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Poverty, Forest Dependence and Migration in the Forest Communities of Turkey

Evidence and policy impact analysis

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EXECUTIVE SUMMARY

This paper is part of an ongoing collaboration between the World Bank and the General Directorate of Forestry (GDF) in Turkey. In 2013, the GDF requested that the Bank help update their 5-year Forest Sector Strategy (2017-2021), and together they developed a Forest Policy Note (FPN) which provided a comprehensive overview of the Forestry Sector; an in-depth analysis identifying areas in which the sector could adopt international best practices in sustainable forestry management. As part of that analysis, a survey was also undertaken to better understand the socioeconomic dimensions of forest villages, their forest dependency and the constraints to income growth in these rural areas. This paper is a complementary document to the FPN, and summarizes the findings of the socioeconomic survey of forest villages and identifies several potential policy directions to improve the livelihoods of forest villagers.

Turkey's forests are an important asset both domestically and internationally. Turkey's forests, covering about 28.6% of land area and accounting for 13% of the total forest coverage in the European Union (EU), represent an extremely important asset in both the domestic and international context. State owned forests (99.9% of all forests) generate over $225 million in harvesting revenue annually and possess a rich diversity of non-wood forest products (NWFPs), largely unexploited, with great export potential to EU countries. Turkey's forests play a critical role in conserving biodiversity, mitigating the adverse consequences of climate change, and supporting the livelihoods of over 7 million forest villagers (representing about 40% of the rural population). Forest villagers also represent a significant proportion of Turkey's rural poor.

The policies and goals of the General Directorate of Forestry (GDF) reflect the Government's commitment to sustainable forest management and poverty alleviation. The General Directorate of Forest (GDF), the key forestry governing body, developed a Forest Strategic Plan (FSP) (2017-2021), which determined an overall vision with four main objectives. These include: (1) protecting the forests and biodiversity against biotic and abiotic pests, (2) developing and expanding the existing forests and increasing forest harvesting efficiency, (3) meeting the public's evolving expectations for forest goods and services and (4) ensuring the institutional development needed to provide sustainable forest management. The FSP also contains a number of sub-objectives to strengthen the outcomes of the 4 main objectives, notably the continued support of raising the standards of living for forest villagers. More specifically, they have directed their policies and programs towards: (1) improving the living standards of forest villagers by creating better paid employment opportunities, and (2) modernizing the forest sector by upgrading forest information systems, equipment, and also human capital through skills development and training. Generating higher return forest employment, and investing in a skilled productive labor force, will have the dual effect of improving livelihoods and sustainable forest use and management. To implement the entire FSP 2017-2021, the GDF has notionally allocated over $US 10 billion over this timeframe to achieve these objectives, with over $283 million in forest villager support, including the goal of creating more than 5,000 new forest-related employment opportunities.

Sustainable forest management and poverty alleviation are twin goals embodied in the Constitution and Forest Law. The government's forest development policies prioritize the sustainable management of forests, in conjunction with anti-poverty measures among forest dwelling communities. These policies are reinforced through the Forest Law and the Constitution. Two articles (169 and 170) in the Constitution are directly related to the overall management and development of Turkey's forest resource. Article 169 focuses on the protection of state forests, and Article 170 mandates the necessity for effective co-operation between the state and inhabitants of forest villages through appropriate measures designed to improve their living conditions. *The approach is based on the understanding that if the livelihoods of villagers can be supported and more income opportunities provided, relations between villagers and the sector would promote more efficient protection of forests and better living standards for forest-dependent communities.* Under the Forest Law, forest villagers are also given preferential treatment. Under Article 40, villagers have a right to employment in the harvesting, thinning, afforestation, maintenance and transportation activities undertaken by the GDF.

The livelihoods of forest villagers are also supported through a specialized grant/loan program administered by the Forest and Village Relations Department (ORKOY) within the GDF. The purpose of ORKOY is to contribute to the protection, development and attainment of forest production targets by supporting the socio-economic development of forest villagers through the operation of a grant and soft-loan program. It is intended to contribute to sustainable forest management and reduce the negative pressure on forests. ORKOY's main activity is the soft loan/grant program for both individuals and cooperatives. In 2017, ORKOY's total budget was 150 million TL ($US50 million) – with 120 million allocated to loans/credits and 30 million to grants. Individuals may apply for credits and grants for social (i.e. home energy efficiency measures) and economic (i.e. income generating) purposes. Loans and grants are also offered to established cooperatives within villages. In 2014, ORKOY provided support to over 12,500 families and 23 cooperatives.

Challenges to achieving GDF's goals are the result of current forest-use patterns and the changing socio-demographics of the forest village population. The government and its development partners, including the World Bank and EU, have recognized the challenges posed by (1) low productivity of the forest sector due to inadequate investments in forest management technology and the skills of the local labor force, and (2) the rapidly declining and ageing population in forest villages due to migration resulting from high poverty and a lack of employment opportunities. Over the past 35 years, the forest villager population has fallen from 18 million to about 7.1 million, as of 2014, mostly due to net out-migration to urban areas as people seek employment and better opportunities. Since forest villagers constitute GDF's harvesting labor, managing the forests with a vanishing labor force is becoming increasingly difficult. Migration will continue to be a growing concern as long as the harvesting model relies on mostly low-skilled, low-paid, manual labor with low returns.

The Socio-Economic Household Survey of Forest Villagers (SEHS), conducted by the GDF and the World Bank in 2016, was launched to provide further insights on the livelihoods of forest-dependent households. This new data source collects important information on the socio-economic conditions of forest village populations, income generating opportunities, forest use and management practices, migration and activities of forest development programs and cooperatives. The analysis highlights the main challenges (summarized below) to improving villager livelihoods and forest management and provides much needed evidence for informing the design and implementation of forest community development programs.

Challenge 1: Poverty rates are high and unequally distributed. The poverty rate in forest villages, estimated using the national poverty line of 1,115 Turkish Lira (i.e. $319 USD) per month, per capita[3], is approximately 80%, which is more than twice the average rural poverty rate in Turkey according to official statistics. There is also significant spatial variation in poverty levels, both across regions and within regions. Comparing SEHS forest-village poverty rates to regional poverty rates from the Income and Living Conditions Survey shows that although a region's overall poverty rate might be low, it might harbor high-poverty forest villages. The Mediterranean Region is a case in point where the regional poverty rate is about 18% (Turkstat), but is higher among forest villages (68% from the SEHS). This indicates that within-region inequality is being masked when aggregated to the regional level and so targeted social programs should be aware of this.

Challenge 2: Poorer forest-village households appear to be held back by their high forest-dependency and lack of income diversification. In certain contexts, forest dependency can result in a poverty trap, and this currently appears to be the case in Turkey. Forest dependency is reinforcing poverty in forest village households because of the low-returns to forest-related activities; a result of low value-added forest product sales (and prices) and low-skill, forest-related employment. Limited income diversification opportunities, as found in the SEHS, further traps these poor households in a cycle of generating low-value forest income.

Forest income constitutes the largest share of income among the poorest households, with the lowest returns. It is 28% of a poor household's income, compared to 8% of total income for non-poor households. Not only is average gross income the lowest at 2,158 Turkish Lira (TL) ($US 617), but income disparity exists even within participating households as highlighted by the difference in the median gross income which is only 400 TL ($US 114). Approximately a quarter of poor households receive income only from forests, compared to 2% of non-poor households.

Non-poor households diversify more, and in higher-return activities. Most often, these households supplement forest income with income from livestock, agriculture, and pensions. Agricultural income has the *highest returns* among all sources, averaging 28,700 TL ($US 8,200) across households. This is even greater than the average household income in the sample, but used more by non-poor households (18%) than poor ones (8%). It is interesting to note that pensions represent the *largest share of income* among non-poor households (constituting 44% of household income on average) which provides evidence for an ageing demographic and a heavy reliance on cash transfers. Moreover, 8% of these households use pensions as their only source of income. This is not surprising since the average pension is approximately 15,500 TL ($US 4,429), almost 60% of average household income.

Challenge 3: Growing out-migration is most prevalent among forest-dependent households, which poses a threat to the GDF's current forest management model owing to its reliance on forest village labor supply. Although migration reduces the pressure on forests, the costs of insufficient forest management will be higher in the long run. An improved forest management model that improves the sustainability of forest-use among

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3   From TÜRK-IS Survey in July 2016 http://www.turkis.org.tr/TEMMUZ-2016–ACLIK-ve-YOKSULLUK-SINIRI-d1156#sthash.vQEufSOc.dpuf

villages and directs forest collection and services towards more profitable opportunities will ensure both a thriving community and forest.

Migration rates show no sign of slowing down. Economic migration is a pathway out of poverty among forest village households, and its prevalence is on the rise. In the SEHS, 13% of households claimed at least one migrant during the past 5 years, a number 2% higher than the 5-year period from (2005-2010), indicating an upward trend in migration. Moreover, a fifth of households (19%) with permanent migrants have no prime working-age members left at home.

A more in-depth analysis reveals the potential of three policy levers that influence migration: membership in forest-related cooperatives and associations, forest-dependency and income diversification to have the most significant effects on the household's migration decision. Forest cooperative membership and income diversification reduce the probability to migrate, whereas forest-dependency increases it. Since previous findings highlighted that the poor are more forest dependent and diversify less, we can conclude that poor households are more likely to migrate. A policy simulation to estimate the benefits of cooperatives found that in the hypothetical case of full membership across all households, migration would decrease by 19% (i.e. almost 500,000 fewer people would migrate).

Challenge 4: Policy simulations reveal that poor households benefit more disproportionately from access to productive assets and cash transfers (such as pensions and remittances). Results from using SEHS data show that one of major differences between the poor and non-poor households is access to pensions. Based on median income by source, pensions are ranked as the second most important source of income (non-forest wage is ranked first), and its security and stability indicates that pension income serves as a safety net to reduce income vulnerability. Access to productive assets was also found to be an important factor in generating higher income. Three policy simulations were conducted by 1) targeting ORKOY credit programs to households that currently do not have key productive assets, such as trucks and tractors, 2) providing basic income support to households that do not receive pensions, and 3) a combination of both interventions. Simulations were conducted by assuming that all villagers were provided these types of support. The analysis explored the impact these interventions had on income and the poverty rate.

While the first policy (1) generates a much larger overall reduction in the poverty rate (30%), the increase is smaller across the income distribution; with the poorest seeing a >40% income increase, while the richest see only a 26% increase in income. In contrast, the second policy (2) is less effective in reducing overall poverty (12% reduction in poverty rate) but it is highly progressive. The poorest saw the largest increase in income (113%) while the richest gain only about 1% in income. The implementation of these two programs combined is estimated to halve the poverty rate among forest villagers (54% reduction), which suggests that the two programs are tremendously complementary.

Moving forward

Recommendation 1: To slow out-migration of forest villages, create greater income opportunities from the forests and diversify. Migration is an inevitable consequence of development. As economies and cities grow, it is natural for migration to occur in the search for a better standard of living. However, in terms of forest resource management, there is an argument to be made that harvesting labor will largely remain a rural job. So the challenge is in how to incentivize living in conditions that are less connected to the outside world. In this study, migration was found to increase with forest dependency and lower income diversification opportunities. In contrast, membership in forest cooperatives was found to reduce the tendency to migrate. Although it would not halt or reverse out-migration, the identification of better income opportunities, perhaps through ORKOY support to the establishment of forest cooperatives, would help diversify forest income from only the low value-added activities being practiced today. But how do we identify these opportunities?

Recommendation 2: Investments in value-added activities such as NWFP processing, can increase forest villager employment, productivity, and thereby also the standard of living for forest villagers. Turkey is the 12th largest exporter of NWFPs in the world, but only 20% of NWFPs undergo domestic value addition (such as processing) before being exported. The estimated value of this gap is significant. A recent World Bank assessment of non-wood forest ecosystem services estimated the value of NWFPs for Turkey at US$2.30 per hectare per year, compared with an average for Europe of US $20.70 (only 10% of Europe's average). In another study of NWFP management across Europe (EU StarTree Project) found Turkey to have the smallest share of managed or formally-harvested NWFP cultivation (approximately 30%).

NWFPs have traditionally been collected by forest villagers at low prices (tariff price) and there is a need to strengthen the value-chain of NWFPs by encouraging more local processing and value adding. Targeted programs that enable investments in Small and Medium Enterprises (SMEs) for processing and packaging of NWFPs would strengthen the value chain and local connections (e.g. via e-commerce). While the potential of NWFPs should not be oversold in terms of their potential for lifting thousands of people out of poverty, they can make a difference to those located near high-value products that can be developed. So where are the opportunities for NWFP strengthening and development?

Recommendation 3: A comprehensive and expansive National Forestry Inventory (NFI) is an essential tool for future policy and NWFP sector development. The current system of assessing forest data on a national level relies on the amalgamation of information from forest management plans to provide data on forest resources at a national level for policy, planning and for data to comply with its international reporting commitments. This has a number of shortcomings including the timeliness of data and lack of precision in the main parameters. National forest policy also requires accurate, timely and comprehensive information. An NFI could help identify region-specific issues, such as tourism opportunities, road infrastructure, NWFP location and potential and help the GDF prioritize these issues. Information generated would also be useful to forest villagers for local development and support programs. Work in this area would also include expanding the NFI to cover other important issues such as biomass and soil carbon. This wider accounting stance would allow for estimation of the Total Economic Value (TEV) of forest and ecosystem services, which are not currently valued, which leads to more informed decision making on the development potential of specific forest areas.

The NFI could be combined with future socioeconomic surveys of forest villagers to help identify potential new opportunities of support through ORKOY.

1. INTRODUCTION

Steady economic growth over the past few decades has bought Turkey to the threshold of becoming a high-income economy. According to a World Bank report (2014), Turkey's achievement is attributed to major policy reforms that have fostered: (1) economic integration through trade liberalization and improved connectivity (investment in infrastructure investment and ICT) (2) social inclusion through managed urbanization, job creation and improved public services and solid public finances and (3) strengthened institution. Recognizing the importance of its forest resources both in the international and domestic context, Turkey became a party of the United Nations Framework Convention for Climate Change (UNFCCC) in 2004.

Turkey's forest covers about 28.6% of the land area, accounting for 13% of the total EU forest coverage. The sustainable management of forest resources has important implications both for Turkey and the EU region in achieving these development objectives. Forests provide multiple environmental services including watershed protection and erosion control, wood panels industry, a rich source of non-wood forest products (NWFPs), and support the livelihoods of forest communities. They are also home to a population of 7.1 million forest villagers, accounting for about 9.6% of the national and 40% of the rural population.

To promote sustainable forest management, several national forest development strategies have been developed, including the National Forestry Program (2004-2023), and the Forest Strategic Plan (FSP) (2017-2021). The FSP was developed following the principles of the global policy for sustainable development, with its broader range of objectives including addressing climate change, conserving environment and biodiversity, reducing poverty and achieving the Millennium Development Goals (MDGs).

Four priority areas are identified in FSP, including (1) improving productivity of wood production and harvesting by forest villager through better technology and equipment, (2) expanding the collection of NWFPs, and increase the value added of NWPFs by developing SMEs targeted at processing and packaging (3) improving the efficiency of the timer supply chain and procurement through investments in forest resource information systems and improving the efficiency of the timber harvesting supply chain by more closely integrating harvesting entities (villagers and cooperatives) which are the principle suppliers (GDF) and purchasers.

The two most pressing challenges to achieving the objectives set forth in the FSP are: (1) the rapidly declining and ageing population in forest villages due to migration (2) low productivity of the forest sector due to inadequate investments in forest management technology and the local labor force. Over the past 35 years, the forest villager population has fallen from 18 million to some 7.1 million (in 2014), mostly due to net out-migration to urban areas in search of employment and better opportunities. Other factors that have spurred migration in the past include high levels of poverty due to a lack of income sources, poor infrastructure, limited access to markets, and inadequate social services (General Directorate of Forestry, 2014).

