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Evaluation of ORKÖY's heat insulation and stove heating project (Case study: Zonguldak Forest Regional Directorate)

Ufuk Coşgun*

Karabuk University, Forest Faculty, Division of Forest Engineering, Department of Forest Policy and Management
* Corresponding author: ufukcosgun@karabuk.edu.tr

Abstract: The General Directorate of Forests and Village Affairs (GDoFVA) has been providing services to forest villagers with its various organisations for over 40 years. It is aimed to raise the life quality of forest villagers with individual and cooperative loan support of social and economic content. By these means, the objective is to reduce the pressure on forests by forest villagers. Since the Solar Powered Water Heating Systems Project began in 2005, it rapidly became widespread and the project reached approximately 40,000 families. The project, which lead to the increase of life quality among forest villager families, became an example of good practice. It was seen that families benefiting from the project had an average annual saving of 30% on firewood. Starting in 2012, GDoFVA began to implement a new project that aimed to further reduce the firewood consumption of forest villagers. The project undertakes the approach of installing the stove heating system and insulation for homes of forest villagers. The project has three main components: i) heating insulation (sheathing) for homes of forest villager families; ii) stove heating system for houses with insulation, and iii) utilisation of heating insulation and solid fuel heating system. The aim of the study is to determine the level of savings in amounts of firewood consumption in households in forest villages that have heating insulation or stove heating systems, or both. The study includes the households that have taken advantage of the GDoFVA project support in forest villages within the boundaries of the Zonguldak Forest Regional Directorate in the Western Blacksea Region. The sample of the study is all families that have taken part in this new project of GDoFVA between the years 2012-2014. Data for the study was collected from families benefiting from project support by means of face-to-face questionnaires. As a result of investigations and observations conducted in the scope of the study, it was found that heating insulation and solid fuel consuming heating systems practices were considerably successful. It was also found that the levels of savings were lower if the household had only stove heating or only insulation. It was observed that in some of the forest households, families had only solid fuel heating systems or stove heating systems. In such households, it was found that annual firewood consumption increased instead of becoming lower. The study found the project to be successful in contributing to family budgets and reduction of firewood consumption by implementation of the heating insulation and solid fuel heating systems of the project.
Keywords: Forest villages, Fuelwood, New policies of GDoFVA

1- Introduction

The establishment of the General Directorate of Forests and Village Affairs (ORKÖY) and its provision of services is a reflection of the rural development approach of the governments in power in the 1960's. One of the ministries founded by the 28th Government, the İnönü Government in power between 1963-1965, was the "Ministry of Village Affairs". With the transition to a planned system, the Ministry (which was established in 1963) carried out work aimed towards the rural sectors and also the forest villages. Together with the establishment of the General Directorate of Forests and Village Affairs in 1970, the activities aimed to the forest villages gained quality. Activities for the regulation of public-forest relations especially found a niche in the forestry sector (Coşgun, 2008). This was strengthened with the establishment of the Ministry of Forestry in 1973 and the founding of the General Directorate of ORKÖY. Since the 45 past years, the Ministry of Forestry and the General Directorate of ORKÖY continues to carry out its responsibilities within a variety of different organisational structures. Today, the "Departments" within the General Directorate of ORKÖY continues to carry out its activities and responsibilities. The ORKÖY continues to provide social and economic support to forest villages by means of cooperative and individual loans.

The main function of ORKÖY is to regulate the public-forest relations with the aim of reducing the pressure of forest villagers on forests. Since its establishment, the organisation has provided social and/or economic related support. Projects implemented as cooperative or individual loans have varied according to the economic political processes at the national level. In the scope of this process, research conducted by Directorates of Forestry Research and Faculties of Forestry of universities (including other faculties), have sought to regulate public-forest relations, to determine the characteristics of rural communities, to assess the place of forest villagers in society and to ascertain socio-economic situations (Sakman, 1974; State Planning Organisation, 1970; State Planning Organisation, 1971). The organisation of forest engineers have open to discussion the policies for forest villagers. The activities of ORKÖY have been assessed in general terms with the aim to shed light on the processes so far (OMO, 1974). The early practices/activities of ORKÖY, up to the 1980's, have been reviewed and data was attempted to be produced to contribute to the field studies and actions of ORKÖY on the basis of a variety of examples of field studies (Anıl, 1973; Duruöz, 1975; Duruöz et al., 1976).

