

The extend of a country's natural forests is a standard for measuring its level of wealth.
TEMA, Istanbul.

Turkey

Prof. Dr. Alexi DANCHEV, corresponding author

Fatih University, Istanbul, adanchev@yahoo.com

Dr. Said DAGDAS

Central Anatolia Forestry Research Institute, Ankara, saiddagdas@yahoo.com

Prof. Dr Mustafa Fehmi TURKER

Blacksea Technical University, Trabzon, mft@ktu.edu.tr

Dr. Bekir KAYACAN

Istanbul University, Faculty of Forestry, Istanbul, kayacan03@yahoo.com.

1. Introduction

The rising discrepancy between increased demand of forestry products and their shrinking supply due to the restricted wood reserves is a common tendency for most of the industrialised and under industrialised economies. There are many reasons for it, which in most of the cases are rather individual for every country. The analysis of these reasons reveals important features for every country and the comparative analysis of these reasons allows drawing conclusions of utmost theoretical and practical significance.

One such interesting example is the forestry sector of Turkey and its role as a supplier of inputs to the technological chain of wood and wood related production. At present the industrial forestry in Turkey is a dynamic sector of the economy completing important economic, social and environmental tasks with national and international significance. Predominant tendency in this sector is the process of serious structural changes and adjustment to the EU standards. (Anonymous Turkish Press, 2004). Forestry sector also takes an important place in the government policy. At the same time it faces serious challenges coming from the national and international factors of development, the controversies of the modern economy and politics and the inertia of natural types of consumption involving wood products in various degrees and levels in consumption.

In general the tendencies in demand and supply of forestry products in Turkey follow the macroeconomic ups and downs and in the short run fluctuate with the main leading indicators. In the long run the increasing demand of wood and other substitute and complement goods stimulates the demand of forestry products, which is facing the shrinking possibilities of the supply based on logging natural forests and wood from industrial plantations. Thus, the economic equilibrium in this sector is shifted more to the demand sector, indicating to the suppliers which are the most demanded products. Due to the international division of labour Turkish forestry sector both import and export wood and wood related products, which stimulates the openness of the national economy.

1.1. Objectives of the study

The aim of the present paper is to outline the basic problems connected with the demand and supply of wood and wood products in Turkey and to define some practical recommendations and urgencies in view of the research carried out in this area.

As a matter of fact however this is very complicated question, coming from the complexity of the technological chain “forestry – consumption”. The problem is that forests are source of multiple social benefits, which affects the chain of supply of forestry production and its demand. The boundaries of forestry production and non-wood forestry goods are rather fuzzy, part of this chain passes through the shadow economy and a lot of information about the various wood and non-wood forestry products is simply “missing”. In the context of these features the study of the problems of the economic integration of urban consumers’ demand and rural forestry production is restricted within the following objectives:

- to outline the tendencies in the consumption of wood and non-wood forestry production.
- to analyse the basic factors influencing consumption of forestry goods.
- to present empirical results of supply of forest products.
- to present recommendations concerning the improvement of the economic integration of urban consumers’ demand and the rural forestry production in the country.

The study is concentrated on the forestry goods consumption and the supply of these goods. Many problems related to it remain outside the analysis mainly due to the limited scope of the study and the missing information. What can be stated as certain however is the fact that the process of integration is on-going despite its controversy and its study presents important part of social management and research. From this perspective the analysis is concentrated on the basic sectors of forestry connected with consumption and supply with explicit indication on the multifarious aspects of forestry and some of its basic side-effects without which the study would be incomplete.

1.2. Brief characteristic of the forestry sector in Turkey

Forests occupy 27% of the total land area of the country. It accounts for 20.7 million hectares. About half of this area is productive forestry, the other half are low quality, low productive semi-forests and shrubs. (VIII. BYKP-OÖİKR, 2001). The location of the forests on the territory of the country is presented in Figure 1.

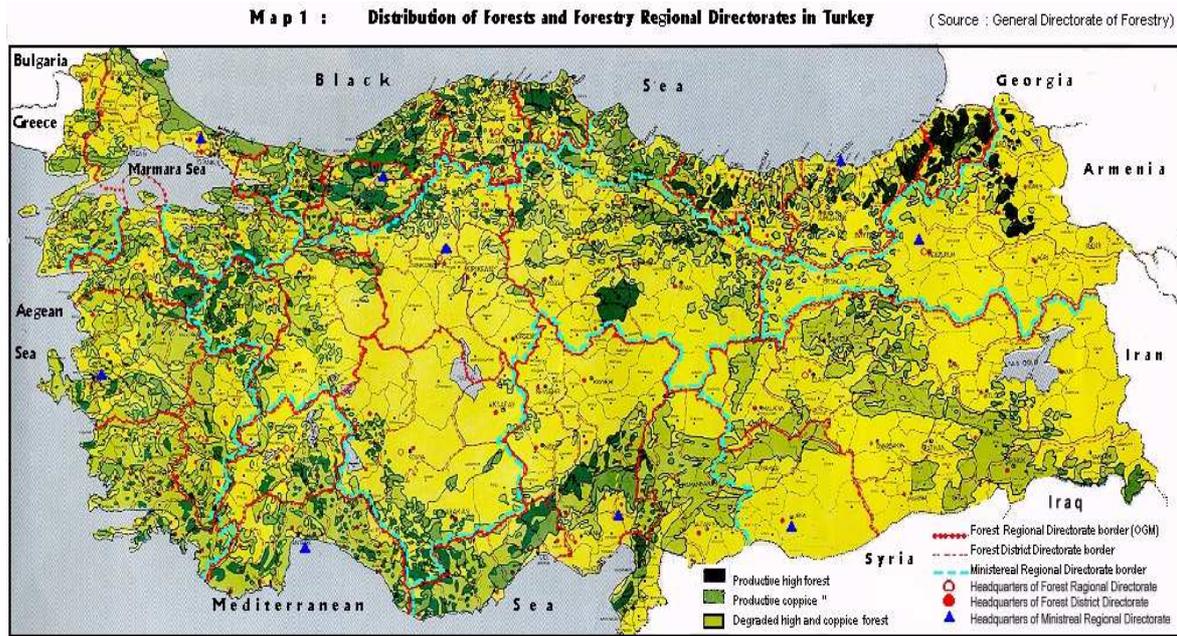


Figure 1. Distribution of forests and forestry Regional Directorates in Turkey.

Forestry sector plays important economic role. It supplies forest products to meet their increasing demand and is a source of significant positive externalities for the national economy. The supply of wood is based on natural and industrial forests with increasing importance of the latter. The basic cultures of industrial forestry are pine, poplar, and eucalyptus plantations. The share of poplar increases very rapidly due to its high productivity and demand, making it attractable for the private sector due to its good profitability.