In response to these challenges, the GDF has launched a range of initiatives to improve the living standards of forest villagers. These include increased investments in technology and infrastructure in forest areas, provision of financial assistance to village populations, skill training programs, and improved collaboration between GDF and forest villages. However, despite the long history of government supported programs in forest communities, the impact of external support on a household's welfare and migration decisions remains largely unknown owing to a lack of data. The few published studies provide non-generalizable conclusions because of their limited sampling and geographic scope (Akan and Kilic, 2014; Atmis et al., 2009; Gokce, 2005; Tolunay and Alkan, 2008; Yilmaz, 2006).

To fill this information gap, in 2016 the GDF collaborated with the World Bank to conduct a large-scale socio-economic household survey (SEHS) across forest villages (World Bank, 2016). This report aims to use the 2016 SEHS to understand the socio-economic condition of forest village populations, in particular, their income generating opportunities, forest dependency, and the linkages between poverty, forest dependence, and migration. This analysis has four main themes: 1) identifying principal income sources and income diversification strategies across forest villages, 2) identifying variations in poverty levels, forest use and forest management practices across villages, 3) examining factors associated with migrations and evaluating linkages between poverty, forest dependence, and migration 4) evaluating ways in which these households can move out of poverty.

This report has eight chapters. Chapter 1 provides the strategic context and motivation of this study. Chapter 2 presents key features of forest resources, forest institutions, the evolution of forest legislation, and key forest development plans in Turkey. Chapter 3 presents a summary of the 2016 SEHS data, including household demographics, income sources, activity participation rates and comparisons between the poor and non-poor. Chapter 4 disaggregates income by forest product and evaluates forest dependence. Chapter 5 explores household migration decisions and their influences. Chapter 6 discusses findings from an income determination model whose results help identify key determinants of household income. Chapter 7 provides an interpretation of the results and assesses the distributional impact of policy measures proposed to address poverty. The final chapter concludes with policy recommendations to sustain the level of labor force in forest communities, primarily by enhancing forest management and protections and improving the forest population's living standards.

2. FORESTS AND FORESTRY INSTITUTIONS IN TURKEY

2.1. Forest Resources

Turkey's forest area[4] accounts for about 28.6% of land area and forest resources are almost all (99.9%) owned by the State, reflecting the nationalization of forests in 1945 (Law of Nationalization, Law 4785) in an attempt to safeguard resources and combat over-exploitation. The forest area has increased by 2.14 million ha since 1973 due to afforestation and forest in-growth on abandoned lands. Forest cover is shown in Figure 2-1. Approximately 50% of forests are classed as having an economic function including the production of roundwood, fire-wood and non-wood forest products, 42% has an ecological function including watershed and erosion control and the remaining 8% is classed as social and cultural (General Directorate of Forestry, 2015).

Figure 2-1 Turkey's Forest Cover

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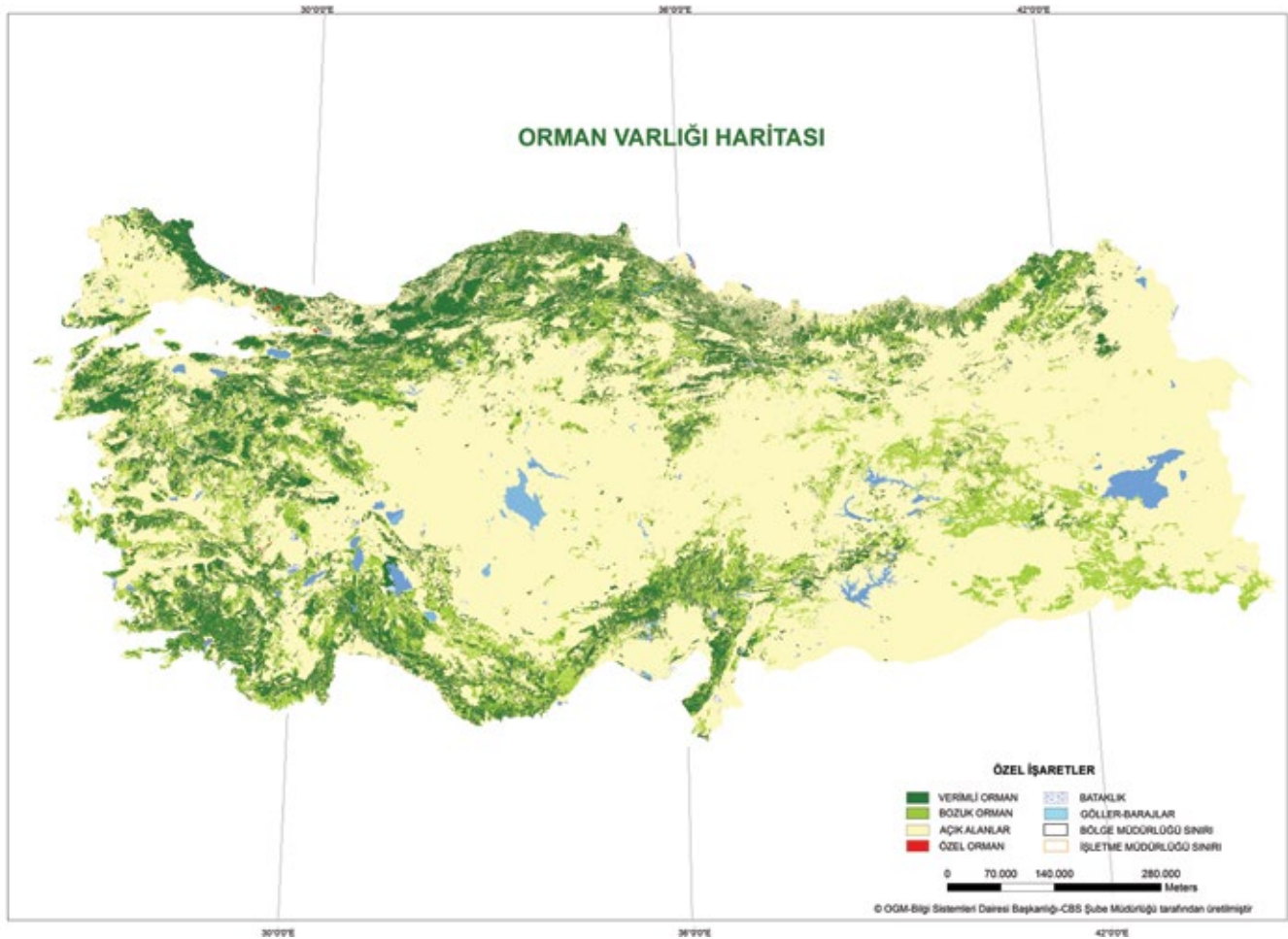
4   The definition of forest in Turkey excludes forest areas less than 3 ha and areas containing species not found in natural forests. Forest areas with a canopy cover of 10% or more are classed as "productive" forest and required to have an allowable cut identified in the forest management plan. The area of forests owned by private persons and public entities with status as a legal entity is approximately 22,000 ha. However due to the definition of forest and the fact that some private land planted with trees remains classed as agricultural land, the area of private forest is significantly understated, and includes an estimated 160,000 - 200,000 ha of high yielding plantations that are mainly poplar.

Table 2-1 Forest Area and Growing Stock

Forest Type	Area (million ha)			Growing Stock (million m³)		
	Productive Forest	Degraded Forest	Total	Productive Forest	Degraded Forest	Total
High forest	11.92	7.70	19.62	1,506.13	33.69	1,539.82
Coppice forest	0.79	1.94	2.72	60.00	11.95	71.95
Total	12.70	9.64	22.34	1,566.13	45.65	1,611.77

Forests in Turkey are divided into two categories, i.e. high forests and coppice[5] forests, in terms of the way they are operated (Table 2-1). The proportion of coppice forests has decreased over time due to the policy of converting them to high forest. Some 43% of forests are classed as degraded and in need of rehabilitation work. The total growing stock is 1.6 billion m³ with degraded forests accounting for 71.95 million m³ or 4.5% of the growing stock. The average growing stock is 72.14 m³ per ha, which varies from less than 7.46 m³ per ha in degraded forest to 121 m³ per ha in productive high forest, as compared with European and world averages of 105 m³ per ha and 130 m³ per ha (State of Europe's Forests, 2011).

2.1.1. Non-wood Forest Products (NWFPs)

The international trade of selected NWFP commodity groups reached US$12 billion in 2011 and has shown steady growth over previous years (Wong and Prokofieva, 2014). An increasingly diverse range of products and steady demand has typified the sector over the past decade and ensures continued growth.

Turkey, rich in NWFPs, is ranked 21st in the world in terms of their export. Due to the country's different climatic and geographic conditions, it is home to a wide variety of tree, shrub and herbaceous plant species. The majority of the NWFPs are found in forests, principally along the coastline. Of the estimated 12,500 plant species in Europe, Turkey has circa 11,707 plant species of which 3,649 are endemic (Ministry of Forestry and Water Affairs, 2011). Turkey is one of the top three worldwide producers of laurel leaves, thyme, sage and pine nuts. In 2013, the most recent year for which data were available, major exports included thyme (US$56.3 million), bay leaves (US$32.26 million), sage (US$6.3 million) and plant extracts (US$30.82 million) (Secretariat General of the Central Anatolian Exporters Union, 2014). The principal importer of NWFPs in 2010 was the USA, followed by Germany, Japan, France, and Hong Kong.

Despite the prevalence of NWFPs in Turkey, their export potential remains largely untapped despite their low collection costs – given domestic supply and local labor, only 20% of

NWFPs receive any form of processing or added value. About 138 different NWFPs are sourced from Turkey's forests, but so far there has been no systematic management planning for these resources, mainly because the necessary institutional capacity still needs to be built. The recent World Bank assessment of non-wood forest ecosystem services estimated the value of NWFPs for Turkey as US$2.3 per hectare per year, compared with a European average of US $20.7, indicating significant growth potential in the future (Siikamäki et al., 2015). This is reinforced by the findings from the EU StarTree project, which show that Turkey has not as yet fully exploited the potential for cultivated forms of NWFPs or undertaken management of these resources at an intensity as practiced in some countries (see Bursa in Figure 2-2) (Wong and Prokofieva, 2014).

Forest villagers have traditionally been the primary collectors of NWFPs, albeit at low prices (tariff price). GDF is responsible for permissions and collection quantities since endangered plant species need protections in order to sustain the biological and genetic diversity in Turkey. Despite efforts by the GDF in the early 2000s to improve sustainable management of NWFPs and increase their contribution to the rural economy, there is insufficient added value and many NWFPs continue to be exported in an unprocessed state. However, supply of non-wood forest products has continually increased - reaching 429,000 tons as of December 2016, up from 31,000 tons in 2002.

Forest managers believe that the area of NWFPs, while currently of only moderate importance, will become increasingly important into the future and on a par with biological diversity (Kuvon et al., 2011). Plants are the natural and biological raw materials for many sectors including the pharmaceutical, cosmetics, medicine, food, dye and chemical industries. It's estimated that approximately 500 plants in Turkey are used for medical purposes. A NWFP and services department was established in the GDF headquarters in 2011 and under the current Strategic Plan there are targets for inventorying NWFPs by 2021 as well as measures for utilizing them sustainably.

The 2017-2021 Strategic Plan marks inventory work to unveil the actual potential of NWFPs as a priority area, including the identification of their current state in terms of natural habitats

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5   High forest refers to forests which originate from seed and are managed on a long rotation to produce saw logs. Coppice is where the forest is regenerated from shoots arising from the cut stumps of harvested trees. Coppicing usually produces many stems per stump, and is usually managed on shorter rotations for firewood or other lower quality products.

Figure 2-2 Active Management of NWFPs in 13 European Regions

NB. Styria (n=3), Alentejo (n=2), Latvia (n=1) and West Wales and the Valleys (n=0) not shown.
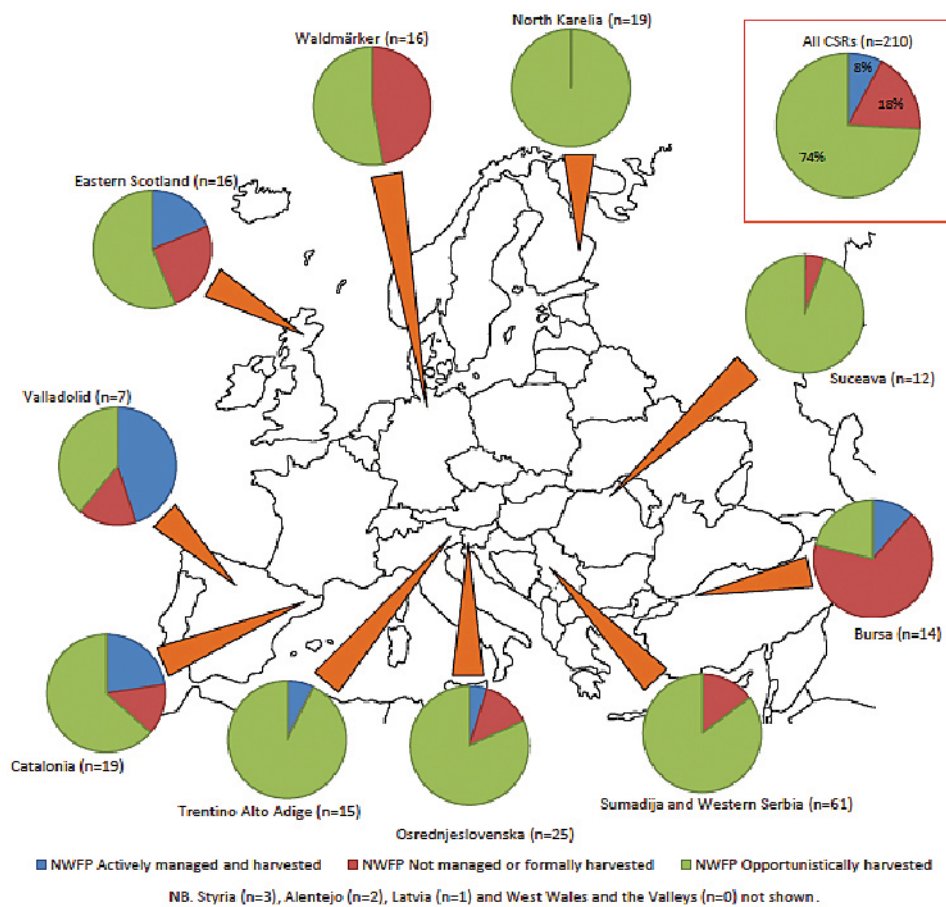
and sustainability. The focus is on products having a higher economic value and preparing plans for their sustainable use. The integration of biodiversity and inventory data into forest management plans will support planning for the sustainable development of NWFPs. In order to identify and diagnose non-wood forest products and their potential, inventory and planning studies have been conducted on 1.4 million ha, covering a total of 210 different species, a result of efforts since 2012. The 2017-2021 Strategic Plan envisions that studies will be conducted on an area of 1.9 million ha by 2021. In addition, inventory and planning work is designed to involve specialization training as well as appropriate employment policies.

The collection of non-wood forest products has potential as a major source of income and employment for those who live in rural areas. The diversity of products, potential for in-country processing and added value represent a significant opportunity for rural communities and the development of an approach focused on products with high added value as opposed to simply harvesting and exporting NWFPs.

2.1.2. Ecosystem Services

A growing recognition is that forests can provide many benefits, identified as ecosystem services. Some of these - such as recreation, relaxation, or shelter - are well appreciated by the general public while others are less understood, or simply taken for granted. The Millennium Ecosystem Assessment of 2005 defined ecosystem services as provisioning (food, water, wood, genetic resources), regulating (climate, floods, disease, water quality), cultural (recreation, spiritual benefits) and supporting (soil formation, primary production).

Under Law No 3234 on the Organization and Tasks of the General Directorate of Forestry, it is tasked with the responsibility for the provision of recreation areas in forests for public use. An Urban Forests Project launched in 2003 by GDF is ongoing. A total of 145 urban forests have been developed encompassing 10,550 ha adjacent to or in the vicinity of cities and towns as of December 2016. Their purpose is to provide for the health, sport, aesthetic, cultural and social needs of the public while increasing awareness of flora and fauna.