The 1980's comprises the second phase of the ORKÖY. In this period, studies concerning forest villages increased and it was aimed to contribute to the activities of ORKÖY by conducting studies regarding the urbanisation and forest-village

relationships were conducted by taking samples of the population in the scope of the socio-economic structures of forest villages were conducted, evaluations regarding the development of forest villages were made and, in regards to the ORKÖY district development plans, studies were conducted to determine the optimum enterprise plans by carrying out linear programming techniques for the forest villages-agricultural enterprises economic analysis for the districts (Geray & Acun, 1980; Acun, 1983; Taraklı, 1982). Important data for ORKÖY was determined regarding the impact of energy consumption by forest villagers (İstanbullu, 1978). The 1960-1980 period was reviewed with an attempt to determine the levels of Village, Town and City Social Transformation. By the end of the second phase of ORKÖY since its establishment, The ORKÖY activities were investigated and new ORKÖY models were discussed concerning the activities for the development of forest villages and the future of ORKÖY (Akşit, 1985; Çağlar, 1986).

The third phase of ORKÖY is the period of the 1990's where a variety of studies were conducted on the activities of ORKÖY. The socio-economic problems of forest villages were determined and recommendations for district or regional level solutions for the development of the forest villagers were developed (Özkurt, 1998; Coşgun, 2005). The global concept of Social Forestry was discussed and new opportunities for ORKÖY were considered (Tolunay, 1992; Tolunay, 1998; Tolunay et al, 2007). During this period, the reflection of the ORKÖY plans and implementations on the forest villagers were investigated (Gümüş, 1993). Especially the level of use of firewood by forest villagers and its impact on the forest eco-system and its impact on the socio-economic situation of forest villagers were determined. By doing so, the ORKÖY practices were evaluated in a different light (Türker & Toksoy, 1992; Türker, 1992).

In the fourth phase of ORKÖY, two main areas of activity of ORKÖY were given emphasis. The first of these was to establish the measures and criteria to be used in the scope of individual and cooperative loan provisions (Coşgun et al., 2007; Coşgun et al., 2009; Alkan & Demir, 2013; Tolunay et al., 2002). The second was the studies to evaluate the impact of the ORKÖY projects implemented to date on the forest villagers (Tolunay & Korkmaz, 2005; Uzun, 2008; Önal, 2010; Önal & Bekiroğlu, 2011; Ay & Tolunay, 2012; Okutucu et al., 2012; Korkmaz & Alkan, 2014; Coşgun et al., 2015, Coşgun & Güler, 2015).

It can be seen in the National Forestry Programme that there is priority given to ORKÖY and forest villagers. The priority areas in the National Forestry Programme are: i) legislation to be developed concerning the principles and procedures regarding the development services for forest villagers, ii) development of the capacity of forest villagers in regards to organisation, production, marketing, iii) realisation of joint initiatives and activities by related groups to strengthen the allocation of public resources for rural development programmes for disadvantaged mountain and forest villages. In addition, the second area of priority was identified as: i) determining the contributions, problems and development needs for the preservation forests, forest-village relationships and development of forest villagers in light of the policies, strategies and practices of past forest organisations, ii) with the aim of improving the struggle and life conditions of forest villagers, to determine the opportunities and conditions of wide spreading appropriate integrated-holistic rural development models (Eastern Anatolian Basin Development Project, etc.) (Anon, 2004).

Aim: The aim of the study is to identify the level of savings on fuelwood in the scope of heat projects implemented in forest villages by ORKÖY, such as heat insulation in houses, stove heating systems or where both practices were applied simultaneously. The sample of the study was obtained by the total area sampling system of families taking advantage of the new project implementations of ORKÖY between 2010-2015. Data was obtained from families participating in the project, by the method of face-to-face questionnaires.

The scope of the study was i) solar energy systems (SES), ii) stove heating and iii) sheathing projects were implemented for the forest villagers by the ORKÖY Branch of the Zonguldak Forest Regional Directorate.

2. Materials and method

The literature of the study was obtained from other studies conducted on the subject matter. In this scope, the data from the General Directorate of Forestry ORKÖY Department, the ORKÖY Branch of the Zonguldak Forest Regional Directorate and the Provincial Forestry Departments of Zonguldak, Bartın, Karabük and Yenice was used. Local data from the forest villages in the region was obtained by means of face-to-face questionnaires administered to forest villagers who had taken advantage of the ORKÖY investments. The sample of the study was obtained by the total area sampling system of families taking advantage of the new project implementations of ORKÖY between 2010-2015. The scope of the study included the forest villagers for which i) solar energy systems (SES), ii) stove heating and iii) sheathing projects were implemented by the ORKÖY Branch of the Zonguldak Forest Regional Directorate (Table 1, 2, 3).