The basic indicators of forestry in Turkey by 2000 are indicated in Table 1.

Table 1. Basic indicators of forestry in Turkey (ha by 2000 year).

Situation / Activity	Quantity (ha)
Forest Area	20.763,000
(Private forests)	18.482,000
Productive Forests	10.027,000
Degraded Forests	10.736,000
Forest Land Use (Public land)	20.745,000
Exploitative Forests	16.650,000
Protected areas	4.095,000
National and Natural Parks, Nature Protected Areas	864,000
Conservation Forest (Mainly erosion control)	3.231,000

Although we outline the demand problems later, we need to indicate since the very beginning that the rising demand of wood on the national and international markets creates problems with the supply of wood products for the national needs, as at present the wood production is not capable to compensate the rising demand for forest products. This is very well evident when we compare total and per capita forests. In comparison with the other countries per capita total forest area in Turkey is not very high due to the increasing population. Despite the big area of forests, it accounts for only 0.32 hectare

per capita, while the same indicator for the USA is 1.13, for Kazakhstan 1.05, for Turkmenistan and Greece 0.92, for Bulgaria 0.40. The story becomes more dramatic when we compare per capita productive forests. For Turkey it is only 0.15 hectare per capita, while for Finland it is 4.53, for Russia, 4.2, for Brazil 3.76, for New Zealand 2.21, for Europe 0.26 and for the world as a whole 0.64. This signals the need of rise of national industrial forestry as one of the paramount tasks of the national economy moreover than Turkey has the necessary resources (land, climatic conditions, water, etc.) to face this challenge successfully.

We analyse later the role of policy to foster forestry sector in the context of overall industrial policy. In general, the present industrial policy in Turkey is concentrated on stimulating high-technology sectors of the economy, which rapid growth reduces the share of traditional sectors as forestry in the economic structure. It does not mean however that this is not a dynamic sector. The survey of the industrial policy for Turkey toward its EU membership indicates that the task of reaching high growth rates and modernisation of economy including forestry is supported by the business and is implemented successfully in many sectors. Thus, for the period 1996 – 2000 the share of low-technology production drops from 73,6% to 72,2% and the share of low-technology exports dropped from 73,3% to 63,2% (industrial forestry production and export are related to this group). At the same time, we observe rise of the share of production and export of medium and high-technology goods. Only the share of the high-technology production in this period increased from 4,8 to 4,9 when the export jumped from 6.6% to 10,3%. This is an evidence of the formation of modern economic structure of production and export of the country. As a result it is expected to stimulate the progressive structural changes in the forestry too (Industrial policy).

Inevitable consequence of it is the fact that during the last decades the share of forestry as a sub-sector in the agricultural sector is decreasing. Only for the period 1997 -1998 this share has dropped from 5.1% to 4.4%. This is due to the positive growth rates in the industrial sector as a whole and diminishing growth rate of forestry sector in particular. In fact, the growing rate of forestry was -3.7 % in 1997, and -2.2 % in 1998 (Anonymous 2000 c, p. 97).

The present tendencies in the industrial forestry in Turkey can be characterized as follows:

- despite the drop of the growth rates of the sector as a whole rise of high productive forestry in the state and private plantations.
- introducing modern technology in cultivation and logging of trees, including genetic improvement of the structure of forestry
- introducing new approaches to the industrial forestry as sustainable logging increased of clear-cut logging, round-wood production, etc.
- increased emphasize on sustainable use of the forests.
- active government policy for rational use of forests aimed at protecting natural forests and extending industrial forestry at the expense of extending plantations on new low productive lands with suitable provenances of species such as Turkish red pine (*Pinus brutia* Ten.), *Eucalyptus camaldulensis* D., *Pinus radiata* D. Don, *Pinus pinaster* Ait, *Pinus elderica* Med., etc. (Cengiz et al., 2002; Dağdaş, 2002; Tulukcu et al., 1987; Tunctaner et al., 1985).

2. Demand aspects of forestry in Turkey

2.1. State of art in demand of forestry products.

The demand of forestry products has long traditions in the Turkish history. The careful attitude to the forests and their sustainable use although not explicitly declared over the centuries is part of the national culture. The modern visions of forestry extrapolate these traditions combining them with the up-to-date policy of sustainable development and its implementation for turning industrial forestry into an efficient and competitive sector. Nevertheless the present modern way of living of both rural and urban population closely related to the consumption of forestry and forestry based products results in extreme depletion of forest resources and disappearance of valuable forestry reserves in some areas.

The up-to-date consumption of forestry products although increasing during the last decades is facing extended protection of forest reserves and creation of new ones, which strongly reduces unsustainable use of these resources. An important feature is also the increasing industrial plantation in non-productive land not suitable for other purposes. This is source of additional wood coming to meet the rising demand of wood and related products. Increasing is as well the role of substitutes both on consumption and supply side of forestry.

The information collected by various statistical institutions and researchers allows shedding light on the problem. Systematic studies revealing the links within the technological chain wood-wood products are limited in number (e.g. the studies by Cakir, 1986 and Kayacan, 2004), Next we try to complete this task by following the logic of technological chain with all its complicated and diversified structures.

2.2. Consumption of basic forestry products.

As a whole for the period 1962 – 2000 the consumption of wood raw materials increased from 3037 thousand m³ to 11,259 thousand m³. In 1962 the basic part was log (2,385 thousand m³), followed by the raw wood used for packing (220 thousand m³) and mine posts (400 thousand m³). For the last three decades consumption of log has been relatively stable at about 5-6 million m³, while the consumption of pulpwood and of chipwood have consistently increased up to 1519 thousand m³ and 1850 thousand m³ respectively (Anonymous 2005; Konukcu, 2001, p. 126).

The analysis of consumption following the technological chain reveals important aspects of the disequilibrium between demand and domestic supply of wood. Our considerations are based on the following scheme of technological chain (Figure 2).