At the end of 2016, a total of 1,304 forest areas amounting to 16,266 ha have been developed as in-forest recreational sites in order to meet the public's daily recreational and picnic requirements. In recent years there has been a rapid development in nature tours in forest areas of varying duration, organized by both private sector companies and NGOs for recreational and training / educational purposes.

2.1.3. Economic Value of Ecosystem Services

The World Bank estimates of Turkey's total non-wood forest wealth are 2.7 times greater, on average, than those previously derived. The previous estimates are on average about 39% of the revised estimates globally ($26 per hectare per year versus $67 per hectare per year, in 2013 U.S. dollars). Adding NWFPs and considering the revised measure of accessible forest area increases the revised estimate to $84 per hectare per year. The estimate for Turkey is $133 per hectare per year - water $98.4, NWFPs $2.4, habitat $1.3 and recreation $31.2 (Siikamäki et al., 2015).

A pilot study in the Bolu region on the total economic value (TEV) of forestry was completed in 2015 (World Bank, 2015). The direct use, option, indirect use, and non-use values of forest products and services were estimated through the use of various valuation methods. The estimated total net economic value (TEV)

was US$666.3 million for 2013. This figure is seven times the current amount accounted for in the national accounts (US$86.4 million). The largest portion of the TEV was the indirect use values arising from ecosystem services, including watershed protection, carbon sequestration and soil erosion control, which amounted to US$341.4 million or 50.0% of the TEV. In traditional national accounting, these values are largely unaccounted for or partially included in the value-added of other sectors, such as cost reductions in the water supply.

The TEV is a truer reflection of the value and contribution of forests to the regional economy, and can help guide development programs and policies towards forest protection and a more sustainable use of forest resources. The development of forest accounts that include estimates of the values of forest services would help decision makers to understand the potential tradeoffs involved with developing certain areas.

2.2. Forest Institutions, Legislative and Policy Framework

2.2.1. Institutional Framework

The Ministry of Development (MoD) is responsible for setting the general economic and social development policy in Turkey. The National Development Plan for different sectors, including

Figure 2-3 Ministry of Forestry and Water Affairs

forestry, is formulated through broad stakeholder consultations, including the MoD and line ministries, such as the Ministry of Forestry and Water Affairs (MFWA) for the forest sector.

The General Directorate of Forestry (GDF) under the MFWA is established as a corporate body and is responsible for the majority of sustainable forest management activities (see Box 1). These include forest management planning, production and marketing of forest products, the management of forest fires, insects and diseases, forest regeneration and rehabilitation, road construction and maintenance, forest cadaster, urban forests, recreation areas, ecosystem services, reforestation/afforestation, erosion control, watershed management, range improvement and support to forest communities and enforcement (see Figure 2-3).

2.2.2. Forest Villages

Turkey's rural inhabitant groups can be classified into two: forest villages and other villages. Forest villages are those containing a forest within their administrative borders (Atmis *et al.*, 2010). There are over 21,000 forest villages, with a total population of about 7 million, about 10% of Turkey's total population. Forest villages are also divided into villages located inside forests or those that are near/adjoining forests. They are also classified on the basis of whether or not production is performed in forests within village boundaries, under Articles 31 and 32 of the Forest Law No. 6831. This classification also plays a determining role in terms of the products generated from forests and subsidies provided. Forest villages are given preferential treatment under the Forest Law. Under Article 40, villagers there have a right to employment in harvesting, thinning, afforestation, maintenance and transportation activities undertaken by the GDF.

Thirty-five years ago there were approximately 18 million forest villagers and according to 2014 data, 7,096,483 people live in 22,343 forest villages, constituting approximately 9.6 percent of the national population and 40 percent of the rural one. This massive out-migration is largely prompted by the lack of economic opportunities for prime-aged workers in forest villages. This results in villages largely populated by the very young and old - making the current forest villager harvesting model less and less sustainable.

Responding to the fundamental changes in forestry approaches, the forestry sector launched assistance programs to forest villages to sustain forest resources and forest-village communities. Several initiatives and measures for improvements in rural living conditions have been broadly implemented under the provisions of the Forest Law 6831 since the late 1950s. This Law provides the legal definition of a forest and introduced the first set of forest policies and strategies.

Two articles (169 and 170) in the Constitution are directly related to the overall management and development of Turkey's forest resources. Article 169 focuses on the protection of state forests and Article 170 mandates the necessity of effective co-operation between the state and inhabitants of forest villages through appropriate measures to be introduced by law for the purpose of improving living conditions in these villages. The approach is based on the understanding that if villagers' livelihoods can be supported and more income opportunities provided, then relations between the sector and the villagers would allow for more efficient forest protections and better living standards in forest-dependent communities.

Table 2-2 Support to Forest Villages (FTE = Fulltime Equivalent)

Indicator	Unit	Average 2011 - 2014	2015	2016	Planned 2017
Employment created through loans to individuals	FTE	2,098.0	4,892.0	6,158.0	7,570.0
Employment created through loans to cooperatives	FTE	24,285.0	24,695.0	24,875.0	26,060.0
Ratio of people to whom loan support is to be extended to the total forest village population	%	30.9	35.1	36.7	38.4
Wood savings provided through social loans	'000 Stere	658.0	902.0	1,002.0	1,102.0

Source: GDF, 2016.

2.2.3. Historical Support to Forest Villages

The General Directorate of Forest-Village Relations (GDFVR) was established in 1970 under the Ministry of Forestry (MOF) with the mandate to contribute to the social and economic development of forest areas. Accordingly, over time the quantity and diversity of assistance for village development initiatives and measures has increased. The GDFVR developed its activities through alternative employment opportunities and income generating facilities for forest villagers and cooperatives.

In 1974, the General Directorate established the "Forest Village Development Fund" (FVDF) in accordance with the related articles of the Forest Law. Law Nr. 1744 regulates the Fund's implementation structures. It was financed by various sources including a certain portion of forest product sales, the profits from timber processing facilities and the general budget. In addition to the FVDF, through the GDF the State supports forest villages in other ways, such as through employment rights in forest operations, sales of construction timber and fuelwood at highly discounted prices for personal needs, provision of forest planting materials such as seed, etc.

The aim of these subsidies and support is to:

A. Promote the sustainability of rural community development and enhance rural well-being;
B. Improve forest-people relations through increased participation and involvement in forest management practices; and
C. Reduce people's dependency on forest resources by introducing alternative income generating activities (i.e. to reduce the appeal of unauthorized or illegal harvesting).

In 2011, the General Directorate of Forest-Village Relations (GDFVR) was closed and its role and responsibilities transferred to the GDF as a department, namely the Forest and Village Relations Department (ORKOY). The principal aim of ORKOY is to contribute to the protection, development and attainment of forest production targets by supporting the socio-economic development of forest villagers. ORKOY provides employment opportunities through various channels – including loans to individuals and cooperatives, and this support has been increasing over time (Table 2-2 and Box 2).

Box 2. Forest and Village Relations Department (ORKOY)

The aim of the Forest and Village Relations Department (ORKOY) within the GDF is to contribute to the protection, development and attainment of forest production targets by supporting the socio-economic development of forest villagers through the operation of a grant and soft-loan program. It is intended to contribute to sustainable forest management and reduce the negative pressure on forests.

ORKOY's main activity is the soft loan/grant program for both individuals and cooperatives. In 2017, ORKOY's total budget was 150 million TL ($US50 million) – with 120 million allocated to loans/credits and 30 million to grants. Individuals can apply for credits and grants for social and economic purposes. Loans and grants are also offered to established cooperatives within villages.

Individual Credit/Grant program

Social Purpose Credit Support: These credits target improvements for forest villagers' quality of life and forest conservation efforts, specifically to reduce the use wood as fuel for heating and preventing the misuse of wood. Some examples include roof covering materials, central heating systems for households and energy efficient stoves with ovens, solar water heating systems, and exterior thermal insulation projects. Social purpose credits may be repaid over a period between 3-7 years, and are interest-free on the first 20%. Between the period 2004-2015, 139,295 solar water heating systems were installed, benefitting over 557,000 forest villagers. In 2016, ORKOY also began supporting electricity production from photovoltaics (PV).

Economic Purpose Credit Support: These credits aim to create income-generating opportunities for forest villagers. For example: animal husbandry, beekeeping, mushroom cultivation, medicinal and aromatic plant production, greenhouses, viniculture, fisheries and micro credit programs for housewives.

The terms for economic credits are:

- For revenue-generating projects, the annual interest rate is 1/7th the T.C. Ziraat Bank's agricultural loan annual interest rate; currently 1.5% over the maturity date, and loan repayments vary from 4-7 years, depending on the activity. Livestock support is currently interest-free.
- There is also grant support for these projects at a rate of 20% of the project amount.

*Appendix 1 provides examples and further details on requirements and eligibility.

Cooperative Loan/Grant Program

Cooperative loans and grants support established forest village cooperatives to improve the cooperation's capacity, gain greater value-added for forest villager's products and increase the level of income of cooperative shareholders. Previous successful examples include a trout processing plant, dairy barns and construction equipment. Appendix 1 provides examples and further details on the terms and conditions.

2.2.4. Other Key Stakeholders

Other key stakeholders in the forest sector include the Central Union of Forest Villagers Cooperative (OR-KOOP) and a variety of unions and confederations. OR-KOOP is the second largest stakeholder, with 2,440 affiliated cooperatives and 294,403 members throughout the country of which 1,506 and 167,841 are forestry based, respectively (OR-KOOP, 2017; see Box 3). The Chamber of Forest Engineers with 13 regional branches and over 14,000 members is a representative body focusing on the problems and issues facing the forestry profession and its members. The Chamber provides facilities for occupational training of foresters and makes recommendations on the forestry practices of the state forestry service.

Other stakeholders include the civil servant unions and the Unions of Forest Workers as affiliated branches in the forestry sector under related country level unions and confederations. The workers' union represents the rights of permanent and temporary forest workers estimated to comprise 25,000 people. The Forest Products Exporters, Importers and Manufacturers Association (TORİD) represents the interests of the forest industry. A number of NGOs are also active in the sector, including the TEMA Foundation, Foundation for Protection of Natural Life (DHKV), and Foundation for Turkey's Nature Protection (TTKD), Turkey Foresters Community (TOD), Association of Green Turkey Foresters (AGTF) and the Nature Protection Centre (NPC).

Box 3. The Central Union of Forest Villagers Cooperatives (OR-KOOP)

The Central Union of Turkish Forest Village Cooperatives, ORKOOP, is a unique example of the Labor Union in Turkey, founded on July 11, 1997 with the support of 7 Regional Unions of Forestry Cooperatives. ORKOOP was created as part of a social security solution to the issues of forest villagers; who are viewed as working under difficult conditions often with inadequate equipment and who receive only modest compensation for their labor. Since its foundation, ORKOOP's belief is that forests represent Turkey's largest natural capital wealth and it works to carry out constant communication and cooperation with related institutions as well as defend the economic and social benefits of its partners.

ORKOOP advocates on behalf of forest villagers to ensure their equitable share from forest resources. It participates in activities aimed at developing and growing forests to ensure production according to national interests. Main activities focus on providing social rights to forestry villagers, and providing training, auditing, and awareness raising in forest villages and cooperatives. The majority of the cooperative members of OR-KOOP deal mainly with forestry work. Other members also carry out agriculture and animal husbandry work. ORKOOP abides by international cooperative principles.

Sources of funding

OR-KOOP is funded through established Cooperative Unions in 28 Regional Unions. The State Forest Organizations deduct one percent of the proceeds from the annual allowable cut under the heading "Training and Supervision Deduction" on behalf of the Cooperative Union. These funds are then transferred to the account of the Regional Cooperative Union, with 1% deducted on behalf of OR-KOOP and transferred to the Central Union's account. This is the main source of income for the OR-KOOP Central Union. OR-KOOP holds an annual financial general assembly meeting and an elections assembly every four years.

2.2.5. Legislation

The 1982 Constitution of Turkey is a significant source of substantive forestry law. Article 169 of the Constitution states that (a) irrespective of ownership, all forests are under control of the State, (b) ownership of the State Forests cannot be transferred, and these forests are run by the State, (c) general and/or special amnesty for Forest Offences cannot be arranged, (d) forest borders cannot be reduced except under special circumstances and (e) the State, in order to protect and improve the forests, takes necessary precautions and creates legislation.

Table 2-3 shows the chronology (starting with the present) of various passed acts and legal arrangements.

Table 2-3 Historical Development of Forest Legal and Regulatory Framework

Year	Laws and legal arrangements (national, regional, global)	Topics and issues addressed
1995- present	UNCED, IPF/IFF, CBD, CCD, Pan-European Process, Near East process, C&I for SFM etc. Law No 4122 Law No 3800	Takes part in regional and global processes related to forestry dialogue for sustainable development of society; Seeking ways to incite public interest in forestry, forest management and nature protection; Amendments and/or additions to existing legislation through incorporating increased public needs and the multi-functional benefits of forest resources.
1983-1988	Amendments/additions and changes of forest and forest related legislation mainly on Forest Law No 6831	Increased forest-based subsidies as in-kind and credit based; New arrangements for encouragement of village co-operatives in private afforestation and private forest establishments; Cooperative programs established with agencies other than forestry and village co-operatives for development efforts in forest villages.
1983	National Parks Law No 2873	Considered the environmental and landscape dimensions of forests; Established more natural parks and protected forest areas, particularly in mountain ecosystems.
1969-1973	Forest Village Development Fund Law No 1744	The first Ministry of Forestry established; The Forest Village Affairs General Directorate established; Special fund for village development developed; District-level development plans provided for forest villages; Mechanisms for additional credits and grants to forest villages and village co-operatives.
1956	Forest Law 6831	Established the foundation for today's forestry concept; Efficient protection and production mechanisms; Multiple management of forest resources; Concessions for forest-dependent villages and village co-operatives.
1937	Forest Law 3116	First comprehensive forestry regulation; Recognition of the importance/influence of forest dependent people on good forest management; Timber-based forest production and oriented forest practices; Setting up scientific and technical based forestry approaches.
1921-1924	Wood cutting Law Usufruct Law	Only fuelwood production considered; Forestry organization began to grow and develop; Regulation on fuelwood utilization.
1862-1869	Forest Status	Primitive forest regulation; Decisions and commands mainly on fuelwood utilization from forests; Sultanates' wood-based needs; Foundation of the first Directorate of Forestry.

2.2.6. Policy Framework

The main forestry policy documents are the Tenth National Development Plan (2014-2018), the National Forestry Program (2004-2023), the Strategic Plan of the Ministry of Forestry and Water Affairs (2013-2017) and the General Directorate of Forestry's Strategic Plan (2017-2021). These documents address numerous issues ranging from forest protections to sustainable production of industrial wood and fuelwood to meet domestic demand, non-wood forest products, rehabilitation and reclamation of degraded forest areas, national parks and protected areas, the protection of wildlife, supply of ecosystem and social services, and rural development.

The National Forestry Program's (NFP) objectives are to contribute to: (1) Establishment of appropriate institutional capacities and mechanisms to address forestry subjects with a broader perspective through sustainable development; (2) Improvement of adaptation and linkages between forestry and other sectors; (3) Improvement of awareness, interest, participation, support and contributions of community and stakeholders regarding the importance of stable and sustainable development in the country; (4) Strengthening the support for the rehabilitation of multiple-use forests by improving the multi-functional and participative forest resources management, and improving the living standards in forest villages or in the vicinity of forests where poverty and dependency on forests are commonplace; and (5) Strengthening financial support (National and International) for forestry activities.

The GDF's Forest Strategic Plan (FSP) (2017-2021) sets out an overall mission to: "Protect forests and forest resources against any type of risks, develop them under an environmentally friendly understanding and manage them as part of the ecosystem integrity and in such a manner which will provide the public with multi-directional sustainable benefits." The four strategic objectives are to: (1) Protect the forests and areas qualifying as forests as well as their biodiversity against any kind of biotic and abiotic pests; (2) Develop the existing forests, increase their efficiency and expand their area; (3) Meet developing and changing expectations from the public optimally for goods and services produced by the forests; and (4) Ensure the institutional development for providing sustainable forest management, offering faster and higher quality services and attaining the designated strategic objectives.