In regards to the number of enterprises/families which took advantage of the ORKÖY Stove Heating and Sheathing projects, all such enterprises/families were included in the sample. When going to the field to conduct the questionnaires, it was that case that some families could not be interviewed, as they are living both in the village and in the city and had not yet returned to their village. A total of 24 families had implemented the stove heating practice in the region (Table 3). Of these, a total of 21 face-to-face questionnaires were administered to a total of 21 families. 133 families took advantage of the sheathing practices. Of these families, a total of 103 (77.44% sampled) face to face questionnaires were administered to families. 80.00% of those included in the sheathing project in Bartın, 84% in Karabük and 72.60% in Zonguldak was included in the sample. Of the total 154 families who took advantage of both projects, 80.52% (124 families) were included in the sample. In this way, the fuelwood saving for both practices were attempted to be determined. It was found that some families implemented both the SES project and the sheathing project or stove heating project, while some families implemented the sheathing or stove heating project and then implemented the SES with their own means. In order to obtain information on the level of savings on fuelwood in the scope of the ORKÖY SES practices, face-to-face questionnaires were conducted in the

same villages or neighbouring villages. Thus, interviews were conducted with 124 families who had taken advantage of the ORKÖY SES project. In this way, the amounts of fuelwood savings were determined for each of the three projects.

3. Findings and discussion

3.1. Distribution of the ORKÖY SES, sheathing and stove heating projects

3.1.1. Distribution of the ORKÖY SES Projects in the region

The investigation of the Zonguldak Forest Regional Directorate ORKÖY practices were conducted under three main headings: i) Sheathing, ii) Stove Heating and iii) Solar Energy Systems. ORKÖY SES practices for forest villagers were conducted by the Zonguldak Forest Regional Directorate between 2010-2015 for 2,590 families (Table 1).

Table 1: Zonguldak Forest Regional Directorate ORKÖY SES Practices

Row Titles	2010	2011	2012	2013	2014	2015	General total
Amasra	33	0	0	21	0	0	54
Kurucaşile	20	6	17	0	0	0	43
Merkez	178	77	40	62	0	16	373
Ulus	67	53	9	0	0	13	142
Bartın	298	136	66	83	0	29	612
Eflani	75	37	0	0	0	0	112
Eskipazar	0	11	0	0	0	0	11
Merkez	14	0	12	0	20	0	46
Ovacık	56	0	0	0	3	0	59
Yenice	22	23	0	0	0	0	45
Karabük	167	71	12		23	0	273
Alaplı	0	9	0	0	0	0	9
Çaycuma	106	50	77	80	0	0	313
Devrek	63	210	42	87	37	0	439
Dirgine	0	0	7	1	0	0	8
Ereğli	74	55	59	103	153	0	444
Gökçebey	124	81	0	0	10	0	215
Kozlu	44	64	23	0	0	0	131
Merkez	61	54	31	0	0	0	146
Zonguldak	472	523	239	271	200	0	1705
General Total	937	730	317	354	223	29	2590

The ORKÖY SES practices were 23.63% in Bartın, 10.54% in Karabük and 65.83% in Zonguldak. It can be seen that in Bartın, 60.95% of the implementation was in the forest villages of the Central District, 23.20% was in Ulus, 8.82% was in Amasra and 7.03% was in Kurucaşile. The implementation in the forest villages of the districts of Karabük was as follows: 41.03% in Eflani, 21.61% in Ovacık, 16.48% in Yenice and 4.03% in Eskipazar. In the case of Zonguldak, the implementation for the families in the forest villages in the districts as follows: 26.04% in Ereğli, 25.75% in Devrek, 18.36% in Çaycuma, 12.61% in Gökçebey, 8.56% in the Central district, 7.68% in Kozlu, 0.53% in Alaplı and 0.47% in Dirgine (Table 1).

3.1.2. Distribution of the ORKÖY sheathing projects in the region

ORKÖY Sheathing practices for forest villagers were conducted by the Zonguldak Forest Regional Directorate between 2010-2015 for 133 families (Table 2). It can be seen that the distribution of the ORKÖY sheathing practice was 23.63% in Bartın, 10.54% in Karabük and 65.83% in Zonguldak.

