production (Ton)	Rank	Cities	Production (Ton)
1	Edirne	375.850	15	Şanlıurfa	2.511
2	Samsun	128.715	16	İstanbul	2.309
3	Balıkesir	113.121	17	Düzce	1.699
4	Çanakkale	87.115	18	Amasya	1.305
5	Çorum	52.321	19	Ankara	1.107
6	Sinop	33.459	20	Tokat	794
7	Tekirdağ	31.997	21	Hakkâri	484
8	Kırklareli	22.981	22	Karabük	402
9	Bursa	20.604	23	Osmaniye	171
10	Çankırı	17.387	24	Bingöl	158
11	Mersin	7.679	25	Bolu	37
12	Diyarbakır	6.487	26	Kahramanmaraş	11
13	Kastamonu	6.227	27	Adıyaman	4
14	Kırıkkale	5.065	Total Production: 920 000 Tons		

Source: TURKSTAT Rice Production According to Varieties by 2016, 2017

While the rice cultivation was performed in 32 provinces in 1994, this number decreased to 27 in 2016 (Taşlıgil and Şahin, 2011). There is also a concentration at province level in rice production. 41% of rice production occurs in Edirne, 14% in Samsun, 12% in Balıkesir, 9% in Çanakkale, and 6% in Çorum. The production of these 5 provinces constitutes 82% of the total production in Turkey (TMO, 2016).

1.2 Gender In Rice Production

The United Nations (UN) indicates that by July 2017 there are 7.6 billion people living in the world. Approximately 46% of the 7.6 billion people living around the globe are living in rural areas. Moreover, 70% of the poor people on Earth live in rural areas. The vast majority of the poor people living in rural areas are women.

Poor women living in rural areas take on domestic roles such as house cleaning, cooking, washing, carrying firewood, bread making, and water transport as well as roles such as reproduction, home management and care for dependent individuals in households. In addition to all these roles, women also devote time to social roles such as visiting patients and participating in funerals. The fulfillment of all of these responsibilities causes women to have up to 14-16 hours of participation in the daily workforce (Sangotegbe et al., 2013).

Women living in rural areas are also actively involved in almost every phase of plant and

animal production. Nevertheless; women usually produce subsistence food on their own land or on land that belongs to the household, and are unable to earn any income on their labor. Women who are able to convert their labor into economical income receive lower wages than men, although they do the same job, and the incomes of women are merely seen as factors that support the incomes of their husbands within the household (Arif et al., 2010).

Rice farming-related activities, particularly production, processing, storage and marketing, are an important source of employment for the poor and about one-quarter of the world's rice production is carried out by small-scale farmers in developing countries (FAO, 2004b). 90% of the irrigated rice cultivation is carried out in the monsoon lands of South and East Asia. Traditional local rice varieties differing in taste and nutrition are mostly grown on West African soil (Fonjong and Mbah, 2007).

Women around the world, living in rural areas and engaged in agriculture, have an important place in rice farming (Fonjong and Mbah, 2007). In many parts of West Africa, rice is produced mainly by female farmers. Rice production by swampland cultivation in Gambia, and by traditional methods in Mali near rivers and wetlands, is carried out exclusively by women (Agboh-Noameshie et al., 2013).

Women farmers engaged in rice agriculture have certain skills in certain issues. In terms of seed selection, seed storage, gene/species conservation and seed health, women assume the role of local information repositories. Due to their knowledge and skills in seed management, female farmers are considered the best seed protectors (Agboh-Noameshie et al., 2013). In the Bafoulabé region of Mali, rice is traditionally regarded as a product of women. Women living in this area and having a lot of knowledge about traditional agricultural methods can identify 30 different local varieties according to their growth cycle, plant growth habit, plant height, number of stalks, grain yield, grain size, shape, color, preparation quality, and the taste and usage characteristics in the final product. Men have less knowledge about local rice varieties than women and assume full responsibility for the three most cultivated rice varieties grown in the region (FAO, 2004a).

The labor that is spent at almost every stage of rice cultivation varies according to gender. In some agricultural communities, rice farming is considered to be women's activity, and women's labor is used in all stages of rice farming (Agboh-Noameshie et al., 2013). Women spend 3% effort for irrigated rice farming in Mali, and 80-100% in swampland rice cultivation in Gambia and Liberia (Agboh-Noameshie et al., 2013). In Nigeria, women contribute to about 60-80% of the agricultural workforce (Ayoola et al, 2011).