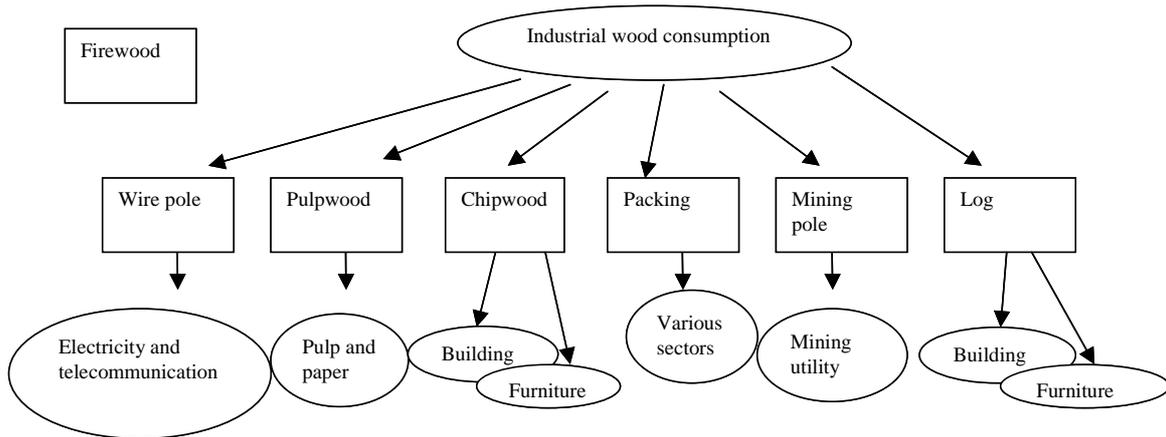
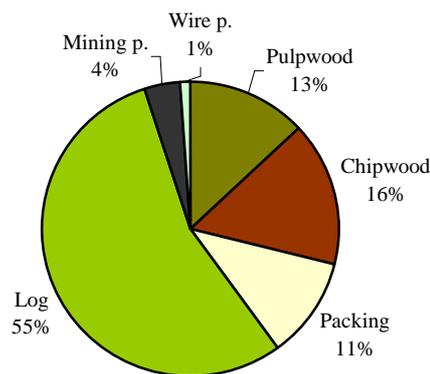


Figure 2. The technological chain of wood consumption in Turkey by 2005.

The scheme is constructed on the assumption that the industrial wood consumption is distributed among the log, firewood, pulpwood, chipwood, etc. Thus we can outline the technological chain of present consumption of wood as firewood accounting for 18,000 thousand m³ by 2000 and the industrial sectors accounting for 11,259 thousand m³. The structure of industrial wood consumption is presented in figure 3. The biggest share in it belongs to the log (55%), which is structured in the following way: for building 70%, for furniture 20% and for the others sectors 10% . [ÇEVRE ORMANCILIK SURASI, (2005)].

The next stages of technological chain: the tertiary use of wood in paper, furniture, building, and other sectors are very important for the analysis as they reveal more exact picture of the problems of present demand for wood products in Turkey. The information about these structures requires very detailed research on firms' levels which is a question of further research.



Source: Konukcu, 2001, p. 125.

Figure 3. Structure of industrial wood consumption in Turkey by 2000

This level of consumption has been reached due to the local supply and import of wood from the rest of the world.

The aggregate picture presented above cannot reveal the complex links within the consumption-production of the forestry products in the technological chain and the final goods in the economy. Additional problems arise as we need to take into account the non-wood based forest products, which complicates analysis. The outlining of more complete picture of the chain consumers – producers of forestry wood – non-wood products is possible by means of input-output analysis providing detailed information of the final consumption of wood (see Table 2).

Although the share of forestry sector in the economy is not high the input-output analysis indicates that it is strongly interrelated to a lot of the other sectors. According to the sum of inverse matrix's row elements, the forestry sector is in 24th position. While the share of intermediate demand in total supply of 97 sectors was about 37% in 1996, the average of this rate in the forestry sector is more than the country with 81%. These figures show that the part of forestry sector's outputs which go to intermediate demand is very high compared to the figures of 97 sectors (Turker, 2005).

The contribution of the forestry sector to the added value and production by 1996 is also significant due to the high forward relations of the sector and the application of labour intensive technologies. According to the sum of inverse matrix¹ column elements, the forestry sector is at the 93rd position within the 97 sectors matrix. The increase of final demand due to the forestry sector has, therefore, little impact on the production of the other sectors of the economy.

Table 2: Total Values and Importance of Forestry Sector in National Economy based on the Inverse Matrix (1996).

The Sum of Elements	Order of forestry in the 97 sectors matrix	
Column j	1.222	93.
Row i	1.868	24

The results of sectoral interaction analysis allow revealing the forward and backward linkages of forestry sector to the other sectors of the economy. While the average forward linkage rate of the other sectors in the national economy was calculated as 0.370, the rate in the forestry sector remained over the overall rate with the rate of 0.810. Correspondingly, while the average of the backward linkage rates of the 97 sectors for 1996 was 0.370, the backward linkage rate for the forestry sector was 0.120 and this rate remained under the overall rate. The conclusion is that while the forward

¹ Inverse matrix given in DIE (2001) is not exactly the well-known Leontief Inverse, since it was derived from the use table coefficient matrix rather than from the *A* technology matrix based on a symmetric industry-by-industry flow table. However, the tendency depicted here might not change dramatically even if we used the Leontief Inverse instead, except that the exact figures and rankings would most probably differ. In fact, Kayacan (2004) reported similar results based upon a 48x48 symmetric industry-by-industry model using the 1996 data.

linkage of the forestry sector is relatively high, the backward linkage rate of forestry sector is low². These results are summarised in Table 3.

Table 3. Interaction rates and importance of the forestry sector in comparison with the other sectors of the national economy (1996).

Sector name	Forward Linkage Rate	Backward Linkage Rate
Forestry	0.81	0.12
97 sectors	0.37	0.37

According to the results, forestry sector can be characterised as a sector that produces mainly intermediate goods and stimulate the rise of production of the sectors, requiring forestry product as input for providing outputs of the final demand. Shortly, the forestry sector is a sector of not high backward linkages, but the forward linkages of which are significant as it gives inputs to a lot of other sectors. Consequently, despite its small share in the national economy the forestry sector can be defined as a sector with strategic importance (Geray, 1993).

There is not detailed information for most of the sectors using forestry product as inputs or for consumption. For example, consumption of fire wood accounts for a big share of all forestry products. Related to firewood are so called energy forests used for energy production. They accounts for 403991 hectares for the period 1963 – 2000 (Konukcu, 2000, p. 47). The exact volume of firewood is difficult to measure as a big part of it constitutes shadow logging in terms of consumption remaining outside the official price system. Part of it is illegal logging by the local population. Taking into account the fact that normally the statistics for this activity is very incomplete, which underestimate the real dimensions, we can expect that the real illegal logging in much higher.

Part of urban demand of forestry products is located in other economic sectors, which influences the economic integration and in future may increase their role generating new demands of forestry products.

2.3. Consumption of non-wood forestry products.

Turkish forests are a treasure of wildlife products. They are source of a lot of non-forestry products (named also secondary forest products (SPO, 1995a), which are substantial part of consumption of some households, especially for the local population³. These include medical shrubs, grass and herbs growing in forest and its open spaces, various crops obtained from their leaves, flowers, seeds, stems, roots, gum resins, etc.