Table 2: Zonguldak Forest Regional Directorate ORKÖY Sheathing Practices

Province	District	Number of projects implemented
Bartın	Ulus	5
Bartın	Merkez	5
Bartın Total		10
Karabük	Merkez	45
Karabük	Ovacık	2
Karabük	Yenice	3
Karabük Total		50
Zonguldak	Ereğli	60
Zonguldak	Çaycuma	13
Zonguldak Total		73
General Total		133

The ORKÖY Sheathing practices were conducted in forest villages as 7.52% in Bartın, 37.59% in Karabük and 54.89% in Zonguldak (Table 2). It can be seen that in Bartın, 50.00% of the implementation was in the forest villages of the Central District and 50.00% was in Ulus. For Karabük, the implementation was 90.00% of forest villages of the Central district, 6.00% in Yenice and 4.00% in Ovacık. In the case of Zonguldak, the implementation of sheathing in forest villages in the districts are as follows: 82.12% in Ereğli and 17.88% in Çaycuma.

3.1.3. Distribution of the ORKÖY stove heating projects in the region

There were 24 cases of the ORKÖY loan provision for stove heating practices for forest villagers with the aim of saving on fuelwood was conducted by the Zonguldak Forest Regional Directorate between 2010-2014 (Table 3). This was only implemented in the Yeşilöz Village in Dirgine District of Zonguldak (Table 3).

Table 3: Zonguldak Forest Regional Directorate ORKÖY stove heating practices

Province	District	Village	Year	Number Implemented	Loan Type
Zonguldak	Dirgine	Yeşilöz	2014	24	Stove Heating

3.2. Contribution of the ORKÖY SES, sheathing and stove heating projects to savings on fuelwood

The investigation of the ORKÖY practices of the Zonguldak Forest Regional Directorate showed that the average annual fuelwood consumption was 18.28 stere and 2.31 tonnes coal for use for cooking, showering, etc. for families who took advantage of the loan opportunities for the i) sheathing, ii) stove heating and iii) solar energy systems. According to Coşgun (2005), the annual fuelwood consumption was 35.8 stere in the early 1990's in the Western Blacksea Region. According to the 2015 data for forest villages of the Western Mediterranean Region, the annual fuelwood consumption was 11.74 stere (Coşgun & Güler, 2015).

3.2.1. Contribution of the ORKÖY SES projects to savings on fuelwood in the region

The ORKÖY SES project implementation was made widespread to the forest villages in the Western Blacksea Region by the Zonguldak Forest Regional Directorate. It was stated that the families who took advantage of the SES project generally benefitted from the project in the summer months. It is generally used following the work concerning the farming and husbandry work. It was stated that the fuelwood saving of families who had received the SES support in region was 32,0%. The annual fuelwood saving of families taking advantage of the SES support in the Western Mediterranean Region is 30% (Coşgun & Güler, 2015).

3.2.2. Contribution of the ORKÖY sheathing projects to savings on fuelwood in the region

It was determined that the annual fuelwood saving of the families who had received the sheathing support was 52.78%. An attempt was made to determine which of the practices (sheathing together with the SES project or SES practices implemented by families own mean) brought about the most saving on fuelwood. It was found that the annual fuelwood saving of families who had both the sheathing and SES practices together was higher when compared with the saving incurred by just the sheathing practice. The sheathing project practices saved more than 52.50% on average in comparison with the SES project practices. Similarly, families who had sheathing together with the stove heating system saved on average 61.57% more fuelwood than families who had only the stove heating practices.

3.2.3. Contribution of the ORKÖY stove heating projects to savings on fuelwood in the region

In the forest villages (Yeşilöz and Tohumlar villages) of Eğerci Village of Dirgine District in Zonguldak, 24 cases of the Stove Heating Project was implemented (Table 3). In practice, this was implemented in two ways. The first was to establish

"stove heating" in the houses and the second was to establish "room heating". The observations showed that the "room heating" was more effective. This means of heating generally uses coal for fuel. Wood is most commonly used as kindling. The practice of "stove heating" generally uses wood as fuel. In the interviews held, the families receiving the support for the "stove heating" stated that they mostly used wood as fuel. Prior to the project, there were heaters in both of the rooms; after the project implementation, the stove is used in only one room. Radiators are placed in the other rooms. As the fuel chamber of the stove heater is larger, larger sized wood can be used. During the winter months, the stove is always kept alight in order to heat the other rooms. In the case where there is a heater in each room, the second heater is only fired at certain times. In the majority of the houses in the region which are using either the "room heating" or the "stove heating" do not have exterior sheathing. Therefore, there is a large amount of energy/heat loss. This leads to a heating problem, resulting in the need to consume more fuel. If there is no sheathing, the aim of saving on the consumption of fuel cannot be reached. It was also observed that some enterprises/families who had received the sheathing support had also implemented the "room heating" system with their own means. Thus, when these two approaches are combined, there is a significant chance for saving on fuelwood as this is a more efficient practice.