In the production of rice, labor requirements are largely met by family members, and male and female workers. In the study of Fonjong and Mbah conducted on 100 women randomly selected from the Bamunka, Bamali and Babunga villages in the Ndop district of Cameroon, Africa, it was observed that 46% of the participants worked as family workers in rice cultivation (Fonjong and Mbah, 2007).

The activities carried out in rice cultivation differ on the basis of gender. Women living in Asian rural areas play a key role in rice cultivation. Women undertake all activities except for

field preparation, irrigation of fields and chemical applications. Women rice producers are the sole decision maker for post-harvest jobs such as seed cleansing, seed selection, seed storage for the next planting season, drying, and decanting. Apart from that, women perform all tasks including marketing the product, cooking rice and consuming it as food (Romero-Paris, 2009; Fonjong and Mbah, 2007).

In a study conducted in 2010 using mixed methods in four regions of Tapanuli Tengah and Kabupaten Timor Tengah Selatan (TTS) districts in Indonesia, it was found that rice cultivation has traditionally been seen in the region as a women's business, and women are carrying out activities at all stages of rice cultivation. In rice cultivation, men only play a role in soil preparation (Arif et al., 2010).

In another survey conducted in the Sierra Leone region, located in Africa, women are responsible for planting, weeding and harvesting, while men are responsible for preparing the land at the beginning of the planting season. Some activities such as seedling planting and harvesting are carried out by both men and women in the Cameroon countryside. In Yangambi, women are involved in rice cultivation and struggle with weeds alongside men. Post-harvesting activities (blending, grinding, boiling, baking, trade, etc.) are often performed by women (Agboh-Noameshie et al., 2013). A number of studies covering African villages show that women generally do more number of agricultural tasks than men, and women often work more hours than men. However, in communities where intensive farming systems are prevalent, it seems that women's labor is less important in production (Sangotegbe et al., 2013).

In the interviews on 47 women and 103 men rice producers in Ghana's Ashanti District, Addison et al. Found that men undertook activities such as land preparation, seed germination, crop harvesting, blending, rice storage, processing and marketing; whereas women undertook activities such as seed planting, removal of weeds, transportation of crops, drying and sorting of seeds, and the preservation of seeds (Addison et al., 2016). It has been observed that the dominant role of men in rice production in Ghana's Ashanti Region is marketing. Women are more occupied with general rice production and characteristics (Addison et al., 2014).

Fonjong and Mbah carried out interviews in December 2003 with 100 randomly selected women from Bamunka, Bamali and Babungo villages where rice cultivation was conducted in the Ndop region of Cameroon to clarify the situation of rice-producing women. As a result of questionnaire-based interviews analyzed by qualitative and quantitative techniques, it was found that women in Ndop undertook approximately 70% of the labor required for rice production. In rice cultivation carried out in the Ndop region, women perform activities such as lawn mowing, transplanting and harvesting in cooperation with men, while mostly performing activities such as sowing, weeding, blending and scraping on their own (Fonjong and Mbah, 2007).

Kolawole et al.'s work in 2011 performed in Nigeria's five provinces of Sawah region (Niger, Kaduna, Ondo, Kwara and Ekiti) showed that the men who live in the region and produce rice undertook all the activities of cleaning, seedbed preparation, diking, canal construction (water canal), blurring/mudding, disposal and marketing; whereas women undertook the task

of winnowing. Other activities such as harvesting, weeding, water management, threshing, transport, fertilization and scaring birds are carried out jointly by women and men (Kolawole et al., 2011).

According to the results of their research with 90 farmers selected by simple random sampling technique from three towns and nine village communities connected to Anambra State in the Awka North Local Government Area in Nigeria in 2017, it was found that women are the key people in rice production. Men who produce rice in the region are involved tasks focusing on land acquisition, clearing land, pesticide applications, seed supply, milling/grinding, blending, fertilizer application/fertilization. Women, on the other hand, are involved in weeding, hazing, irrigation, marketing, planting/transplanting, sowing, preparation of seedlings, and mudding of soil. As a result of this study, it has been observed that traditional labor intensive tasks are increasingly performed by women due to the lack of male labor (Iwuchukwu and Udegbunam, 2017).

There are also significant gender differences in terms of ownership of agricultural land. Due to the patriarchal social structure that is dominant throughout the world, women face restrictions on land access and ownership, especially in rural areas where the effects of this social structure are felt more deeply. In-depth studies of the rice farming communities of Kindia (Guinea) and Yangambi (DRC) have revealed that small rice-cultivated fields belonging to women play a critical role in local rice cultivation. These small fields belonging to women are also used to manage agricultural biological/gene diversity. These small rice gardens are also used as "experimental fields" where new crop varieties are tested (Agboh-Noameshie et al., 2013).