The production of non-wood forest products in Turkey is realised in two ways: as planned and unplanned production (SPO, 1995a; GDF, 1995). The planned production has been realised according to the targets determined by the Five Years Development Plans, and depending on the demand of home and foreign markets. Its management and the preparation of the silvicultural plans in this area are based on the budget and the regulations related to logging, production and sale rules of secondary forests products.

² Low backward and relatively high forward linkages of the forestry sector in Turkey were also shown by Kayacan (2004) more comprehensively in light of other criteria for direct and indirect linkages.

³ Strictly speaking we need to include here also the consumption of drinkable water from the forest areas. For technical reasons it remains outside our study.

In particular, this is related to such products as resin, storax, laurel leaf, box-tree, garden stake, fat pine, etc.

On the other hand, other non-wood forest products, which have high potential of exporting and which are cultivated in the forest areas such as pine nuts, chestnut, sage, mushrooms, sumac, lime etc. are supplied mainly without any plan and independently from the market demands.

As a whole, the production of non-wood forest products in Turkey is strongly dependent on the home and foreign demands. As the production potential is high there products are used not only for home consumption, but also for export. Between 1990 and 1998, a total of 300.937 million \$ of forest products were exported. A part of \$ 294,448,000 of total export revenues was obtained from the non-wood forest products, while the remaining part (\$ 6,488,000) was received from round wood (Konukçu, 1999), representing 98% of total forest products exports. (Turker, 2005).

As the foreign demand exceeds the local demand of non-wood forest products Turkey exports much more of these goods than imports. Due to its natural potential Turkey plays an important role in the aromatic and medical plants trade in the world. For instance, between 1990-1999 Turkey exported medicinal plants for 682.7 million dollars [Toksoy, Gümüş and Ayyıldız, 2003, p. 8]. The total export and import of non-wood forest products for Turkey are presented in table 4.

Table 4. Exports and Imports Non-Wood Forest Products in Turkey.

Plan period	Years	Export (\$)	Import (\$)	Import - Export (\$)	Import/Export (%)
I	1963 - 1967	11,279	456	10,823	4
II	1968 - 1972	13,235	500	12,735	4
III	1973 - 1977	34,723	695	34,028	2
IV	1979 - 1983	76,764	256	76,508	-
V	1985 - 1989	177,367,800	5,656,000	171,711,000	3
VI	1990 - 1994	141,720,000	13,861,000	127,859,000	10
VII*	1996 - 2000	119,568,000	27,562,000	92,006,000	23

*Results of the first three years

Source: Turker 2005.

There are evidences that the exploitation of a lot of non-wood forestry products is not-sustainable that causes a loss of biodiversity and endangers the ecosystems in the forests. Although some information can be found in the state forest enterprises concerning the medicine herbs, mushrooms and wild fruits collection, it reflects only part of collected species as a lot of it is gathered by the tourists for own consumption. The collection in most of the cases is not sustainable for many reasons, the most important of which is the lack of collection culture. Biggest part of the collection remains outside the price system. As a whole the information to more precise estimation of the consumption of non-forestry products is not available by now.

The consumption of goods results of animal breeding in the forests accounts for significant part of non-wood forestry products. Animal breeding in the forests is popular in the whole Balkan region. It is a source of income for the local poor rural population

in the mountainous areas. The main breeding animals include sheep, goats, cows, etc. They are source of meat, milk, wool and related products of high nutrition quality.

Thus, we observe another technological chain of primary and secondary products of forestry areas, which constitutes serious part of local consumption. The primary animal breeding results in secondary goods (milk, meat, wool, leather, manure, etc.) all of them part of the local consumption. Although we can expect that the animal breeding in the forests is big in the rural populated mountainous areas, there is not available information about its dimensions. No official statistics could be found for the quantities produced and the prices per unit. The collection of such information can be realised by means of a survey carried out in the villages adjacent to the forests.

Animal breeding can be regarded in some aspects as an opportunity cost of biodiversity loss. The biologists assert that the grazing changes the structure of herbs and thus changes not only the biodiversity among the herbs, but also the food for some wildlife. For example, the manure from grazing stimulates the growth of some herbs having detrimental effects on the herbs used as a food by the wildlife. The conclusion is that the intensive animal breeding in the forests infringes the ecological equilibrium not in favour of the wildlife. A detailed survey is needed to prove this assumption.

2.4. Non-use value of forestry.

The analysis of the modern consumption of forestry products would be incomplete if we do not consider the non-use value of forestry. It is a value reflecting various attributes of forests as goods which may not be used in the traditional sense. These attributes could be formulated from various points of view: from the very fact that forests exist or that they are appreciated by the consumers as alternative future use for them or their children or the next generations. The estimation of non-use values is an expensive and time-consuming procedure requiring specialized research with the application of various methods for non-use values estimation.

Our preliminary observations indicate that forestry sector in Turkey is a source of important non-use values, which are substantial part of the benefits from forestry and are closely related to potential consumption of benefits coming from forestry. According to Bann and Clements the non-use value of forests in Turkey account for about 61.5 % of the total benefits of forests in Turkey (Bann and Clemens, 2001, p. 55-56). Other estimates also indicate that the non-use values of forestry products per hectare exceed the total per hectare benefits (Toksoy, Gümüő and Ayyıldız, 2003, p. 8).

The non-use values are important source for estimation of demand of many forestry related goods as for example recreation in forestry. While most of the resorts are concentrated in the sea areas, the Turkish forests provide an excellent recreation capacity. This activity is highly developed in some areas but as a whole the usage of forest is far below its potential. Producing estimations of such non-use values as existence, bequest, etc. values can be used in planning the growth of recreation in forestry areas.

These kinds of estimations also should be included as a part of analysis of consumption of forestry products as they create long-run effect on consumption. Producing estimations of non-use value of forestry gives a powerful instrument to the decision-makers to assess the benefits (real and potential consumption) of such activities in the forestry sector as creating recreation zones, protected areas, national parks and reserves, tourist zones, etc.

2.5. Shadow consumption of forestry products

The information provided above contains sufficient evidence that the shadow consumption of forestry products is not small. Taking into account the features of national consumption especially in rural population we expect high shadow consumption of non-wood forestry products. This is very symptomatic for the whole region, where the collection of forestry products as mushrooms, medical herbs, etc. is a tradition from old times. Besides, the forests products are as a rule an object of shadow consumption especially in countries where the control over the property rights is slack. The shadow consumption of forestry products may increase however also due to inefficient defining of property rights. It results in consumption of forestry products, which remains outside the existing in the economy price system. This includes consumption of forestry and non-forestry products freely collected from the forestry areas, illegal logging, consumption of non-forestry goods self-produced in forestry areas, etc. The study of shadow consumption requires a lot of specific information as a rule not available in the traditional statistical sources. For this reason we can express only some intuitive considerations on the subject.