A comparision of "room heating" and "stove heating" has showed that, coal is most often used as fuel for the former and wood for the latter. Thus, it is important to encourage the wider use of "room heating".

Another factor which effects fuelwood consumption in the "room heating" and "stove heating" practices is the number of members of the household. In households were there a 2-3 persons and homes which are used all year round, this practice is less efficient. It is stated that it is more efficient if the members of the family are 4 persons or more.

Within the sample, there were families who had received ORKÖY support for "room heating" or "stove heating" and also the Solar Energy System (SES) to be used for hot water. To be able to Access hot water in a short period of time has increased the quality of life for the villagers, especially in the summer months following the laborious farming and husbandry work. However, this has not had an impact on the annual fuelwood saving. When considering the annual fuelwood consumption of families, the "room heating" or "stove heating" project practices leads to 25.45% more saving than the SES project practices. The reason for this is that there percentage of exterior sheathing is low among households. On the other hand, families who have taken advantage of the ORKÖY "room heating" or "stove heating" project has saved an average of 31.25% fuelwood annually.

4. Conclusion

This study has determined the probable contribution of the ORKÖY Zonguldak Forest Regional Directorate loan support projects of i) sheathing, ii) stove heating and iii) solar energy systems on fuelwood saving. The annual fuelwood consumption of villagers in the region has shown a significant reduction in comparison to the 1990's. It was observed that forest villagers has also began consuming coal as fuel, instead of firewood. It was found that the average annual fuelwood consumption had reduced to 18.28 stere and 2.31 tonnes coal was also used as fuel. Considering that an annual consumption of 2.5 tonnes of coal is on average equitable to 10 stere fuelwood, the annual fuelwood consumption is at the amount of 28.28 stere. This amount is below the amount of 35.8 stere annual fuelwood which was found to be consumed on average in the Western Blacksea Region in the first half of the 1990's. The reduced amount of fuelwood consumption is also thought to be the result of the reduced forest village population and lower members of households in the last 20 years.

It was seen that the average fuelwood saving was 32.00% as a result of the ORKÖY SES Project, a saving of 52.78% as a result of the sheathing project and an average of 31.25% as a result of the "room heating" and "stove heating" project.

Families stated that their coal consumption increased with the room heating practices, while fuelwood consumption increased with the stove heating practices. Of the two approaches, the room heating practice should be preferred and the villagers should be encouraged to implement this project. However, in both cases, the lack of appropriate exterior sheathing for the majority of houses means that the impact of the practice is not effective on the consumption of fuel. Therefore, the families who are to implement the "room heating" or "stove heating" projects should consider the condition of their housing. It is important for the housing to have at least a common approach insulation.

The ORKÖY sheathing project was the project which resulted in the most saving of fuelwood on average, annually. It is recommended for this practice to become was widespread as possible. However, the cost involved in this approach is a limitation for its widespread practice. Forest villager families expressed doubts as to whether they could meet the costs of sheathing. It is not easily accepted and practiced. For this reason, the ORKÖY should develop long term policies for provision of loans for this practice. As with the momentum gained since 2005 with the ORKÖY SES practices, it could be a possibility to ensure a longer term in loan repayment to ensure the practice can be an option.

It was seen that the most significant impact on the reduction of fuelwood was to implement two projects in combination. However, the costs involved in the combined approach has an effect on the rate of implementation in such way. It is recommended that policies be developed for special loan opportunities for sheathing and also to implement the sheathing and room heating practices together.

Technology of heat insulation is rapidly developing. The use of boron based materials are increasingly becoming widespread. Materials such as polystyrene, fiberglass, etc. in sheathing practices should no longer be used. A recent fire in England has led to the discussion of using materials which have a higher level of fireproofing in the insulation of buildings. According to studies, there are materials manufactured under various trade names in Turkey which boron based, are more fireproof and can provide sound insulation. Thus, policies need to be developed to encourage the use of boron based materials in sheathing practices.

The architectural characteristics of housing in forest villages are more preserved than that of urban housing and are thus have heritage/traditional value. In this light, the sheathing practices should be applied in a manner which preserves the architectural design of the housing. It is recommended to take special consideration when developing new policies to make changes to the project concerning the interior insulation of the houses.

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