There is also a gender-based variation in decision making and participation in decisions among rice producers. Ajewole et al. conducted a survey on sixteen villages in Nigeria's Nasarawa / Benue rice center; and found that the decision on the type of product to be cultivated was made by men 79.31% of the time, by women 0.86% of the time, and jointly 7.76% of the time. They found that 81.88% of the decisions regarding land management were taken by men, 8.70% by women, and 7.24% by women and men; and 80% of the post-harvest distribution decisions were taken by men, 10.53% by women and 6.14% by women and men (Ajewole et al., 2015). Many studies in the region show that women in sub-Saharan Africa make key decisions for many agricultural activities, including the production of food plants (Sangotegbe et al., 2013).

Women living in rural areas and engaging in agriculture are excluded from modern agricultural technologies as well as the production and dissemination of traditional technologies due to traditional gender roles attributed to them. Although some women farmers in some rice farming areas are seen to be using modern technologies such as tractors, electric straw and animal hauling, many women farmers cannot use these technologies (Fonjong and Mbah, 2007).

Compared to men, women cannot access or have limited access to agricultural technologies that may increase their productivity. Even if they gain access, they do not have the knowledge to use existing technologies. The reasons for this are cultural barriers, heavy workload of

women, women not being aware of the importance of providing information. Agricultural innovations and technologies are often indirectly transmitted to women through men. Adusumili and Laxmi carried out a research in 2011 to reveal the advantages and disadvantages of using the System of Rice Intensification (SRI) methods in rice cultivation. This study is based on comparative analysis with 110 randomly selected farmers (55 using SRI methods and 55 using traditional agricultural methods) using SRI methods and traditional agricultural methods in Andhra Pradesh, south of India. The results of the study show that the task of cleaning weeds belonging to women is now carried out by men because of the use of mechanical tools for this work thanks to SRI methods. As a result of this, it is observed that the labor of men decrease by 64% and the labor of women decrease by 26% in rice production where SRI methods are used (Adusumilli and Laxmi, 2011).

Labor inequalities between men and women in the production of rice are also observed in the division of labor in the household. In many countries around the world, traditional norms require women in rural areas to perform routine activities such as childbearing, house cleaning, cooking, washing, carrying wood, bread making and carrying water. In addition to all this, the fact that women are involved in almost every phase of agricultural and animal production, which are labor intensive processes, causes their burden to increase/become even heavier.

In interviews performed by Addison and colleagues in Ghana's Ashanti District with 47 female and 103 male rice producers, it was found that women spend more time than men for housework that limits economic opportunities. According to the results of the research, the contribution of men to housework varies between two and four hours, while the time women spend on housework varies between eight and ten hours. The results show that women have less time for productive activities and entertainment, and spend more labor for housework (Addison et al., 2016). The interviews performed by Fonjong and Mbah with 100 women selected from rice farming villages of Bamunka, Bamali and Babungo in Ndop region show that women working in rice farming has changed the traditional division of labor and gender roles to a great extent (Fonjong and Mbah, 2007).

There are no studies on gender roles in rice production in Turkey, but it is emphasized in many researches that women in rural areas play an active role in both private areas and many agricultural production activities, and feminization of rural areas have been indicated (Eroğlu, 2017; Eroğlu, 2016; Gülçubuk et al, 2010; Fazlıoğlu, 1999).

Today, women living in rural areas are at a very clear disadvantage with the gender roles that are burdened to them both in the private space and in the public space. The most important element in this position is the removal and exploitation of the value created by woman by the man despite all the labor and efforts of women in production. Women's labor and productive work are ignored and evaluated less, despite their significant contributions to agricultural and rural economies.

In recent years, many studies have been carried out in order to identify and highlight the undeniable roles of women living in rural areas all over the world in agricultural and animal production. Despite the fact that the presence of women in all kinds of production in rural

areas is brought to light, women still face economic and social risks due to the patriarchal social structure.

2. Method

This research was conducted using qualitative data. The primary data sources of the study are the data obtained from the focus groups of women and men living in Çeltikdere village and the observations of the researchers; and the secondary data sources are reports, newspaper news and other studies. In Çeltikdere village, which was studied as a case during the field work, 4 focus groups consisting of 5 men and women, 1 mukhtar (local authority) interview, a face-to-face meeting with a shepherd, and meetings with institutions were conducted.