The illegal loggings accounts for too big part of the whole forestry in Turkey. Very high is the level of illegal cutting (7,200 thousand m³), which is comparable with the production in the private sector.

3. Supply aspects of forestry in Turkey

3.1. State of art in supply of forestry products

The supply of wood is based on natural and industrial forests with increasing importance of the latter. The basic cultures of industrial forestry are pine species with increasing share of poplar and eucalyptus plantations. The share of poplar increases very rapidly due to its high productivity and demand, making it attractive for the private sector due to its good profitability.

The supply of forest products depends strongly on the structure of forestry production, its efficiency and links with the other sectors of economy. Its role is multifarious: forestry production is a source not only of inputs for the other sectors, it also created additional jobs especially in areas with high unemployment – a fact additionally increasing the economic importance of this sector. Belonging traditionally to the low-technology sectors forestry is not high profitable segment of national economy and the government support is of paramount importance for its growth and development. From this point of view the analysis of supply of forestry products requires to shed lights on many other problems influencing the further growth of forestry. Part of these problems has been answered in the demand analysis of forestry as it is the other side on the input-output relationships in the national economy.

3.2. Production of forestry products.

A good precondition for the creation of a healthy economy is the pyramidal structure of the industry in terms of the firms size with definitely high share of the small and medium enterprises (SME), which are the core of the business and employment. The industrial structure of Turkish economy corresponds to this requirement. The share of SMEs with up to 250 employees in 2000 is 99.6% of total number of establishments, 63.8% in total employment and 36.0% in value added [Industrial policy].

This pyramid more or less is reproduced in forestry production sector. A general picture of forestry is presented in figure 4, which outlines the basic indicators characterizing forestry sector in physical terms. Correspondingly the increment of woods is calculated as 34,270 thousand m³, AAC as 17879 thousand m³, total production as 13,260 thousand m³, including private production of 7480 thousand m³, export of 3 thousand m³ and import of 1,500 thousand m³.

About 56% of the wood raw materials are produced by the private sector, while the ownership is almost completely public.

In the light of this comparison the production capacity of the Turkish forest sector is not sufficiently high and to meet the challenges of the increased demand and the country import 1,500 thousand m³ from the rest of the world.

Forestry sector was in a process of progressive structural changes during the last decades. The dynamics of production was increasing during the second half of the XX century reaching its maximum in 1970s with slight fluctuation during the next decades around 4800 thousand m³. In structural aspect the changes were toward increasing the share of goods based on modern for these sector technologies. It is illustrated in Figure 4, and Table 5.

The investments in forestry sector were also dynamic during the last decades reaching its peak in 1977 and 1987 and although slowing down for the next decades as a whole they exceeded the investments in the previous decades. For the present decade we can say they are relatively stable with expectations to rise due to the need of modernization of this sector. The basic sources for investment were the budget and after 1986 the Afforestation fund, which share in the total investment increased (Ormanlar, p. 85-86).

Table 5. Production of Wood Raw Material in Turkey – private and public in 1000 m³ for the period 1962-2000.

Years	Types of product							Total Private share	Firewood
	Logs	Wire P	Mining. P	Pulpwood	Chipwood	Packing W.			
1962	2192	32	505			150	2879	124	
1967	3418	40	386			250	4094	306	
1972	4940	39	563			460	6002	597	
1977	5824	161	545	976	454	470	8430	1157	28000
1982	4470	71	470	935	908	577	7431	1430	28000
1987	5074	190	567	1470	1293	732	9326	2060	24250
1992	4747	122	440	1149	1645	860	8963	2492	20800
1996	4912	89	436	1568	2050	1293	10348	2803	18500
1999	4505	90	456	1610	1791	1183	9635	2570	17800
2000	4723	156	414	1538	1893	1216	9940	2580	18000

Note : About 80 % of the total industrial roundwood comes from coniferous species. <http://aks.iujp.dot>

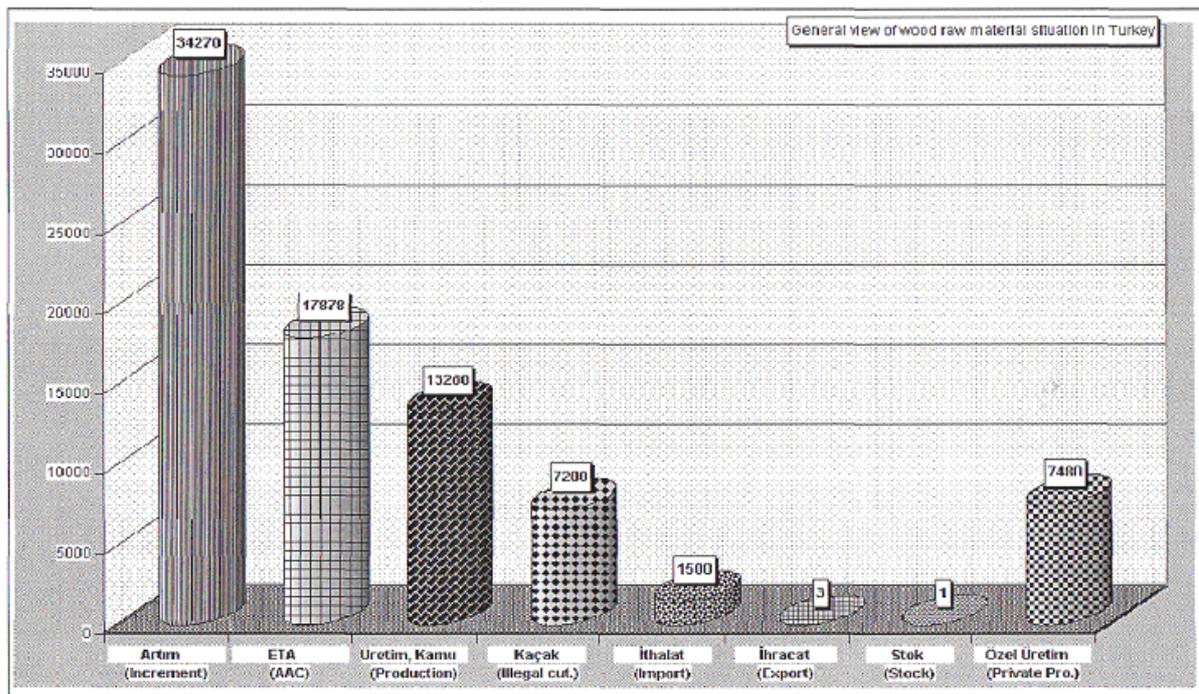


Figure 4. Structure of the forestry sector in Turkey by 2000.