Broadly speaking, the objectives laid out by the NFP and FSP are similar including: (1) institutional capacity development, (2) forest protections, (3) generating community awareness of ecosystem services and potential gains, and (4) supporting livelihoods. Recommendations from the World Bank Forest Policy Note (2017) indicate several priority areas for strategies to achieve their shared goals of sustainable forest management and address poverty in forest communities. First, improving the forest resource information system, in particular the National Forest Inventory (NFI) would help provide the benchmark for identifying the income generating potential of forest resources and assessing policy impacts. The second area is in updating forest legislation, in particular covering NWFPs and their sustainable exploitation. The third area would be to improve the productivity of timber harvesting, the wood processing sector and wood supply chain management. Finally, success in achieving the targets set by FSP requires institutional reforms in the forest sector, including the role of GDF.

3. SOCIO-ECONOMIC CONDITIONS IN TURKEY'S FOREST VILLAGES

Turkey's rural inhabitants can be classified in two groups, namely forest and non-forest villages. Forest villages are also divided into ones located inside forests or those near or adjoining forests. Thirty-five years ago approximately 18 million forest villagers resided in some 22,000 forest villages, however by 2014 there were only 7.1 million forest villagers in these villages, representing an approximately 60% reduction.

The rapid population decline in forest villages is a consequence of out-migration to urban areas as people search for employment and better opportunities (Gokce, 2005). Specifically, the high rates of out-migration are due to a lack of income sources and social services, poor infrastructure, and limited access to markets (General Directorate of Forestry, 2014). For example, nearly 10% of all villages do not have access to water, 80% have no sewerage system and 53% have no internet access (Turkstat, 2012). Forestry work is seasonal, lasting for approximately five months, mostly in winter, and done under very harsh working conditions with low monetary remuneration. The combination of the seasonality of the work, and low pay, means that forests are not meeting the current needs of forest villagers. With prime-aged members (>16 and <65) leaving villages, the ageing demographic profile limits the ability of forest villages to undertake hard physical forest work (Yilmaz, 2006). In terms of alternative income sources, the average agricultural holding of 2.4 ha is mostly used for subsistence farming, and affords limited opportunities for additional income. One of the main limitations of using forests for income is that forests are 99.9% State-owned and highly regulated, so they cannot be used in the same manner as they are in other countries (see Box 4).

According to a recent socio-economic survey of forest villagers (described below) approximately 37% of village households have at least one member who permanently left the village (World Bank, 2016). The rate of out-migration among forest villages in the past 10 years is over 10%, which is more than 4 times the annual average migration rate from rural to urban areas (3.5%) between the years 1995-2000 (TUIK, 2016).

3.1. Socio-economic Household Survey

Several case studies from the recent past have analyzed the specific socio-economic conditions of the forest village population, however they are often limited in scope and scale, rendering their results non-generalizable (Alkan and Kilic, 2013; Atmis et al., 2009). The 2016 SEHS data analyzed in this paper are more comprehensive in their geographical coverage and include a greater amount of information than previous surveys. This gives us an opportunity to explore the socio-economic conditions of the forest population in greater detail.

The survey, conducted from February-August 2016, attempted to document the links between poverty, forest dependence, and out-migration in forest villages. The Turkish consulting group UDA managed the survey.

Table 3-1 Survey Sample

		POVERTY	
		LOW	HIGH
OUT-MIGRATION	LOW	Low-Low Strata 1 62 villages	Low-High Strata 2 6 villages
	HIGH	High-Low Strata 3 77 villages	High-High Strata 4 57 villages

The sample design followed a two-stage stratification method (UDA, 2016). In the first stage, 203 villages were selected based on poverty and net migration rates and then grouped into four areas (or strata): low migration and low poverty (LM-LP), low-migration and high poverty (LP-HP), high migration and low poverty (HM-LP) and high migration and high poverty (HM-HP). Table 3-1 presents the village sample distribution by stratum. In the second stage, 2000 households were randomly selected from 203 representative forest villages across Turkey. The sample distribution is shown in Figure 3-1.

Figure 3-1 Randomized Sample of Forest Villages Surveyed
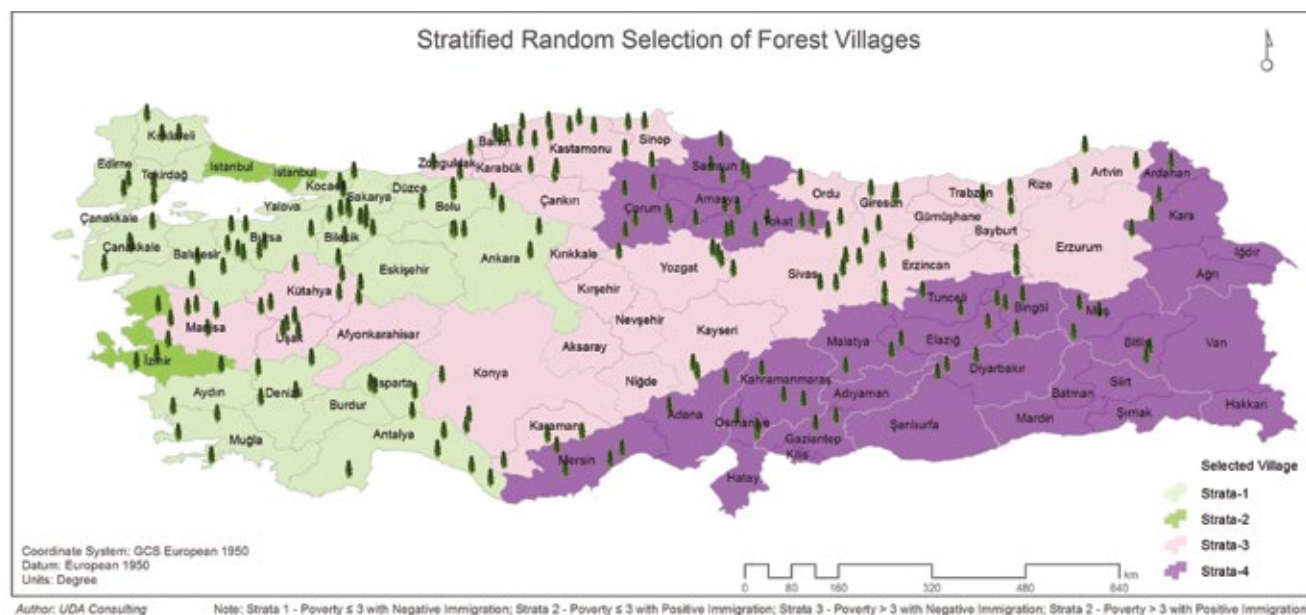
Source: World Bank, 2016.

Table 3-2 Household Demographics and Employment Status by Poverty and Migration Area

	All villages	Low Migration-Low Poverty	Low Migration -High Poverty	High Migration -Low Poverty	High Migration -High Poverty
Socio-demographics					
Age of HH head	56.65	55.63	60.05	57.3	55.68
Male head (%)	95.00	97.00	93.00	94.00	93.00
Household size	4.09	3.79	3.27	4.09	5.12
Dependency ratio	0.54	0.46	0.65	0.52	0.62
% No school or dropout	5.65	3.78	3.27	5.49	10.33
% Primary school	61.98	66.91	60.13	61.68	55.75
% Middle and high school	23.05	23.19	20.26	21.71	21.45
% Tertiary education	3.22	3.58	4.58	3.31	1.81
Employment					
Labor force participation rate %	52.07	40.09	48.51	51.69	75.1
% of women in labor force	23.50	15.72	28.57	25.59	35.71
No. of households	1828	431	60	725	545

Note: The dependency ratio is the ratio of total household members aged <16 and aged >65 to total working age members (16-65).

Household level information, including socio-demographic information, income generating activities - in particular forest related income, access to forest resources, and support from cooperatives, was collected using household modules. A village module was also administered to collect village level information, such as access to infrastructure and forest resources, and forest village development programs implemented by ORKOY. A detailed discussion on the survey of forest village households was presented in a report by UDA Consulting (UDA Consulting, 2016). The data and analysis from this survey contributes to better evidence-based policy recommendations that can lead to the sustainable development of forest communities in Turkey.

3.1.1. Socio-demographic Conditions

Table 3-2 summarizes some key household demographic indicators by the aforementioned areas. High migration villages are younger and have more female household heads. Not only do they have more household members but their dependency ratio is also larger i.e. they have more non-prime age members depending on prime-age members. The education level of household heads also varies by stratum. The education attainment is lowest among high migration high poverty villages, with the share of those without any schooling being the largest and those with tertiary education the lowest.

The labor force participation rate is lower in low migration regions and higher in regions with high migration (highest in high migration, high poverty regions) In particular, participation of the female labor force is highest among villages with high poverty. One possible explanation is that many women engage in economic activities with low returns.

3.1.2. Income Sources

Table 3-3 summarizes the income sources, in terms of income received from engaging in a variety of economic activities (measured by both mean and median) and household participation rates for these activities. Income for each activity is estimated using only participant households, which allows comparisons between forest village households and other non-forest rural communities. Moreover, both mean and median are presented because when the mean is highly skewed by several large values (as is the case in the survey), the median is a more appropriate measure of the common household income. The wide disparity between these two statistics is also evidence of further inequality among forest village households; although a few households reap high returns for certain activities, such as forest collection, most households receive much lower returns.

Table 3-3 also reports gross income totals for the majority of activities since the data structure restricted our ability to generate net totals. Agriculture income and livestock sales,

Table 3-3 Household Average Income by Source and Participation

Income source	Level (TL, annual per HH)		Participation	
	Mean	Median	No. of HH	Percent
1 (a) Forest collection gross income	2,158	400	1,246	61.2
- forest sale value	6,491	600	269	13.2
- own consumption value	840	360	1,123	55.1
1 (b) Forest collection net income (net of cost)	1940	300	1,242	61.2
2 Forest wage income	13,762	3,900	79	3.9
3 Non-forest wage income	16,709	15,600	377	18.5
4 Pension income	15,446	14,400	868	42.6
5 Capital/interest income	18,259	9,000	39	1.9
6 Agricultural income	28,798	10,000	511	25.1
7 Livestock income	11,959	8,000	571	28
8 Other income	8,656	5,000	229	11.2
Total income (including only participants)	26,250	16,200	1,818	89.2
Total income (including all HH)	23,187	15,000	2,037	100
Per capita income (including only participants)	9,259	5,758	1,818	89.2
Per capita income (including all HH)	8,206	4,906	2,037	100

Note: Gross forest income (1a) consists of sales of forest product collection and subsistence value (the imputed income from household consumption of collected forest products). Forest collection net income is estimated by subtracting cost of transportation and input from collection from gross income. Agriculture and livestock sales are gross income because the cost for agriculture and livestock production is not collected in the survey. Total income is the summation of the 8 income items from 1.a to 8, but not including 1b.

which lacked cost information, are presented as gross totals because of the unavailability of cost data. They are directly comparable with forest collection gross income. We found that 5% of households (101 of 1,242 households who reported collecting forest products for sale) reported negative net forest collection income i.e. losses, over the past 12 months. Although cost information was available for forest collection income, the inability to distinguish between fixed/variable costs might have led to an overestimation of costs, encouraging us to rely on gross forest collection incomes for our analyses. Moreover, gross totals facilitate comparisons across activities.

The importance of various sources of income can be evaluated using either participation rates (i.e. accessibility), or income amounts (i.e. profitability). Based on the household *participation rate*, forest collection is the most prevalent income source with roughly 61% of households deriving value from forest products (from market sales or subsistence consumption). Forest collection participation was followed by pensions (42%), livestock and livestock products (28%), agriculture (25%), and non-forest wage income (18%).

However, non-forest related employment and pensions are the most profitable income sources, in terms of median returns. They were followed by agriculture or livestock, and capital/interest income (covering income from real estate and interest earnings).[6]

3.1.3. Income Diversification and Forest Dependency

Income diversification captures an important aspect of household welfare and poverty, because it reveals household's resilience to shocks as well as their capability to expand opportunities to improve their livelihood beyond the forest. Less diversification could be interpreted as being more specialized, and this may the case in specific circumstances, however more generally in Turkey, it appears that the poor are more limited in their opportunities to diversify among income sources. Such information is valuable for guiding policies that aim to effectively target poor households and support their movements out of poverty by enhancing productivity and income diversification. The analysis of income source diversification is based on the seven principal income sources listed above in Table 3-3. Figure 3-2 below presents the distribution of the number of income sources that captures the degree of income diversification in forest villages. The majority of households, 30%, participated in 3 activities.

Figure 3-2 Income Diversification
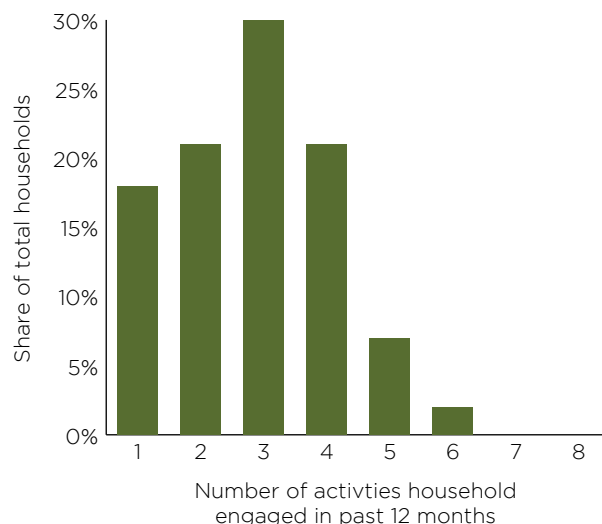
Note: Households can receive income from 7 potential activities, including: forest product collection, forest employment, non-forest employment, livestock sales, capital interest, pension, and other non-forest related sources.

Figure 3-3 Common Combinations of Income Sources (% of households)

- Non-forest related employment only
- Pension only
- Forest related activities, Pension, and Agriculture and/or Livestock
- Forest related activities only
- Forest related activities and Agriculture and/or Livestock
- Rosehip
- Other combinations
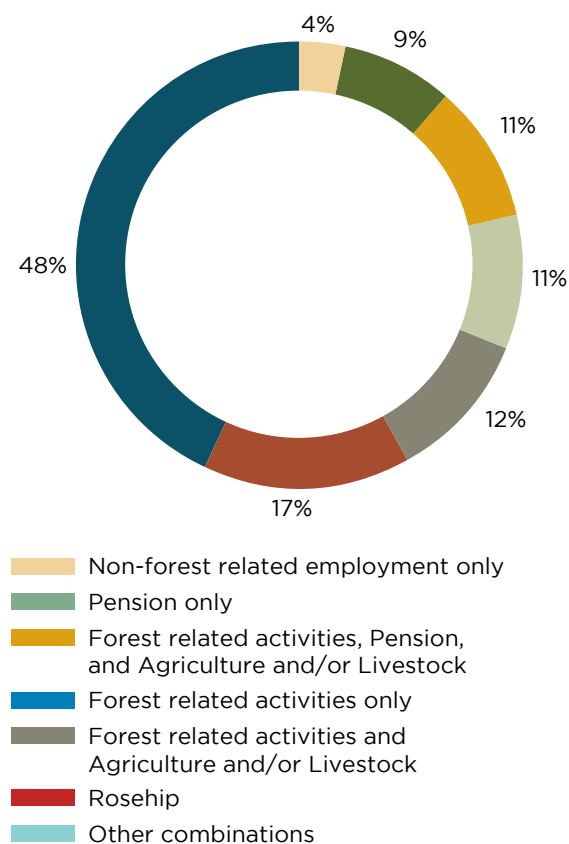
6   Note that receipt of capital or interest income was only reported by about 2% of households in the survey.

What are the household income-earning strategies? Figure 3-3 below presents the most common combinations of income sources,[7] capturing the vulnerability of single activity households, and forest dependency among participants in forest collection or forest employment.

The distribution presented in Figure 3-3 above shows a concentration among agriculture, livestock production, and forest-related activities. About 15% of households engaged solely in agriculture or livestock for income generation, compared to 10% only on forest income. However, households engaging in forest-related activities tend to supplement their forest income with other activities; roughly 11% of households added agriculture/livestock activities, and 10% added both agriculture/livestock sales and pensions. A surprising 8% of households rely only on pension income, signaling the aging demographic of forest villages. The majority of households in forest villages (43%) depend on a highly diversified portfolio of income sources, but these results were not provided since individual combinations represented less than 3% of the population.