Research questions of this study are; determining the effects of gender on rice production in Çeltikdere village, and the effects of increasing emigration from the village on genders.

3. Findings

3.1 Demographic Change

Çeltikdere is a forest village, which is established in Aladağ Creek Valley that is part of Seben district, with a population of 215 according to 2016 data. Rock houses from the Phrygians and the presence of church remains that show similarities with Byzantine architecture are evidences of the village being used as a settlement since ancient times (Anonymous, 2017).

In the village of Çeltikdere, which consists of two districts, a collective settlement pattern is seen. Wooden materials are used in the construction of houses, and the ground floors of the houses, which are usually two-storey constructions, are used as animal shelters.

An elementary family structure can be seen in Çeltikdere village. Average number of children in the household is 3-4, and the village is steadily losing population since 2007. The reasons for the population loss and the effects on rice production are important research questions.

The population, which was 318 in 2007, declined to 294 in 2008, 255 in 2010, 224 in 2015, and 215 in 2016, as confirmed by meetings with official institutions.

This population decline affected the educational services in the village and 2 schools in the village were closed due to the decreasing population. Students continue their education in the schools in Seben district, via mobile teaching. During the academic year of 2016-2017, 11 children (7 boys and 4 girls) were attending primary education; and only 5 children (2 boys and 3 girls) were attending high school.

3.2 Change in Agricultural Production

The subsistence production of the households living in Çeltikdere Village is agriculture. Agricultural production is carried out both as vegetative and animal production. Rice

cultivation has the most important place in production. There is a local rice variety that grows in the village. It is a nutritious rice species with long lasting durability, which is called Karakılçık. In 2016, the price of Chinese rice was 4 TL, whereas the price of Karakılçık rice was around 12-13 TL.

There has been an intense decline in production population in the village in recent years. During the 80's, all the households in the Çeltikdere Village were producing rice, in the 90's this rate decreased to 90%, and today it is only 25%. According to official records, only 22 households living in the village in 2016 are involved in rice production. Since Karakılçık is a local species, rice paddy seed is obtained by traditional methods, the separation method. Farmers divide some of the harvest they produce each year as seeds for further planting.

Rice planting starts around the 20th of May and continues until the 30th of June. Crop harvest is in November. Due to the seasonal changes experienced in recent years, however, the harvest is carried out in October.

**“The seasons for rice have changed. We plant it later and harvest it sooner!”
(Rice Producer 1)**

The rice producers in Çeltikdere Village are intensively using agricultural pesticides to kill the weeds in the field and to fight against bahasara (root disease) known as rice disease among the people. A producer explains this situation as follows;

**“There are so many diseases lately, so the farmers increased the use of pesticides in the valley. There are no weeds now, but no rice either! The remaining rice is like poison. Look, I grow rice separately here for my family, without pesticides.”
(Rice Producer 2)**

The production yield of Karakılçık species, which is a local species, is decreasing over the years. This situation caused the market size of rice to shrink. The producers were able to send their products to Bolu province center as well as to Düzce and Adapazarı (Sakarya) provinces, but nowadays they can only send them to Bolu province center.

“Karakılçık is a very precious species. It can last long, 1 unit becomes 2, and cooked rice can last 1 week without going bad. In commercial products this is only 2 days. But it is disappearing day by day. It's not only us, there are some villages nearby that produce rice, and they are in the same situation.” (Rice Producer 3)

The rice producers living in Çeltikdere Village stated that there were floods in the region due to irregular rainfall in recent periods and that the rice trenches constructed for rice planting were negatively affected by floods.

“It is not hitting us from one place, last year the floods came twice and swept all the rice trenches!” (Rice Producer 2)

In Turkey, particularly irregular precipitation and floods due to climate change are encountered in the northern provinces of the country. The interviews that have been held

reveal that Çeltikdere village is affected from this change. According to Farmer registration data, rice production was 68 decares in 2014; 110 decares in 2015; 103 decares in 2016; and 42 decares in 2017.

The most important factor affecting production in Çeltikdere Village is Çeltikdere and Cevizlidere Hydroelectric Power Plants (HEPP), which were built in 2013 on two streams feeding the village. This has increased the affect of climate change that has been felt in the region in recent years, and most importantly, HEPP's water retention prevented the water flow from the stream to rice trenches.