To stimulate the modernisation of the structure of forestry sector the government is encouraging private initiatives within the publicly owned forestry land (government policy in this sector is analysed next). The ownership in forestry is mainly public, but it changes from state to private in terms of increasing the role of private sector in industrial forestry. This rise was impressive during 1990s to reach by 2000 the total amount of 28,476 hectares. By ownership, the private plantations are distributed as about the half belonging to the village legal entities and about a quarter to the real persons and others (Figure 5).

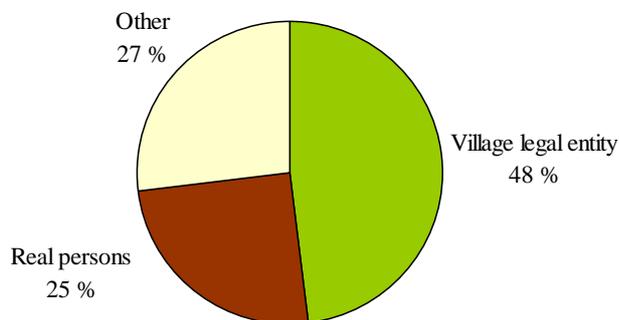


Figure 5. Private plantations in Turkey by ownership (2000)

The supply of forestry products has multiplicative effect for the national economy as it affects not only the production, but also income, employment and the state of environment. According to Turker (Turker, 2005) the production multiplier of forestry sector accounts for 1.222, the income multiplier is 1.377 in the 97 sectors input-output matrix of national economy. This puts the importance of forestry sector in the ranking of all the sectors on the 93rd place in production ranking, and on the 89th place in income ranking. As it was indicated above despite its low place in the ranking due to its forward and backward linkages this sector plays very important role in the national economy.

As the employment is not included in the Inter-industries Treatments Tables prepared by SSI for the year 1996, the employment multiplier of the sectors related to the forestry could not be calculated. The values regarding these sectors were obtained from a research done for Trabzon Sub-Region located in the North-East part of Turkey (Özyurt, 1982). According to this research, in the Trabzon Sub-Region economy, the employment multiplier of forestry sector is 0.291, which puts it at 17th position with regard to the employment effect in 64 sectors. This high ranking is results of the application of labour-intensive technologies in forestry sector.

3. 4. Government policy of stimulating forestry products supply.

Although the government policy in the forestry area has old traditions since the Ottoman times, the government activity in support of forestry accelerated in the second half of the XX century. Since 1950`s there is a rise of plantations and forestry experiments carried out by various government institutions. At present the government policy in forestry sector includes a complicated institutional structure with great influence on decision-making in macro and micro levels. It directly and indirectly affects the supply of forestry products.

Basic provider of the government policy is the Ministry of Forestry (MOF) re-established in 1991, which includes General Directorate of Forestry (OGM); General Directorate of Reforestation and Erosion Control (AGM); General Directorate of Forest

Village Relations (ORKOY); and General Directorate of Forests, Game-Wildlife (MPGM). The merging MOF and MOE in 2003-2004 allowed to improve the efficiency of the main General Directorates and to stimulate the supply of forestry product in more sustainable way.

The legal framework starts with the Constitution, and continues with a lot of forestry laws (the Forest Law No.6831; the forests Law for Supporting Development of Forest Villagers No.2924; the Law on Development of Forest Villagers; the Law for the Establishment and Duties of the Ministry of Forestry No.3800 and the General Directorate of Forestry No.3234; the National Mobilisation Law for Afforestation and Erosion Control No.4122; the Hunting Law No:3167; and the Land Cadastral Law; the Specially Protected Areas Law; and the Law for protection of Cultural and Natural Assets).

As it can be seen for these facts, the government policy stimulating forestry including supply of forestry products is based on detailed institutional system of laws, regulations, rules, etc. The Forestry Law gives “exclusive authority and responsibility for the management of forests” (CP2002 – Turkey, p. 31) to the independent State Forestry Organisation. It prepares important documents outlining the framework of the forestry sector in the economy. Two basic activities are of utmost influence: the Special Forestry Reports and Forestry Master Plans.

Included into the institutional structure are also the Higher Board of Environment; the Environmental Impact Assessment Process; the National Forestry Assembly; and the National Environment Action Plan (including forest resources), which are regarded as “effective mechanisms” for providing the government policy in forestry sector.

The institutional and legislative base of regulation supply of forestry products is in process of improvement and better codification aimed at facilitating the unification with the European standards and implementation of the basic aims of the policy of sustainable development. Afforestation Regulations and Afforestation Fund Regulations (1994) are example of such improvement. The National Reafforestation Mobilisation Law (1995) although removed by 2004 nevertheless was assessed as “the most significant legal and financial arrangement, securing sustainable flow of sufficient amount of financial resources into the Afforestation Fund”. The government policy in forestry is improved also by further extending of forestry legislation, stimulating private plantations development, providing financial support to industrial forestry, etc.

The basic policy instruments used to stimulated industrial forestry can be defined as: direct (command-and-control) instruments and economic instruments.

The direct instruments of regulation are expressed mainly in the government initiatives of industrial forestry development. It starts with including this activity in the nation-wide planning process since 1956 as well as in supporting various initiatives of non-government institutions. It is facilitated by the fact that most of the forestry is public property.

Illustration of this regulation is the growth of **planned public investment** in the forestry sector. Figure 6 (Ormanlar, p. 87) reflects the ratio of the planned public investment and their realisation in the planning process starting from the First Five-Years Development plan in 1961 until present. Actually, we observe gradual rise of public investments in forestry reaching its peak in the fifth plan (second half of 1980s) with gradual slowing down until present. Nevertheless, public investments in this sector are high and the ambitions are to increase them in future. It is reflected in the Five-Years Development Plan (2001 – 2005) of the State Planning Organisation aimed at increasing annual average growth of industrial forestry to 56 thousand hectares for the planning period. The public planning is regarded as “the basic and the most important planning tool in Turkish forestry” (CP2002, p.32).

To complete the picture we have to add to it the long-run planning activity within the Forestry Master Plan (covering 1990-2009 period), which is prepared with close co-operation with the National Forestry Programme and Special Forestry Reports (CP2002, p.32).