The analysis of a household's choices of income sources provides strong evidence that non-forest wage jobs are very limited across forest villages, since less than 4% of households depend on their livelihoods solely from non-forest wage income. Non-forest wage income is 3-4 times higher than forest wage income (median in Table 3-3), which is an indication that expanding non-forest employment opportunities can be an effective policy instrument to increase household income.

3.1.4. Poverty in Forest Villages

Turkey has made significant progress in poverty reduction. Using the annual Household Budget Survey (HBS) data, the poverty headcount ratio decreased from 44% in 2002 to 18% in 2014 (using the international poverty line of 5 dollars/day (in 2005 purchasing power parity, PPP).[8] Extreme poverty, measured by the threshold of 2.5 dollars/day (in 2005 PPP), also experienced consistent decline, and at an even higher proportional rate, decreased from 13% to 3% (Cuevas and Rodriguez-Chamussy, 2016). Turkey made larger gains in reducing national poverty than several other upper-middle income countries in the ECA region. For example, the poverty rate (using the international poverty line at $3.10 a day) was 2.6% in Turkey in 2013, which is lower than that in Bulgaria

(4.7%), Romania (4.1%) and Georgia (9.8%). Despite these positive country-level results, rural poverty not only remains higher than urban poverty in Turkey, but is also decreasing at a slower rate (Azevedo and Atamanov, 2014). Moreover, the level of poverty among forest communities is most widespread in rural Turkey. Although Turkey has routinely administered national household surveys (such as the integrated budget surveys, and Income and Living Conditions Surveys), no official estimates have been available due to a lack of data from forest village households.

The 2016 SEHS presents an opportunity to analyze the extent of poverty among forest village households, and its relationship with forest dependence and migration. Due to a lack of data, the measure of welfare used in the following analysis has been restricted to per capita household income, despite better known alternatives in poverty literature.[9] The poverty rate among forest village households was found to be about 79.6%,[10] which is significantly higher than the average rural poverty rate of 38.7% (TUIK, 2016).

Poverty can also be measured using a relative poverty line to assess how poverty varies within forest communities. Using the conventionally defined relative poverty line, i.e. 60% of median per capita household income among forest village households (480 TL/ per capita per month, or $130), the relative poverty line is found to be 288 TL/ per capita per month or $78). The results show that about 40% of households in forest villages lived below this poverty threshold. The estimated (relative) poverty rates among 11 regions (as shown in col -1 in Table 3-4 below) reveal a large spatial variation in poverty across forest villages.

Table 3-4 below presents two sets of regional poverty rankings using the income data from the 2016 SEHS, and the 2016 Income and Living Conditions Survey for two purposes. The comparisons allow us to check the consistency of poverty rankings, and help us to place the poverty of forest village households in a regional context. The comparison shows that the regional poverty ranking is broadly consistent using the two data sources, except in two regions. While Central East Anatolia is ranked as the fourth poorest region among forest villages, it was the fourth richest region using the poverty rate from the Income and Living Conditions Survey, which covers all households (both rural and urban areas in the region).[11]

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7   These include income source only from (1) forest-related activities; (2) non-forest wage; (3) agriculture or livestock (4) pensions (5) combination of forest income with either agriculture/livestock, (6) combination of forest income with agriculture/livestock and pension or (7) the rest of permutation excluded in (1)-(6)). The combinations of income sources are numerous, but include such combinations as: forest income + non forest wage; non-forest wage + agriculture / livestock; non forest wage + pension; and agriculture / livestock + pension + non forest wage.

8   The poverty measure used here is monetary poverty.

9   There is a long-standing debate about which is the better measure of standards of living. For developing countries, a strong case can be made for preferring consumption, based on both conceptual and practical considerations (Deaton and Grosh, 2000). The poverty analysis uses income as a welfare measure because of unavailability of consumption data. The seasonality issue associated with income data, to some extent, is lessened as the income covers the past 12 months.

10 Based on the national poverty line of 1,115 TL/ per capita per month. Official statistics are from the results of the TÜRK-IS Survey in July 2016. The official national poverty line defines monthly food expenditures (hunger limits) for a healthy, balanced and adequate nutrition for a "four-person family" and is TL 1,370. The total amount of other monthly expenditures required for clothing, housing (rent, electricity, water, fuel), transportation, education, health and similar needs together with food expenditures (poverty limit) amounted to TL 4,461. This is about 1,115 TL /per capita per month (without taking into account equivalent adult scales). The monthly cost of living for a single employee was TL 1,704.70 (http://www.turkis.org.tr).

11 Similarly, Central East Anatolia is ranked the fifth poorest region among forest villages, but has the highest poverty rate using the national survey data.

Table 3-4 Forest Village Poverty Rates versus Regional Poverty Rates

Region	SEHS Forest Villages		Turkstat Country Regions	
	Rank	Poverty Rate*	Poverty Rate**	Rank
Mediterranean	1	67.9	18.1	6
South East Anatolia	2	60.4	17.3	7
West Marmara	3	53.9	21.2	2
Central East Anatolia	4	52.2	16.3	9
North East Anatolia	5	51.2	20.1	4
West Anatolia	6	50.2	21.2	2
Central Anatolia	7	43.6	18.1	6
West Black Sea	8	43.4	16.7	8
East Black Sea	9	25.8	20.9	3
Aegean	10	22	19.1	5
East Marmara	11	19.3	21.5	1
Total		41.0	21.9	

Note: Poverty rate * is estimated using the 2016 SEHS, with the poverty threshold set at 60% of the median per capita income. Poverty rate ** is from Turkstat, using the 2016 Standard Income and Living Conditions Survey. The poverty threshold is set at 60% of the median per capita income. For details see http://www.turkstat.gov.

This indicates that richer regions such as Central East Anatolia may harbor high poverty incidences among forest communities - and thus greater inequality overall. In formulating national development policies, policy-makers must recognize in-region income inequality to improve the targeting of poverty.

3.1.5. Differences between the Poor and Non-poor

Non-poor households are defined as in the top 30% of the income distribution, while the poor are those below the relative poverty line as defined above. The analyses below focus on two areas with the most differences between the groups: (1) Household Composition - socio-demographic characteristics and asset ownership, and (2) Household Strategy- diversification of income sources and forest dependency.

Differences in Household Composition:

Table 3-5 below shows the first set of comparisons by socio-demographic status and asset ownership. Many similarities exist between poor households and villages with overall high migration. On average, the head of the household among the poor is younger (48), compared with the non-poor (53), but no significant differences exist in gender and education attainment of the household head. Poor households have a much larger household size of 4, and high dependency ratio at 0.5 (the ratio of total number of members under age 16 and above age 65 to total working-age members 16-65), compared with non-poor at 2.6 and 0.3, respectively.

Poor households have many significant differences from their wealthier counterparts, and are less well connected socially and physically. Poor households are less likely to belong to cooperatives and associations, and this difference is statistically significant. Non-poor households, on the other hand, are more likely to have family members who permanently migrated to urban areas within the past 10 years (36%, compared with 26% of poor households).

Poor households live in disadvantaged locations: further away from the forest (14 km on average, compared with 4 km among the non-poor) and less often in villages with a water network - 47% of poor households lived with water networks, compared with 60% of non-poor households.

Poor households also own fewer assets. Just 5% of the poor have internet access (while 8% of non-poor do), 34% owned a car or truck (53% for the non-poor), 34% own tractors (46% for non-poor) and 41% owned chainsaws (55% for non-poor).

Differences in Household Strategy:

The second part of the analysis focuses on the difference in household income strategies, i.e. income composition and diversification between the poor and non-poor households. As shown in Table 3-6 below, the poor have a much higher dependence on *low return* forest-based activities, such as forest-related activities (28% use forests). Non-poor households depend more on *high return* income sources (such as agriculture

Table 3-5 Poor and Non-poor Household Comparison: Socio-demographics and Assets

Socio-demographics	Group Mean		Significant difference between groups?
	Poor	Non-Poor	
Age of household head	48.33	53.80	✓
Share of households with male heads	0.86	0.83	
Head with education above mid school	0.21	0.18	
Household size	3.99	2.59	✓
Dependency ratio	0.54	0.29	✓
Member of a cooperative	0.20	0.26	✓
HH with migrants within 10-year	0.26	0.36	✓
Distance to forest (km)	14.78	3.65	✓
Share of households in villages with water networks	0.47	0.60	✓
Asset ownership			
Access to internet	0.05	0.08	✓
Solar panel	0.45	0.49	
Livestock owner	0.58	0.61	
Own car or truck	0.33	0.53	✓
Own motor bike	0.15	0.15	
Own tractor	0.35	0.45	✓
Own chain saw	0.41	0.56	✓

Note: Poor households were classified using a relative poverty line, which was defined as 60% of the median per capita income (total HH income/HH size) of all forest villager households. Households with per capita income in the top 3 deciles were classified as non-poor households. Household weights were used to make the sample representative. Significance is calculated using T-tests.

Table 3-6 Comparison between Poor and Non-poor Households: Income Share and Diversification

	Group Mean		Significant difference between groups?
	Poor	Non-Poor	
Income Share			
Forest	0.28	0.08	✓
Non-forest wages	0.09	0.13	
Agriculture	0.08	0.18s	✓
Livestock	0.14	0.12	
Pensions	0.07	0.44	✓
Income portfolio			
Forest income only	0.24	0.02	✓
Non-forest wage only	0.03	0.02	✓
Agriculture and/or livestock	0.19	0.08	✓
Pension income only	0.03	0.08	✓
Forest + (ag and/or livestock)	0.13	0.06	✓
Forest + (ag and/or livestock) + pension	0.01	0.18	✓
All other combinations *	0.48	0.63	✓

Note: Poor households were classified using a relative poverty line, which was defined as 60% of the median per capita income (total HH income/HH size) of all forest villager households. Households with per capita income in the top 3 deciles, were classified as Non-Poor households. Household weights were used to make the sample representative. Significance is calculated using T-tests.

and pensions) and less on forests (8%). The high forest dependence among poor households in SEHS is very much aligned with global evidence from 24 developing countries, which shows higher forest dependence among the two bottom-quintile income groups (Angelsen et al., 2014).

Poor households also diversify less. Roughly 50% of the poor engaged in single income generating activity compared to 20% of the non-poor households. A quarter of the poor earn income only from forest sources (compared to 2% of the non-poor) and about a fifth derive income only in agricultural and/or livestock activities (in ontrast with 8% of the non-poor). Pensions, which provide the highest returns after non-forest employment, are scarce among poor households (1%) despite being prevalent in richer ones (18%). It is important to note that pensions are a steady source of income, providing a safety net or liquidity to constrained households.

In summary, the poverty analysis reveals high poverty among forest communities and significant spatial variations in the incidence of poverty across forest villages. In comparison to non-poor households, poor ones are younger, have a larger household size, a higher dependency ratio, and are less likely to have permanent migrants in the family. They also have fewer assets, income sources, and poor infrastructure. They are engaged in low return activities, and in particular they are more dependent on forest-related income. In contrast, non-poor households have access to high return and stable income sources, including pensions, agriculture, and non-forest wages.

The above evidence indicates that pensions, the degree of forest dependence, ability to diversify income sources (including through migration), and ownership of productive assets, are all important factors related to poverty. The following two chapters focus on forest use, and forest resource management and migration.

4. FOREST RESOURCE USE AND MANAGEMENT

Increasing the productivity of forest resources represents one of the key components of GDF's Strategic Plan (2017-2021) for promoting sustainable development and better forest management. The degree of forest dependency of poor households in forest villages further validates the pursuit of better forest management. This section focuses on income generation among forest product categories: Wood Forest Products (WFP), Non-wood forest products (NWFPs), and Agricultural and Horticultural Products (AHPs)).

4.1. Income by Product

Figure 4-1 below presents the frequency of collection of forest products reported by at least 10 households. About 54% of households collected firewood, but only 1% collected wood for industrial wood operations, even though the average sale value (i.e. gross market sales) of industrial wood is almost 30 times as much as firewood. Despite the higher profitability of industrial wood, poorer households collected more firewood and less industrial wood than non-poor households, and fewer households sold industrial wood in the market.

The top five NWFP collected were: mushrooms, herbs, thyme, rosehip, and pinecones. For all 5, non-poor households engaged more in collection and market sales of these NWFPs. As discussed previously, Turkey is one of the top three worldwide producers of laurel leaves, thyme, sage and pine nuts and is ranked 21st in the world in terms of exports of NWFPs. In 2013 the major exports were thyme (US$56.3 million), bay leaves (US$32.26 million), sage (US$6.3 million) and plant extracts (US$30.82 million) (Secretariat General of the Central Anatolian Exporters Union, 2014). However, the collection and sales rates in the surveyed villages are meager.

Details on a few agricultural and horticultural products were also included in the survey with olives/olive oil as the most collected and sold product (collected by roughly 10% of households).[12] As with NWFPs, non-poor households collected and sold more olive oil (2 times more than poorer households) and reaped gross sales that were 17 times higher than those of poorer households. About a quarter of the households surveyed sold agricultural and horticultural products, with sales from tobacco being the most profitable (despite being collected by only 1% of households), followed by tea, olives and apricots.

Figure 4-1 Percentage of Households Collecting Forest Products

Legend:
- Firewood
- Mushroom
- Other
- Herbs
- Thyme
- Rosehip
- Pine cone
- Industrial wood
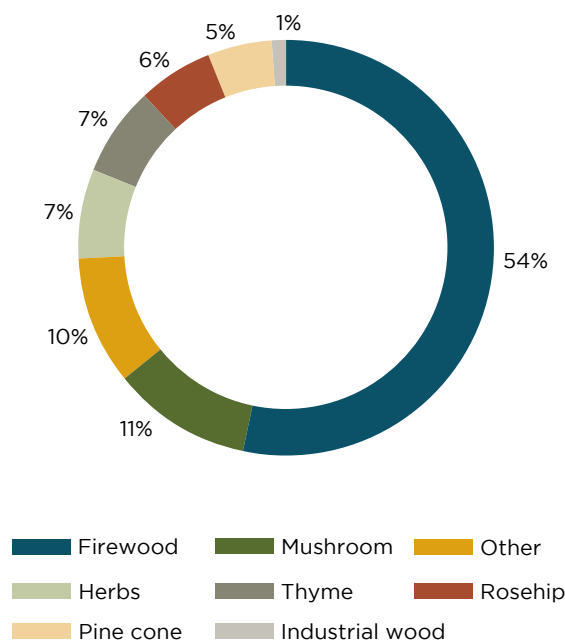
Note: Households collected 70 different types of products. For this chart, only products collected in the forest, and by at least 10 households, were used. 'Other' products include: Sage, Hazelnut, Linden, Stingnettle, Walnut, Chestnut, Blackberry, Trefoil, and Opium.

The preceding discussion highlights the mismatch between the rate of return and the collection rate of forest products among poor households in forest villages, especially the sparse market sales of NWFPs. Since Turkey is considered well-endowed in NWFPs, enormous potential exists to improve the income sources from NWFPs. About 16% of households surveyed obtained income from selling NWFPs even though the median gross sale of NWFPs was 600 TL (200 TL higher than forest collection sales).

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12 Respondents were asked to list the non-wood forest products they collected - and in some cases they listed agricultural or horticultural products. This could have been a misunderstanding of the question in classifying products. Therefore, we cannot presume that these are the only agricultural and horticultural products collected by households.

Table 4-1 Forest Resource Dependency by Income

	Group Mean		Significant difference between groups?
	Poor	Non-Poor	
Fuelwood			
Used for energy in past 12 months %	95.0	95.0	
Purchased in past 12 months %	33.0	44.6	
Dependent on fuelwood for:			
Cooking %	21.6	13.0	
Heating %	69.6	75.0	✓
Boiling water %	22.0	10.6	
Coal			
Used for energy in past 12 months %	46.9	37.6	✓
Purchased in past 12 months %	33.6	34.9	✓
Used forest plants for health %	**21.0**	**33.6**	✓
Used forest timber for construction %	**4.3**	**9.5**	✓

Note: Poor households were classified using a relative poverty line, which was defined as 60% of the median per capita income (total HH income/HH size) of all forest villager households. Households with per capita income in the top 3 deciles were classified as non-poor households. Household weights were used to make the sample representative. Significance is calculated using T-tests.