“I worked and tried to convince the people in the village square. I said to them ‘if it is a bad thing, then the government would not do it’. I was wrong, I had no idea. We used to go fishing in these streams. Now our village is ruined.”

HEPPs cause climatic changes to occur more rapidly in the region and make these changes felt more violently. During the focus groups and interviews, it was found that during the construction phase of the Çeltikdere Hydroelectric Power Plant the village was **not given any water for about two years**. This has led to rice production coming to an end.

Besides the Çeltikdere and Cevizlidere Hydroelectric Power Plants located in the region of Çeltikdere Village; the village is also negatively affected by two thermal power plants, one located in the district of Göynük, in Bolu province, and the other located in the district of Beypazarı of Ankara. The villagers especially point out that apple cultivation is affected by this.

All these developments have changed the production pattern of the village. The households that cannot produce rice have migrated to Bolu province center, but continue some seasonal production in the village. Village has shifted from vegetative production to animal production. The number of small cattle, which was 2280 in 1998, rose to 2465 in 2007 and 5799 in 2016. The number of bovine cattle was 247 in 1998, 392 in 2007, and 472 in 2016. Shepherd interviews confirm the total livestock asset statistics between 1998 and 2016.

“I was a rice producer back in the day. Though in recent years diseases were more common in rice, but when that HEPP started retaining water everything got much worse. Most families moved to Bolu. I started thinking. I sold part of my land and I bought these sheep. Now I have about 100 sheep. Some households bought cows, but then you have to buy factory pellet food for cows, that is more expensive. Sheep is the best. I planted fodder crops on some parts of my land. So far things are good for me. But there are no people left in the village.” Shepherd

3.3 Changes in Gender Roles

There is no sharp difference between genders in the role sharing of producers who cultivate rice in Çeltikdere Village in the years when this research was carried out. However, in the focus group interviews, it is stated that rice trenches were prepared by men and other works in the production process were performed by women. It has also been noted in other studies that gender relations in production become more balanced, and women's participation in

decisions increases in crisis situations.

The seasonal migration of men in approximately 10 households in the village causes an increase in the workload of women. Women, who undertake the entire workload of fruit and truck farming, and is a partner of rice production and livestock activities, become solely responsible for vegetative and livestock production due to the seasonal migration of men. Even during the period of the research, a partial feminization can be mentioned in agricultural production. However, it can be said that the feminization of agriculture is the step before the collective migration of the household. This situation reveals that migration due to environmental factors in rural areas is also a problem in the village of Çeltikderesi. Although it has been revealed during interviews that these factors negatively affect both genders, it has a more intense effect by reducing employment and causing dispossession of women and reducing their participation in social life.

4. Conclusion

Rice production in the village is mostly gender-balanced, but the effects of emigration are mostly impacting women. It has been determined that even before the migration from the village to urban centers increased, men in rice producing households did emigrate to Bolu or other places for seasonal work. While this situation was emphasized during interviews to have increased the workload of women in agricultural production, distribution of tasks within the family became more balanced within the household in terms of the highly decreasing production after HEPP construction. Findings obtained in this study indicate that in the village, production of rice is on the point of finishing, fishery is completely finished, and apple growing is under the intense pressure of climate factors and diseases. In contrast to these decreasing productions, there is only an increase in the production of small cattle animals. Animal husbandry is an important stage of adaptation before migration.

The impact of climate change and the hydroelectric power plant on water sources are causing rice production and a local species to come to an end.

Although the households in the village shift to livestock as an alternative to rice production in the fight against droughts, animal husbandry cannot be sustained either due to the lack of local knowledge of producers on this subject, and the lack of active population that can make up the labor force.

In Turkey, climate change is expected to cause an increase in food prices and a risk of food safety. This research has produced data supporting other studies on rural areas carried out in different regions in Turkey (Eroğlu, 2017). The rural dwellers are predominantly immigrating to the city, and the climatic factors felt by producers play a role in this migration. A large proportion of producers are unable to manage the adaptation process alone and need consultancy that matches their conditions. On the one hand, the world today has argued that climate-change-related effects play a role in wars such as the Syrian war, while intense drought and famine have created a concept called climate refugees. For this reason, it is more important today to make societies living in rural areas happy where they are and to help them

adapt to climate change.

In the Çeltikdere village, which is the subject of this study, the common effects of HEPP and climate change are felt by producers. Due to this, a high level of emigration from rural villages to urban centers occurs. Climate change and energy projects take away the local resources and the management power of women living especially in rural areas and are forced to emigrate, and put them in a more vulnerable position.

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