The dynamic of public investment (the basic source of productive investment) is uneven and not highly correlated with the revenues in this sector⁴. It is an indication of multifarious influences on the link investment – revenues. Really, the results of the simple regression (linear and non-linear) are not sufficient for more profound conclusions; besides, this link has definite lag, which in forestry sector is rather long. On the other hand, however the rise of revenues means higher logging and the need of higher investment for afforestation, which would generate increased investing. The revenue movement in this sector demonstrates more fluctuations in comparison with production, and the difference between revenue and production is slowing down over time which can be regarded as some drop of profitability in forestry sector (Ormanlar, p. 93).

To reveal better the mechanism revenue – investment we need to analyse the structure of sales revenue, which changes seriously during the last decades. We observe rise of the share of general management cost from 10.6% in the total sale’s revenue to 35.4% and drop of investment share from 14.9% in 1985 to 4% in 2000. Again, we can see a slight rise of production costs from 27.0% in 1985 to 33.5% in 2000. The share of maintenance cost actually remained the same during the period – from 20% in 1985 to 19.4% in 2000 (Ormanlik, p. 94).

During the implementation of the basic development plans the industrial forestry was regarded as an important intermediate sector having backward and forward linkages with a lot of other sectors. The results of input-output analysis indicated above showed the level of these linkages in general. The government investment in forestry allows shedding more light on the issue in terms of investing process and its forward and backward linkage effects. Thus, the government investment in forestry due to the backward linkage stimulates the rise of supply of seeding production, artificial

⁴ The simple least squares estimation indicates that revenue = 240.1700 + 2.322786 investment.
(20.44228) (0.406221) R² = 0.632

The application of autoregressive conditional heteroskedasticity method reveals low convergence even after 100 iterations.

regeneration, afforestation activity, erosion control, energy forestry establishment, range improvement.

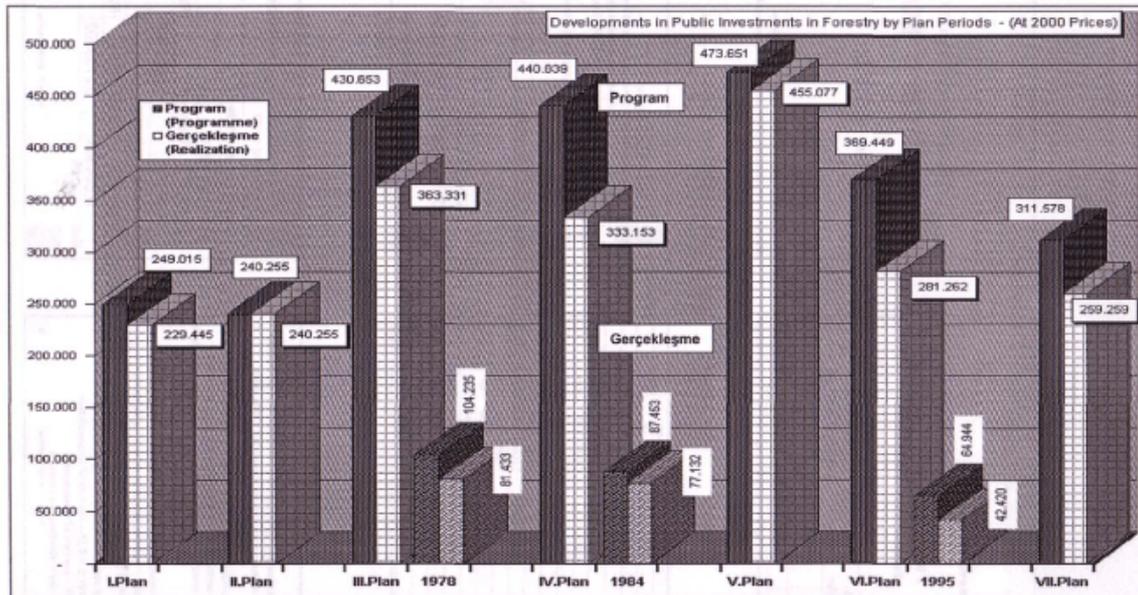


Figure 6. Public investment in Forestry by plan periods (at 2000 prices). The plan periods didn't cover the years of 1978, 1984 and 1995.

Due to the forward linkage the rise of investment in industrial forestry results in the accelerated growth of paved roads, road maintenance works, forest cadastral works and other supporting activities. The backward and forward linkages as a result of the growth of industrial forestry starting from 1939 and continuing through the development plans are shown in Table 6.

Table 6. Realisations in Major Forestry Activities in Turkey for the period 1939 – 2000.

Years	Management ha	Seeding production Million	Artificial reg. ha	Affores- tation ha	Erosion control ha	Energy forest ha	Range imp. ha	New road pave. road km	Road main. works km
1939-62	10697628	361		110529	14806		961	20691	-
I.Plan	7388604	517	-	148529	39896	-	7000	16466	.
II.Plan	12415860	561	-	94257	20152	-	5682	16315	2419
III.Plan	1721628	652	115666	134855	29635	-	13925	19760	4826
IV.Plan	4016643	1498	132866	214669	29222	42726	13858	18147	5704
V.Plan	6916084	2782	111150	555894	92052	280182	16214	13323	3712
VI.Plan	6351658	1700	111167	226865	34019	125335	11044	8453	1503
VII.Plan	10165257	937	105868	131940	134903	51662	18930	8186	1749
TOTAL		9772	646210	1763472	418797	552352	96229	131616	22527

Source: Konakcu, p. 97

To complete the picture we have to add the fact that various afforestation programs are initiated and supported by government bodies to restrict the rise of depredated forest lands in the country.

Finally by present we have an institutional structure providing the national forestry policy by means of a lot of government, private and non-government organisations. Although the general government policy is carried out by the Ministry of Environment and Forestry, its implementation in real decision is realised with a lot of institutions outside the central government bodies. Thus, the General Directorate of Forestry has prepared Forestry Master Plan to compensate the rising gap between demand and supply for the ongoing period. The General Directorate of Reforestation and Erosion Control (GDREC) manages the process of deforestation and provides assistance in reducing erosion in the country. NGO's are also involved in preventing erosion of the forestry land. Great contribution in this activity has the Istanbul based NGO TEMA, which has initiated projects on nationwide terracing and large scale industrial plantations. (Anonymous Tema, 2004).

Government policy is based on the recommendations provided by a lot of government-funded Research Institutes of the Ministry of Environment and Forestry. The basic features of these research institutions affiliated to the Ministry of Environment and Forestry are presented in Table 7.

Table 7. The Research Institutes affiliated to the Ministry of Environment and Forestry. Italics: Approximate numbers.