The potential of NWFPs is currently constrained by slow growth and limited processing. The volume of NWFPs sold grew just 12% over 14 years,[13] with only a fifth processed before export. Returns from NWFPs could be increased by improving the productivity of harvesting, and increasing the value-added through developing small-scale local processing industries. We believe that targeting ORKOY programs to help forest villages develop their local processing capacity may boost both income and employment.

4.2. Forest Resource Dependency: Energy, Health and Housing

The survey data show that the large majority of households across the income spectrum depend on forests for their energy needs; approximately 95% of SEHS sampled use fuelwood and 43% use charcoal (as seen in Table 4-1 below). However, differences exist in their method of procurement (with non-poor more likely to purchase) as well as their use. Poorer households depend on fuelwood for cooking and heating water almost twice as much as non-poor households. This possibly reflects their lack of access to modern energy sources, such as electricity and gas.

While the poor are dependent on fuelwood due to a lack of alternative energy sources, the non-poor benefit more from forest plants for health benefits, and access timber to for housing construction. This finding indicates the poor may use low-return forest resources while the non-poor are able to take advantage of high-value forest resources.

4.3. Forest and Pasture Management

Forest villagers participate in several activities to diversify their income, depending on their circumstances –motivated by the belief that it will generate greater income. While the true reasons for participation are quite varied (i.e. access to credit or other constraints), it pays to look at what villagers chose to do. Table 4-2 summarizes some perceptual and behavioral aspects of the forest villager's choices in land management – mainly how they manage forests and pasture land.

While a fifth of households recognized a decrease in forest changes in the last five years, non-poor households abandoned more land for natural re-vegetation and planted more woodlots than average in the last 10 years. The primary reason for planting woodlots across households was for food. Secondary concerns included soil fertility and carbon sequestration.

A fifth of households engaged in pasture management with no significant differences between poor and non-poor households, apart from the average land size managed by households. Pasture land was used mainly for grazing, and marginally for cropping.

The top two adaptation strategies that households practiced with regard to climate variability were either planting trees (54%) or protecting them (24%). Reducing forest clearance was the only strategy that poorer households practiced more. Non-poor households were more likely to implement all the rest of the strategies. In light of previous discussions about

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13 National NWFP supply grew from 31,000 tons in 2002 to 429,000 tons in 2016.

Table 4-2 Forest and Pasture Management

	Group Mean		Significant difference between groups?
	Poor	Non-Poor	
Perceptions of forest change			
% decreased	18.1	22.2	✓
Land abandoned last 10 years (m²)	405.2	490.2	
Planted woodlots in last 10 years (%)	22.1	40.7	✓
Access to pasture land			
Very easy (%)	15.6	14.5	
Distance to pasture land (km)	2.9	2.4	
Pasture management			
HH managed pasture last 12 months	20.0	18.4	
Land area managed by household (m²)	750.6	502.1	
% used for grazing	96.9	96.0	
% used for cropping	0.1	0.1	
Adaptation to climate-related disasters			
% planted trees	38.8	56.0	✓
% diversified forest income	1.4	2.8	
% reduced / stopped forest clearance	5.1	5.0	
Received benefits from forest services (% yes)	42.1	64.2	✓

Note: Poor households were classified using a relative poverty line, which was defined as 60% of the median per capita income (total HH income/HH size) of all forest villager households. Households with per capita income in the top 3 deciles were classified as non-poor households. Household weights were used to make the sample representative. Significance is calculated using T-tests.

income diversification it is interesting to note that roughly 2% of households diversified income in response to climate change, and non-poor households did so more so than poorer ones.

Realizing ecosystem benefits from forests was lower than average among poorer households. The most important benefit of ecosystems perceived across households was water conservation, although support of this fact was stronger among non-poor households (20% among the poor, 36% among non-poor). The next most important benefits were shade and aesthetics. This provides evidence of not only a lack of awareness about the ecosystem services of forests, but also the significant untapped potential of Turkey's ecosystems. The recent World Bank assessment of non-wood forest ecosystem services estimated the value of NWFPs for Turkey as US$2.30 per hectare per year, compared with a European average of US$20.70 - i.e. as little as 10% of Europe's average.

5. ANALYSING MIGRATION DECISIONS

The high out-migration rates of prime-aged forest villagers is a concern, not only because low living standards and low employment rates are the primary reasons for leaving, but also because forest villagers constitute the labor force responsible for forest management. While the benefit of migration is a reduced pressure on forests, the costs associated with a shrinking forest labor force are higher in the long run.

Economic migration is a pathway out of poverty among forest village households, and its prevalence is on the rise. In the SEHS 13% of households had at least one migrant during the past 5 years, which is 2% higher than the earlier 5-year period (2005-2010), indicating an upward trend in migration. The results from Section 3 (of this report) show that other factors being the same, households with permanent migrants have higher per capita income, which can either be evidence of a credit threshold necessary to support a migrant, or the benefits of remittances (Adger et al., 2002). However, since the survey was conducted for only one time period, we do not know which of these two it may be; in all likelihood it's probably a bit of both. A review of global evidence, Hecht et al. (2015) shows that migration has long been a feature of communities living near and using tropical forests, and forest dependent households have used migration as an important livelihood strategy. The following section presents evidence of (1) the types of households that support migration (2) and the factors that most affect household migration decisions in SEHS.

5.1. Descriptive Statistics of Migrant Households in the SEHS

Forest village households can be classified into three groups based on their migration status: households with at least one permanent migrant,[14] households with potential migrant(s),[15] and households without migrants. Table 5-1 below presents a summary of migrant frequency across the sample strata. Over half of households surveyed had either permanent or potential migrants. Even in low migration-low poverty areas (presumable the most well-off of all strata), half of the households had either the intention to migrate, or a family member who had already done so. As stated earlier, it is possible that many of the poorest households cannot afford to send a migrant, since it is a costly investment that requires a certain threshold of liquidity.

Table 5-2 below presents the summary of the age and education attainment of the household head, as well as household demographic structure by migration status. The demographic structure is captured using the dependency ratio, or the proportion of non-prime members (<15 and >65) supported by prime-age members (15-65). About 30% of households with permanent migrants who left 10 years ago have no prime-aged members living in the household, compared with 12% among those who permanently migrated within past 10 years. Moreover, a fifth of households (19%) with permanent migrants have no prime-working age members left at home.

Table 5-1 Distribution of Household Migration Status by Stratum (% of total HH)

Household migrant status	All villages	Low Migration - Low Poverty	Low Migration - High Poverty	High Migration - Low Poverty	High Migration - High Poverty
With permanent migrants	37.6	35.0	43.9	39.6	40.6
With members who intend to migrate	14.1	13.3	12.0	14.9	13.5
No migrants	48.4	51.7	44.1	45.5	45.9
All HH	100.0	100.0	100.0	100.0	100.0

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14 A member who has migrated permanently is classified separately from a temporary or a seasonal migrant who is expected to return home in the short term.
15 The SEHS asked household heads if anyone in their household hoped to migrate. Any household who responded positively was flagged as having a potential migrant. It is important to note that a household can have both permanent and potential migrants.

Table 5-2 Household Socio-demographic Profile by Migration Status

	Household head				Household	
	Age	Education attainment (%)			No prime-age members	Age dependency ratio
Household migrant status		Dropout	Never in school	Mid and above	(%)	(%)
Have permanent migrants	55	12	75	13	19	35
- within 10 years	55	10	76	14	12	29
- 10 years ago	56	15	72	13	31	46
Intend to migrate	45	8	61	31	2	54
No migrants	49	7	69	24	11	46
All HH	51	9	70	22	13	43

Note: Age dependency ratio is the ratio of the total number of aged below 15 and above 65 to prime working age (15-65). Based on the distribution of migration duration, households with permanent migrants are regrouped into (1) those with long-term migrants (defined as leaving more than 10 years ago) and those with relatively recent migrants (within 10 years).

Table 5-3 Average Income by Household Migration Status (TL)

	Household migration status			
	Permanent	Potential	No	All
Income source	Migrants	Migrants	Migrants	Households
Forest collection (Mean)	2,111	2,098	2,229	2,158
Forest collection (Median)	480	435	360	400
Forest wage	13,287	14,158	13,813	13,762
Non-forest wage	16,320	16,005	17,064	16,709
Retirement pension	14,961	14,755	16,049	15,446
Agriculture	37,049	14,411	24,770	28,798
Livestock	9,473	11,510	13,928	11,959
Other income	9,135	9,219	7,932	8,656
Total income	29,635	19,916	25,301	26,250
Per capita income (Total HH income / HH size)	12,028	5,749	8,030	9,259
No of households	757	259	1,021	2,037

Note: All income sources except forest collection are reported as average TL only. Because of the wide disparity between mean and median forest collection income, both statistics were provided.

This indicates that migration has posed a serious challenge, leading to a shortage of prime-age labor in forest communities. The results also indicate that heads of households with potential migrants are much younger, and more educated, than heads of households with permanent migrants. Given that the majority of migrants (97%) are sons or daughters, the age gap between household heads suggests there could be a cohort effect. That is, non-migrant households may have a lower number of migrants since they are younger households (the average age of household head is 45 compared with 55 for households with migrants) and as such their children are too young to work outside villages. Migration is apparently a more realistic possibility when the head's children reach prime working age.

Table 5-3 below presents average income by source across households with varied migrant prevalence. Households with permanent migrants have a much higher level of per capita income (12,028 TL) than no-migrant households (8,030 TL) and potential migrant households (5,749 TL). This is likely a reflection of household size and indeed, the average household size among migrant households is smaller (2.9) than non-migrant households (3.6) and those intending to migrate (4.4), which contributes to higher per capita income. However, we cannot definitively say whether households with higher income can now afford to migrate, or whether the migrant is sending money back, increasing the household's income.

Although there is little variation among the returns from forest-related activities, households generate varied returns from non-forest related activities such as livestock and agriculture (highlighted in Table 5-3 above). This may suggest a negative association between a household's non-forest income generation capacity and the propensity to migrate, i.e. households who are more capable of generating non-forest related income (such as from agriculture and livestock), are less likely to send members away seeking jobs.[16]

5.2. Factors Influencing Household Migration Decisions

A household's decision to support a member's migration is understandably dependent on its income and income sources, which are further dependent on many known and unknown household and community characteristics (Adger et al., 2002). Forest development programs and social groups, such as associations and cooperatives, can also have an impact on a household's economic opportunities and their livelihood strategies, including migration decisions. While it is challenging to identify all of the possible pathways through which these variables may affect the migration decision, SEHS presents an opportunity to capture the most disruptive factors by means of an econometric analysis.

The econometric model used in this report aims to determine factors that affect the probability of migration, while accounting for household and village-level characteristics (e.g. differences in infrastructure, access to basic services, and government supported programs).[17] To examine the impact of policy changes on migration over time, the analysis was carried out separately for recent migrant households (defined as migrants within 5 years of the time of survey, i.e. during the period of 2012-2016) and those with migrants who left between 2007 and 2011.[18]

The empirical results (presented in Table 5-4 below) provide evidence that household income, forest dependence, productive assets (livestock) and social assets (measured as membership in cooperatives) all have significant effects on migration, while controlling for differences in household demographic characteristics. The former three factors are positively associated with the probability of migrating, while membership in forest cooperatives reduces a household's propensity to migrate.

Although the SEHS is a cross-sectional survey, the long cooperative membership periods allowed us to chart the effect of long-term memberships on recent migrations, resulting in the discovery of a causal relationship between cooperative membership and a lack of migration. Cooperative membership

Table 5-4 Determination of Migration Probability

Migration probability	2012-2016	2007-2011
Indicators for education of household head		
Never in school		
Primary school		
Mid-high school		
Age of HH head	✓	
Age of head (squared)	✓	
Male head		
HH size	✓✓✓	✓✓✓
log (total income)	✓	✓
Share of forest income	✓✓	✓
Share of non-forest wage income		
HH is member of forest coop	✓	
HH is member of other coop		
HH has internet access		
HH is owner of livestock	✓	✓
HH has tractor		
Living in village with water network		
Asset index		
Legend:		
Positive		
Negative		
p< 0.01 = ***	✓✓✓	
p< 0.05 = **	✓✓	
p< 0.10 = *	✓	

Notes: The checks (✓) indicate level of significance of the variable in the regression, not the magnitude of the effect.
The asset index includes 8 items: cellphone, computer/tablet, freezer, solar panel, car/truck, motorcycle/scooter, tractor and chainsaw.
For the complete regression table, please refer to Appendix 2.

was found to be significant within the recent five years from 2012-2016 (no effect on migration in the earlier five-year period from 2007-2011). This either implies that only recent benefits affect household migration decisions, or that the structure of membership has also changed such that it reduces migration.

It is interesting to note that the membership impact on migration during the period from 2012-2016 coincides with the institutional restructuring of GDF. The General Directorate of Forest Village Relations (GDFVR), established in 1970 under

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16 Several households communicated that they had purchased livestock as an incentive to keep the younger generation from leaving home. In some cases, it worked.
17 Probability (migration) = f (X_{hh}, $W_{village}$, Policy variables), where X_{hh} are household variables including age, education of household head, household income; $W_{village}$ are village-level characteristics including village infrastructure; and policy variables including membership in a forest cooperative, membership of other cooperatives, and forest dependency (measured by the share of forest-related income).
18 The table in Appendix 2 contains results for the two time periods reported: 2007-2011 and 2012-2016.

the Ministry of Forestry, was the principal agency responsible for supporting social and economic development in forest communities. However, in 2011 GDFVR was closed, and its role and functions transformed into ORKOY, which was re-mandated to be responsible for meeting forest production targets and supporting forest villages. ORKOY's programs include social credit and loans to household and cooperatives, employment and income diversification opportunities (such as animal husbandry and NWFPs cultivation). ORKOY's effectiveness has been reviewed using data from 11 villages (Alkan and Kilic, 2014), which presents positive feedback from village households. However, it is unclear whether the impact on migration is due to improvement of the program implementation or other macro-level factors, such as improvements in employment opportunities in the forest village communities over time. Further exploring the underlying reasons for the positive impact of membership is important, although it involves a more detailed assessment of programs implemented by forest associates and cooperates, which is beyond the scope of this study.

From what we can ascertain from this survey, households that are more dependent on forests for income (measured as share of forest income) are more likely to have permanent migrants in the family. This result remains consistent over the past 10 years, as shown in Table 5-4 above. Since the survey results indicated that poorer households are more forest-dependent, this finding confirms that forest income alone is insufficient to support livelihoods, and migration may be a pathway out of poverty.

Forest cooperatives play several roles, but an important one is to create employment opportunities for its members in forest villages. Almost 60 percent of Turkey's total wood production is carried out through forest cooperatives every year. Annual forest production revenues are about US$225 million – but only a small proportion of that revenue is retained within the villages through wages and income (General Directorate of Forestry, 2017). In the past, this income was very important to support and maintain living conditions in the forest. However, with a declining population and more limited forest-related income opportunities – the sustainability of this previous forest villager labor model appears to be in question (World Bank, 2017).

5.3. Simulating Effects on the Migration Decision

Based on the results from the migration model, it is useful to assess the impact that various policy proposals have on migration. Table 5-5 below illustrates a policy simulation that expands membership of forest cooperatives to cover all forest village households. It is important to note that the survey data revealed that currently only about 6% of households belong to either forest cooperatives or associations, and the estimated probability of households sending migrants abroad over a 5-year period is 36%. If all households were to become members of cooperatives, the probability of migration falls to 29%, representing a 19% reduction.[19] Using the official 2014 population data, this indicates that about 500,000 people who would have migrated permanently would instead remain in forest villages.

While the simulation exercise should be regarded only for illustrative purposes, the results demonstrate the scale of the potential impact of new initiatives on migration. In next chapter, the analysis focuses on linkages between poverty, forest dependence and migration, with the objective of identifying pathways for forest households to move out of poverty.

Table 5-5 Estimated Probability of Migration and Policy Simulation

	Sample average	Simulated average (assuming all households become cooperative members)
Share of households in cooperatives	5.8	100
Estimated probability of migration decisions (%)		
Sending a permanent migrant	36	29
Estimated number of people leaving within 5 years	2,554,734	2,057,980

Note 1: The simulation is carried out using the estimated coefficients during the period 2012-2016 in Table 5-4, and newly constructed explanatory variables based on the choice of policy proposals. In this case, the new variable is the cooperative membership, which changes all non-member households into members (i.e. setting the cooperative member dummy variable into one) and all other explanatory variables are set to the sample mean. The simulated migration probability is 29%.
Note 2: The official data shows that in 2014, there were 7,096,483 people living in forest villages.

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19 Calculated as (2,057,980-2,554,734)/ 2,554,734.

6. PATHWAYS OUT OF POVERTY

Global experience with forest-poverty dynamics among forest dependent households shows that the process of moving out of poverty is a slow one, and at times takes several generations (Shyamsundar et al., 2017). Households living in remote forest locations have attempted a variety of strategies to improve their livelihoods, including resource extraction (Angelsen, 2010), migration (Hecht et al., 2015) and transforming forests for food production, timber and other economic benefits (Brack et al., 2016). The key question lies in whether those alternative income-generating strategies can sustain a reduction in poverty without forest degradation.

Based on what appears in the literature, together with lessons and evidence from recent projects and public investment in the forest sector undertaken by the World Bank, a conceptual framework of pathways to prosperity in forest landscapes has been developed, called P.R.I.M.E, (Shyamsundar et al., 2017). The framework includes improvements in the productivity (P) of land in forest landscapes; strengthening communities, households and women's rights to forest access (R) complementary investments in institutions (I) public services and increased access to markets (M) and strengthened mechanisms for valuing ecosystem services (E) to ensure that benefits accrue to the poor (see Box 5 below).

Box 5. P.R.I.M.E. - Pathways Toward Prosperity

Five broad pathways can help launch the forest-dependent poor onto a sustainable path toward prosperity. These pathways, referred to as PRIME, identify economic development strategies and build on the premise that forests themselves remain intact.

PRODUCTIVITY: Growth in labor and resource productivity (P) is integral to economic development. In forested landscapes, labor productivity can be improved by enhancing individual and community skills in sustainable forest management. Resource productivity can be improved through the infusion of capital (for instance, portable saw mills), forest fire and pest management or tree plantations. Associated technologies, policies and capacity strengthening activities need to meet the requirements of women, indigenous people and other marginalized households to ensure that the poorest benefit.

RIGHTS: Wealth accumulation is an essential pathway out of poverty. One strategy is to increase the wealth of the poor by strengthening their rights (R) over natural capital. A large body of literature and local environmental movements point to the importance of community rights to using and selling forest resources in the reduction of poverty. Within forested communities, it is particularly important to empower women and other marginalized individuals to have tenure rights and decision-making power.

INVESTMENTS: Poverty reduction in forested landscapes will not be possible without investments (I) in complementary institutions and public services. Forest-related pathways to prosperity are only likely if the poor also have inclusive and affordable access to complementary public services such as education, health, agricultural extension, transportation and mobile phone access. The role of gender-responsive institutional arrangements in providing information, enabling local level innovation and offering insurance against down-side risks will be important.

MARKETS: Income generation and diversification require the strengthening of small and medium timber and non-timber enterprises and increasing their access to markets (M). Markets for a small number of high-value non-timber forest products (e.g. Brazil or Shea nuts) are one example of a pathway that is likely to be more beneficial to women. Timber certification and export markets for timber offer an alternate broader approach. This pathway may need careful designing to be responsive to the preferences of women, indigenous households and youths, as well as conservation requirements.

ECOSYSTEMS: Ecosystems and their hidden services (E) are integral to prosperity. Over the last decades, policy instruments such as eco-tourism, payments for eco-system services and carbon markets have proven to be useful mechanisms to regulate ecosystem services and their benefits. It is important to channel this demand for ecosystem services into monetary and non-monetary support for the poor, and, women within poor households.

Table 6-1 The Proportion of Non-participant Households by Income Source and Income Quintile

Income Source	Total household with non-zero income per source	Income Quintile (%)					
		1	2	3	4	5	Total
Forest	790	29.2	17.7	19.2	18.6	15.2	100
Agriculture	1,525	26.6	20.1	18.5	20.2	14.6	100
Livestock	1,465	27.0	17.7	18.1	20.1	17.1	100
Forest Wage	1,957	20.8	19.5	20.2	19.9	19.5	100
Non Forest Wage	1,659	24.5	18.9	18.2	19.7	18.6	100
Pension	1,168	35.0	28.3	17.2	9.1	10.5	100

6.1. Variation of Participation across Income Quintiles

The following section uses the SEHS data to identify some of the potential pathways highlighted in the P.R.I.M.E. framework, focusing on factors that are important determinants of household income. Supporting the analysis of Table 3-3 (*Household average income by source and participation*), Table 6-1 below further breaks down participation rates by income quintile. However, since we are interested the lack of access or use of certain activities this analysis instead quantifies *non*-participation.

Those in the poorest quintile participate the least across all income-generating activities except forest wage income, which remains relatively constant across the income distribution. Similar to previous results, the largest gaps between the poorest and richest quintile are in pension, agriculture and livestock incomes.

6.2. Determinants of Income

Econometric analysis can help reveal relationships that effect household incomes; given the breadth of income-generating activities and the differences in participation across different types of households, the analysis was conducted for each individual type of income as well. While income is influenced by many factors, the causal links between the results should be interpreted with some caution since the data were collected for one-time period only, and thus causality cannot be fully explored.

Table 6-2 below summarizes the estimated returns to a range of factors, both at the household and village level. The analysis is carried out for multiple single income sources as well as aggregate income (measured as total household and per capita household income). First, focusing on **forest income** (a) the results show that membership in cooperatives, access to

infrastructure such as water networks, and owning productive assets such as tractors and chainsaws, all have a significant impact on income. Households with cooperative membership earn a third more forest income, compared with non-member households. Households who own trucks, tractors or chain saws have 34%, 21% and 20% higher income, respectively. On the other hand, households located in villages with a water network generate less forest income (50% lower), compared with their counterparts who lived in villages without a water network. This latter finding may suggest that households with better water access may seek more profitable activities than forest-related activities. This conjecture is indeed supported by the results from the **livestock income** regression (c) - on average; households in villages with a water network generate 34% higher livestock income.[20]

A few other results highlight the key factors or necessary assets for participating in the respective income-generating activity. Results for **agricultural income** (b) show that only two variables have a significant impact: ownership of trucks and tractors. For **wage income** (e), it is interesting to observe that access to the Internet is positively associated with non-forest wage income (but has no effect on forest wage income (d)) and households with Internet access earn a 22% higher wage income than do those without Internet access. It is possible that access to the Internet provides households with better-paid job opportunities outside the forest.

Table 6-2 Determinants of Income, by Income Source

Dependent variable: log (income by source)

		Forest Income (a)	Agricultural income (b)	Livestock income (c)	Forest wages (d)	Non-forest wage (e)	Pension income (f)	Total income (g)	Per-capita income (h)
Household Decisions	Migrants			✓✓✓				✓	✓
	Coop member	✓✓		✓✓				✓✓✓	✓✓
Village Infrastructure	Water network	✓✓✓		✓✓✓					
Household Assets	Internet					✓			
	Car	✓✓	✓			✓✓	✓		✓✓✓
	Tractor	✓✓	✓✓✓				✓✓	✓✓✓	✓
	Chainsaw	✓✓✓				✓			✓✓
	Livestock					✓✓✓		✓	
No. of observations		665	291	351	40	256	440	1017	1017

Notes: The checks (✓) indicate level of significance of the variable in the regression, not the magnitude of the effect.
For the complete regression table, please refer to Appendix 3.

Legend:	
Positive	
Negative	
p< 0.01 = ***	✓✓✓
p< 0.05 = **	✓✓
p< 0.10 = *	✓

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[20] The sample size for forest and non-forest wage regressions is relatively small due to the small number of households participating in wage employment. This makes it difficult to generalize the conclusions to all forest villages.

7. INTERPRETING THE RESULTS

Productive and social capital. While the positive relationship between access to productive assets and income is well known, the significant effect of the social capital (cooperative membership) deserves further discussion. Addressing poverty in forest communities has been a central focus of the GDF development plans for past few decades. The implementing agency of GDF, previously the GDFVR established in 1970, which was replaced by ORKOY in 2011, has a long history of providing development assistance to forestry communities through the promotion of income diversification, creating employment while reducing dependency of forest resources (i.e. to reduce uncontrolled harvesting).

Since 2011, ORKOY has implemented a range of specific measures to support forest villagers. These include providing credit to households and cooperatives, supporting business projects such as animal husbandry, beekeeping, and mushroom cultivation. They also installed energy efficient stoves and solar water systems to reduce wood use, and provided training and technical assistance in forest management. The significant income enhancing effect of cooperative membership captures these positive benefits.

Unequal membership rates (as shown in Table 3-5) between the poor and the non-poor (20% for the poor versus 26% for the latter) is a potential indication that policies that increase the inclusiveness of cooperatives are likely to have a large impact on poverty by reaching the poorest households in forest communities. Future research should aim to gain a better understanding of the operation of cooperatives and associations in forest communities with a special emphasis on membership conditions and inequality in membership access between poor and the non-poor households. The proposals to expand the scale of cooperatives in forest communities (Atmis et al., 2010) should be assessed based on their impact on multiple indicators, including migration and income distribution.

Income security. The results show strong evidence of positive associations between household income security (measured by access to pensions and remittances) and household welfare. Pensions and remittances are more stable income sources, thereby providing safety nets that both prevent households from falling into poverty in the event of adverse shocks and boost a household's confidence to invest in productive assets.

Global evidence from the past two decades has highlighted that one of the major causes of poverty, in particular among rural populations, is vulnerability to adverse shocks (World Development Report, 2000). Poor people have limited capacity to diversify, and their livelihoods are often more dependent on natural resources, such as forests, land and water, and consequently their income sources are more volatile. At the same time, their ability to cope with shocks is limited because they have limited access to financial assets (credit and insurance) to cope with risks. Therefore, without external support from the public sector, vulnerability can be a poverty trap to the poor.

Box 6. Targeting Development Programs around the World

One of the key components of program development is to concentrate resources on "target groups" of poor or vulnerable households. Based on a review of experiences and lessons learnt from 122 antipoverty programs/projects in 47 transition and developing countries, Coady, Grosh and Hoddinott (2004), conclude that targeting has the potential to increase the effectiveness of these programs. Targeting is particularly important for the transfer of programs that constitute safety nets to address vulnerability, but the choice of targeting methods must be driven by local context.

The recognition of the important linkages between poverty and vulnerability has led to a dramatic expansion in the number of developing countries that have established relatively large cash transfer programs focused on society's low income and excluded groups (Hanlon, Barrientos and Hulme, 2010). Social protection programs cover public transfers, in cash or in kind, to protect and raise the consumption of the poorest households. Fiszbein *et al.* (2014) estimated that social protection programs are currently preventing 150 million people from falling into poverty.

However, development programs that aim to simultaneously improve social as well as ecological protections remain very few. Some examples include public employment programs, such as India's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), South Africa's Working for Water program, and the Brazilian Bolsa Verde program which links an existing social protection program (Bolsa Família) with a scheme of Payment for Environmental services (PES) (Schwarzer *et al.*, 2016).

One of the world's largest social protection programs, *Bolsa Verde*, has been implemented in many extractive reserves and forests in Brazil where rural poverty was widespread. In 2011, the Ministry of Environment collaborated with the Ministry of Social Development to create *Bolsa Verde* as part of the Brazil Without Extreme Poverty Plan, which distributed $34 million to 44,388 households. *Bolsa Verde* provides households with social security support and guaranteed quarterly income combined with training and technical support, in exchange for a household's contribution to various activities linked to forest management and conservation.

7.1. Assessing the Poverty Impacts of Policies

The central focus of the FSP for 2017-2021 is to achieve the twin goals of sustainable forest management and increasing the standards of living in forest villages. However, achieving these objectives requires effective local institutions, such as village cooperatives, as well as a more informed roll-out of the forest development programs identified in the GDF's strategic plan. The former involves both improving the effectiveness of operation of cooperatives and expanding membership of cooperatives to include the poorest households. The latter involves both increasing resources allocated to forest community assistance programs and better targeting resources to ORKOY activities that have a larger impact (see Box 6). Specifically, this involves channeling resources to upgrade timber harvesting equipment, increase the value-added to NWFPs, and enable better paid forest management jobs through skill training and capacity building in forest management.

It is critical to understand the poverty impact of these programs. The above analysis identifies key determinants of household income among forest village households, making it possible to simulate the impacts of various policies and development programs aiming to address rural poverty through sustainable forest management in forest communities.

The FSP (2017-2021) provides direction for promoting sustainable development through better forest management, enhancing the productivity of wood and NWFP harvesting, and improving the wellbeing of the forest village population through economic diversification and increased development assistance. The priority areas identified in the development plan include: (1) improving the productivity of wood production and harvesting by forest villagers through better technology and equipment, (2) expanding the collection of NWFPs, and increasing the value-added of NWFPs by developing SMEs targeted at processing and packaging, and (3) improving the efficiency of the timber supply chain and procurement, through investments in forest resource information systems and improving the efficiency of the timber harvesting supply chain by more closely integrating of harvesting entities (villagers and cooperatives), principle suppliers (GDF) and purchasers.

In the short to medium term, the new forest model proposed by the GDF focuses on harvesting and increasing value-added activities related to NWFPs while engaging villagers in more collaborative approaches to forest management. This includes fully utilizing their local knowledge as forest caretakers and protectors, as well as their labor resources for harvesting and reforestation.

Table 7-1 Analysis of Policy Impact on Income and Poverty: simulations (TL)

Income quintiles	Baseline (BL)	Policy A		Policy B		Policy C	
		A	% change	B	% change	C	% change
			(A- BL)/BL		(B - BL)/BL		(C - BL)/BL
1	**588**	853	**45**	1,254	**113**	2,107	**258**
2	2,862	4,060	42	3,320	16	7,380	158
3	5,681	7,809	37	6,019	6	13,827	143
4	9,268	12,601	36	9,532	3	22,134	139
5	**29,205**	**36,798**	**26**	**29,591**	**1**	**66,389**	**127**
All income groups	7,577	9,964	31	8,023	6	17,987	137
Poverty rate (%)							
Using relative line	41.0	32.3	**-30.4**	36.0	**-12.3**	18.7	**-54.4**
Using national line	82.5	75.0	-24.9	82.1	-0.5	55.4	-32.8

Note: Policy A covers expanding co-op membership and targeting loans to help HHs purchase tractors and trucks. Policy B provides HHs who currently have no pension income with 20% of the median pension income in the form of basic income support. Policy C is a combination of A and B.

While it is difficult to fully quantify the impact of the full range of policies developed in GDF's plan, a policy simulation exercise can be useful in illustrating the potential impact of some specific policy proposals on income. The income analysis provides the marginal impact of several policy variables that can be used in the policy simulation.[21] Based on findings from the above analysis (per capita income) and a review of global experience (Shyamsundar et al., 2017), three highly simplified yet practical programs were chosen for the policy simulation. They include: (A) targeting ORKOY credit programs to households that currently do not have key productive assets, such as trucks and tractors (B) providing basic income support to households that do not receive pensions, and (C) a combination of (A) and (B).

The choice of expanding basic income support among forest village households that have no access to stable income sources is motivated by two considerations. First, the findings from the previous chapters consistently show that one of the major differences between poor and non-poor households is access to pensions. Based on median income by source, pensions are ranked as the second most important source of income (non-forest wage ranks first), and its security and stability indicates that pension income plays the role of a safety net to reduce vulnerability. Other studies also show pension income (both coverage and size) as an important factor behind poverty reduction during 2002-2014 (Azevedo and Atamanov, 2014). The share of social spending in GDP in Turkey was relatively high given its demographic structure with a large and young working population, and the size of pension benefits relative to average earnings (which were ranked second after New Zealand among OECD countries). This suggests that targeting social spending to forest village households in the area of pension coverage can be an important route to

increasing their standard of living. It is also relatively easy to target households without pensions.

The policy simulation exercise focuses on the distributional impact of the proposed programs across income groups and regions. The simulation is based on a per capita income regression presented in Appendix 3. Table 7-1 presents the summary of impacts, measured by the change in household income and poverty rate, from the baseline case. The results show that both proposed programs provide more benefits to poor households.

While policy (A) generates a much larger overall reduction in the poverty rate (32% reduction, using the national poverty line), the increase is smaller across income groups; with a 45% income increase in the bottom two quintiles, and a 26% increase in the top quintile. In contrast, Policy (B) is less effective in reducing overall poverty (12% reduction in poverty rate) but it is highly progressive. The poorest saw the largest increase in income (113%) while the top income quintiles gain about 1%. Implementing these two programs combined is estimated to halve the poverty rate among forest villagers (54% reduction).

Table 7-2 summarizes the policy impacts across regions. Measured by the reduction in the poverty rate, this simulation shows less of an increase across regions than in income groups – but the findings are still quite substantial. The poorest regions did not see the largest reduction in the poverty rate, indicating that these programs may not be perfectly targeted to reach the poorest. However, given that over 80% of forest villagers lived below the national poverty line, achieving geographical targeting may be less of a concern in the design of the program's implementation.

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21 The estimated marginal effect is presented in Appendix 2 in the income regression analysis.

Table 7-2 Poverty Impact across Regions

Region	Poverty rate (%) Baseline (BL)	Policy C	Change (%) (BL-C)/BL
Mediterranean	67.85	34.35	49.38
South East Anatolia	60.43	34.42	43.05
West Marmara	53.87	29.33	45.54
Central East Ana	52.23	21.23	59.36
North East Anatolia	51.23	21.60	57.84
West Anatolia	50.24	35.37	29.60
Central West Ana	43.60	19.41	55.47
West Black Sea	43.38	17.08	60.62
East Black Sea	25.78	10.05	60.99
Aegean	21.97	6.59	70.01
East Marmara	19.27	8.53	55.76
Total	41.03	18.71	54.41

The simulation results provide important information for informing program design. That is, to achieve the goal of reducing poverty across forest villages, community-based programs could focus more on how to modify existing programs (e.g. provision of credit to purchase productive assets) and develop new programs (provision of basic income support to address vulnerability) than focusing on program placement in forest villages (i.e. the issue of geographical targeting). The analysis indicates that there exists an ample scope to improve the cost effectives of the current forest development programs.

The policy simulation and impact assessment should be regarded as an illustration rather than a policy prescription. The development of new forest programs/projects requires the collection of more program-base information, including program cost and implementation feasibility assessments to evaluate cost effectiveness. In addition, the program's design should aim to generate synergies among a range of activities in order to maximize impact on development. Program managers should assess the impact of complementary programs including combining ORKOY programs (skill training of forest villagers to use modern technology for forest management and protection, information on marketing, exporting and e-commerce for NWFPs) with other forest and non-forest fiscal policies.

Given Turkey's long tradition of government-supported programs in forest communities, policy-makers have much to gain from understanding the impact on household welfare. Such knowledge is particularly useful for developing a new forest community model that aims to integrate sustainable forest management with the objectives of alleviating poverty and promoting economic development in forest communities. Unfortunately, information on the impact of these programs/ projects is sparse due to lack of data collection for program monitoring and evaluation. A few studies in this area include Atmis et al. (2009), and Alkan and Kilic (2013), using small-scale surveys that collected limited information. Building the capacity of GDF for household data collection and program impact assessment should be regarded as a key component of the new forest community development model to improve program design and implementation.

8. CONCLUSIONS AND POLICY RECOMMENDATIONS

Turkey's forestry challenges are embodied in the twin objectives of sustainable forest management and increasing the standard of living in forest communities. As the country's primary source of harvesting labor, forest villagers' standard of living is of particular concern to the General Directorate of Forestry (GDF). The GDF provides support to forest villagers to reduce their dependence on forests (i.e. reduce any illegal harvesting) and to reduce pressure on the forests itself. However, this support is often too little, of itself, to fully lift villagers out of poverty – leading to further out-migration.

Out-migration has resulted in a rapidly declining and ageing population in forest villages, a trend that is not unique to Turkey. Comparisons of Turkey's forestry sector to EU countries show that Turkey is beginning to experience a similar trend in forest sector employment. In particular, the EU experience has illustrated that as countries shift from manual labor to more capital-intensive (mechanized) harvesting - this increases the efficiency and management of the resource. While this shift requires less labor - those who do continue to work in the forests generally make higher wages due to their more advanced skills. But even under the current model, Turkey still has enormous potential, in particular through its contribution to total exports (Table 8-1).

The global evidence shows that many high-income countries have gone through a similar process of economic development and structural changes, accompanied by rural-urban migration as part of the urbanization process. As Turkey is reaching the threshold of becoming a high-income economy, the key issue is how to manage the forest sector transition through the development of policies and programs that ensure that the goals of sustainability and poverty alleviation in forest communities are mutually reinforcing rather than in competing with one another. In this regard, the forestry sector should also work with other institutions responsible for rural livelihoods. This would include other social program assistance, such as pensions, and even the private sector.

Table 8-1 Comparing Turkey's Forestry Sector with the EU's, 1990-2010

		1990	2010
Value added ($ mil, 2010 price)	Turkey	1,804	3,077
	Finland	4,301	4,019
	Sweden	3,516	5,890
Forest sector employment as % labor force	Turkey	0.7	0.6
	EU	1.6	0.9
Forest sector as % of GDP	Turkey	1.0	0.8
	EU	1.6	0.9
Forest sector as % of agriculture and manufacturing GDP	Turkey	2.3	3.0
	EU	5.2	5.0
Forest exports as % of total export	Turkey	1.0	2.1
	EU	4.4	3.1

Source: FAO data sources.
Note: Turkey (forest area of 216,781 km²) has a similarly-sized forest coverage to Finland (233,320 km²) and Sweden (234,855 km²), so they were chosen for comparisons.

The evidence generated from the forest village household survey supports these policies and is consistent with existing research, case studies and analysis in Turkey and more broadly in line with global evidence. The analysis explored some aspects of the linkages between poverty, forest dependence, income vulnerability and migration. Findings show that the poor are more forest dependent because of their lack of alternative income options, a low level of productive assets, social capital (e.g. members of a cooperative) and high vulnerability. As a result, they have limited capacity to diversify income sources and move to higher-return economic activities - such as agriculture and owning livestock. To a certain extent, forest dependency represents a poverty trap - since income opportunities are low in the value chain and do not pay that well. However, specific interventions, such as strengthening the value chain through greater local level processing, can improve the situation. Currently, the most forest dependent individuals are in the bottom 20% of the income quintile.

The analysis using the SEHS data shows that ample scope exists to improve the existing forest program in order to target activities that could have a large impact on increasing income as well as addressing income vulnerability. These include: (1) focusing credit to support household investment in productive assets, such as tractors, chainsaws, and access to the internet; (2) increasing social capital, such as membership in cooperatives and associations, (3) increasing access to stable income support to reduce vulnerability (e.g. pensions or other transfer programs) and (4) increasing local NWFP processing capabilities given the untapped potential of value addition at the local level. Programs could enable investments in Small and Medium Enterprises (SMEs) for local processing and packaging of NWFPs, and strengthen local connections to the supply value chain (e.g. via e-commerce). Policy simulation results show that these community assistance programs are highly progressive and can benefit those most in need.

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APPENDIX 1: ORKOY – TERMS AND CONDITIONS OF SUPPORT

Terms of individual grant/loan program support:

A. The forest villager must apply to the Local Unit of the Forestry Directorate in written form;
B. Must have lived in that particular village for at least one year from the credit support date;
C. The forest villager must have documented proof of being a forest villager;
D. The forest villager must use the credit as specified in its pre-set conditions and be committed to paying the credit back;
E. A document as proof of need from the legal head of village (Mukhtar);
F. The forest villager cannot be a permanent employee, officer, tradesman or retired official.

Note: If there is insufficient demand within a village, requirements e) and f) are not necessary.

Credit support limits and caps

Project type	Unit	Maturity Timeframe	Grace Period	Payment Period	2017 Credit Upper Limits (TL)
SOCIAL PURPOSE PROJECTS		No Grace Period			
Exterior Thermal Insulation and Solid Fuel Fired Central Heating (100 m²)		7			16,000
Roof Cover	150 m²	5			2,200
Solid Fuel Heating System		5			5,000
Exterior Fencing	100 m²	5			11,000
Solar Energy System	2-3 collectively	3			1,800
ECONOMIC PURPOSE PROJECTS					
Viticulture	5 decares	7	4	3	14,500
Orcharding	5 decares	7	4	3	12,000
Dairy Cattle	2 head	6	1	5	27,000
	5 head	6	1	5	
Milk Condensation	30+1 head	6	1	5	29,000
Family-operated Hostel		6		6	29,500
Plastic Greenhouse	500 m²	5		5	21,500
Plastic Greenhouse	1000m²				31,000
Thyme Breeding	5 decares	5	2	3	8,000
Sage Cultivation	5 decares	5	2	3	9,000
Fenni Beekeeping	30 beehives	4		4	14,000
	30 hives with enclosure	4		4	17,000

Examples of a Social Purpose Credit

Roof covering materials

Exterior thermal insulation

Solar water heating

Central heating system for households

Examples of an Economic Purpose Credit

Animal husbandry

Beekeeping

Greenhouses

Microcredit for housewives

Mushroom cultivation

Terms of Cooperative\ Grant/Loan Program support:

A. The Cooperative must fulfill the obligations of the Law of Cooperatives, and from the Main Contract must set up quality bookkeeping;

B. A general meeting of shareholders should be held within the legal period, and the scope of activities must be clarified in the general meeting of shareholders or main contract;

C. 51% of households in the cooperative's central village must be shareholders of the cooperative;

D. 10% of the project amount must be financed from the shareholders' equity;

E. The applicable project should be accepted by 51% of the shareholders in a general meeting, and must be approved by the General Directorate;

F. A notarized credit contract and bank guarantee or instrument of charge must be provided.

ORKOY - Forest villager support in 2014

Support Type	Number of families
Roof Cover	1,039
Solar Water Heating	4,889
Heat Insulation	518
Central Heating System	98
Heat Insulation and Central Heating System	48
Total Social Support	**6,592**
Bee Keeping	1,046
Animal Husbandry	4,398
Greenhouse	164
Mushroom Cultivation	16
Eco Tourism	1
Micro Credit	273
Total Economic Support	**5,946**
Total Individual Support	**12,538**
Total Cooperative Support	**23**

Source: General Directorate of Forestry, 2016.

Examples of Cooperative Credits

Trout preparation plant

Dairy barn

APPENDIX 2: MIGRATION ANALYSIS

The econometric analysis for migration is based on a probit model to estimate the relationship between migration status (households with permanent migrants) and a set of household and village variables. Migration status is defined over two time periods: (1) 2007-2011 and (2) 2012-2016. The impact of household and village covariates is estimated using the following equation:

$$\text{Log}(P_{hh}) = \beta + \beta 1\ X_{hh} + \beta_2\ W_{village} + \text{regional fixed effect} + u$$

where P is the probability that a HH has permanent migrants during a specific period, X_{hh} are household variables including age and education of the household head, log household income, membership of forest cooperative, membership in other cooperatives, living in a village with a water network, and a household asset index.

Determination of migration probability

Migration probability	2012-2016	2007-2011
Indicators for education of household head		
Never in school	0.012	0.113
Primary school	0.073	0.301
Mid-high school	-0.254	-0.063
Age of HH head	0.156*	-0.046
Age of head (squared)	-0.001*	0.001
Male head	-0.072	-0.050
HH size	-0.119***	-0.149***
log (total income)	0.086*	0.095*
Share of forest income	0.491**	0.393*
Share of non-forest wage income	-0.078	-0.225
HH is member of forest coop	-0.498*	-0.188
HH is member of other coop	0.086	0.060
HH has internet access	-0.329	0.006
HH is owner of livestock	0.267*	0.285*
HH has tractor	0.033	-0.116
Living in village with water network	0.010	0.026
Asset index	0.044	0.005

Note: The asset index is constructed using Principle Component Analysis covering 8 assets: cellphone, computer/tablet, freezer, solar panel, car/truck, motorcycle/scooter, tractor, and chainsaw. The first principle component (PC1) explains 47% of the total variation of 8 durable/asset variables.

APPENDIX 3: INCOME REGRESSIONS, BY SOURCE

Determinants of income, by income source

Dependent variable: log (income by source)

Variable	Forest income	Agriculture income	Livestock income	Forest wage	Non-forest wage	Pension income	Total income	Per-capita income
Has migrants	0.17	0.22	-0.42***	-0.34	0.09	-0.02	0.13*	0.19*
Coop member	0.31**	0.19	0.31**	-0.06	-0.03	0.01	0.32***	0.24**
Household size	0.01	0.03	0.01	-0.02	0.05*	-0.01	0.05*	-
Live in village with water network	-0.50***	-0.34	0.34***	-0.22	0.11	0.06	0.03	0.09
Has internet	0.16	-0.11	0.16	1.15	0.22*	0.10	0.18	0.07
Has solar panel	-0.06	0.09	0.15	0.09	0.06	0.00	0.07	-0.02
Has car	-0.26**	0.31*	0.13	-1.34	0.26**	0.08*	0.34***	0.34***
Has motorbike	0.22	0.24	0.04	-1.22	0.08	0.06	0.11	0.08
Has tractor	0.30**	0.58***	-0.04	1.65	0.08	-0.12**	0.30***	0.21*
Has chainsaw	0.39***	0.10	0.14	-1.12	0.18*	0.06	0.25***	0.21**
Own livestock	-0.08	-0.27	1.24	1.75	-0.28***	-0.02	0.17*	0.08
The following variables are with respect to household head:								
Graduated primary school	0.32	0.17	-0.15	(omitted)	0.71	0.14	-0.64	-1.17***
Graduated middle school	0.15	0.67	0.06	-1.02	0.92	0.23	-0.25	-0.63*
Graduated high school	0.32	0.68	0.06	0.08	1.01	0.29	-0.23	-0.56
Attended tertiary school	-0.49	0.77	0.35	-4.49**	1.03	0.40	0.24	-0.22
Age	0.02	0.03	-0.10***	0.28	0.12***	-0.01	-0.05*	-0.05
Age squared	0.00	0.00	0.00***	0.00	-0.00***	0.00	0.00**	0.00**
Male	0.21	0.14	0.25	-0.44	-0.03	0.09	0.04	-0.18
Regional fixed effect included	sig	sig	sig	sig	sig	sig	sig	sig
No. of obs	665	291	351	40	256	440	1017	1017
R sq	0.17	0.09	0.15	0.08	0.18	0.04	0.24	0.25

Note: The income model is in semi-log form, therefore, the estimated coefficients (times 100), represent a percent change in income for unit increase in the covariates (in the case of continuous variables) and discrete change (in the case of dummy variables). For example, col (7) for total income, 0.13*, means that, on average, households belonging to cooperatives, earn a 13% higher total income, compared with non-member households, all other factors being the same.

APPENDIX 4: PROPORTION OF HOUSEHOLD ASSET OWNERSHIP

Item	% HH ownership
Internet	0.63
Cell phone	8.86
Computer	1.17
Dishwasher	2.47
Fridge	2.54
TV	9.79
Solar panel	4.71
Car/truck	4.24
Horse	0.35
Donkey	0.68
Motorbike	1.36
Tractor	4.16
Generator	0.26
Handheld harvester	0.01
Harvest combine	0.00
Harvest harrow	0.01
Water pump	0.70
Chainsaw	4.88
Motorcycle	0.00
Livestock	6.18

Poverty, Forest Dependence and Migration in the Forest Communities of Turkey

Evidence and policy impact analysis