Research Institutes of the Ministry of Environment and Forestry				Scientific & Technical Staffs		
No.	Name	Head Office	Year Estab	Total	MS ^c	PhD
1	Central Anatolia Forestry RI	Ankara	1952	40	12	8
2	Poplar & Fast Growing Forest Tree Species RI (PFGFTSRI)	İzmit	1962	23	6	4
3	Forest Tree Seeds and Tree Breeding RI	Ankara	1964	16	2	3
4	South-West Mediterranean Forestry RI	Antalya	1992	14	8	8
5	Eastern Mediterranean Forestry RI	Tarsus	1992	7	2	1
6	Aegean Forestry RI	Urla-Izmir	1992	26	2	6
7	Marmara Forestry RI (1)	Istanbul	1992	(7)	(1)	(1)
8	Western BlackSea Forestry RI	Bolu	1992	10	4	0
9	Eastern Black Sea Forestry RI	Trabzon	1992	15	5	2
10	Eastern Anatolia Forestry RI	Erzurum	1992	5	0	1
11	South-eastern Anatolia Forestry RI	Elaziz	1992	11	1	1
12	Forest Soils and Ecology Forestry RI	Eskişehir		9	2	0
	Research and Development Division, RPCD, Headquarter	Ankara		6	1	1
Total 11 GDRS AR Institutes				182	45	35

Notes: (1): CLOSED in 2004

Source: The Research And Development Chairmanship, February, 2005. Updated by Dr. Said Dagdas.

The economic instruments of the government policy include a broad spectrum of measures aimed at stimulating the private sector to participate in industrial forestry in sustainable manner. Among them we can indicate various grants, subsidies, favourable tax regimes, assistance to providing grants and low interest credits for private forestry plantation growth, guarantying risk, reshaping property rights to enhance industrial

forestry, etc. Some authors (Diner and Koçar S. 1999) recommend external funding of plantations, zero coupon bonds, mortgage certificates and annuity charge bonds as the most suitable financial instruments for the long term. Financing institutions involved in this process are various insurance companies, pension funds and development and investment banks

The stimulation of the private sector participation in the new plantations establishment is of a great significance as it helps not only to increase production of timber but also to create new jobs. It is especially important for the mountainous areas where unemployment is high. The government keeps on giving free allocation of the low productive lands for reforestation of the private sector. Among the other measures we can indicate also technical assistance, free access to a lot of information concerning reforestation, free seedlings. Good examples are the family run poplar plantations providing timber not only to the wood industry but also for other sectors and local needs.

The ongoing programs for privatisation are another from of stimulating private sector participation in industrial forestry.

4. Factors affecting the competitiveness of forest wood/non-wood products chain.

4.1. Comparative advantages of Turkish forestry sector.

The modern consumption creates a broad spectrum of challenges to the industrial forestry, which creates disequilibrium between demand and supply of forest products. The first challenge is the gap between rising national and international consumption of forest products and the shrinking production of forest products. At present, the demand for forestry products is increasing faster than their supply, which widens the gap between supply and demand of wood in the country. It is expected that this tendency will increase during the present decade. Our explanation is that this is due to increased standard of living and export of wood from the country. Table 8 reflects this process in summary.

Table 8. Comparisons between the estimation and realisation of wood production and consumption values (1000 m³)

Wood		1995		1997		1999	
		FMP 1988	Anon. 2001	FMP 1988	Anon.. 2001	FMP 1988	Anon. 2001
Round	Production	11656	10984	12169	10146	12908	10189
Wood	Consumption	15289	11535	16286	11650	17178	11219
	Deficit	-3633	-551	-4117	-1504	-4270	-1030
	Production	19339	26024	19333	24598	22683	23548
Total	Consumption	34448	27205	34816	25641	33130	24579
Wood	Deficit	-15109	-1181	-15483	-1043	-10447	-1031

Source: Tunctaner 2004

The comparative analysis of the consumption of industrial wood indicates that it is less in Turkey than in the world as a whole and in the big industrial countries. For example, by 2000 Turkey consumed 0.185 m³ per capita industrial wood, while for the world as a

whole it accounted for 0.263 m³ per capita, 1,293 for North and Central America, 0.832 for Oceania, and 0.541 for Europe.

Relatively high is per capita fire-wood consumption in Turkey in comparison with the other industrial countries. It accounts for 0.273 m³, while the same indicator for Africa is 0.693, for North America 0.595, for Sweden 0.473 and for the world as a whole 0.417 (Ormancilik 2001, p 175). It can be explained with the high share of population living in mountainous areas and the high use of chalk wood for preparing a lot of national foods.

4.2. Turkish forestry in the international competitive markets.

Turkey participates actively in the international trade of wood and non-wood forestry products. The export of forest wood and non-wood products is increasing (the export-import of non-wood forestry products was analysed above) as it is indicated in Table 9.

Table 9. Forest Products Export (1990-2000) FOB prices.

Year	Wood products		Non-Wood Products	Total
	Quantity	Value	Value	Value
1990	2880	1100	26790	27890
1991	1370	940	26680	27620
1992	754	240	31770	32010
1993	863	350	29790	30140
1994	2948	910	26690	27600
1995	1872	780	33160	33940
1996	2599	790	42770	43560
1997	871	316	39740	40056
1998	3150	970	37530	38500
1999	4634	742	39486	40228
1999(New)	4634	742	7472	8214
2000(New)	4272	1305	5875	7180

Source: (Ormanlik, p. 132, <http://aks.iujp.dot>)

The geographical orientation of the export is to Holland (24.6% of the total export of forestry products by 1999), Germany (23.1%) and England (12.9%). Totally the countries of the EU occupy 77.5% of the total export of forest products (Ormanlik, p. 133).

The import of forest product is more diversified than export. The import of forest products for the period 1990 – 2000 is presented in table 9 below. It shows uneven tendencies in terms of quantities and values. If we exclude import from Russia (35.2% of the total import) all the other country's import is rather small with exception for African states as Gabon (8.2%), Cameron (5.9%), Liberia (3.1%). The total import of forest product from the EU countries by 1999 accounted for 14.9% of the total import of forestry products. The import of forestry product from Bulgaria accounts for 2.4% and from Romania 2.7%. Turkey imports forestry products even from the USA (0.6% from the total forestry import). (Konukcu, p.133)

Table 10. Import of Forest Products for the period 1990-2000 in current prices, (CiF)

Year	Wood products		Natural Rubber		Other non-woods	Total
	1000m ³	1000 \$	1000 ton	1000\$	1000\$	1000\$
1990	885	123911	50	44512	3461	171884
1991	1096	131445	70	63469	1810	196724
1992	1357	142860	73	66390	2930	212180
1993	2343	271840	82	74040	3120	349000
1994	1154	134000	65	68900	2540	205440
1995	718	96800	84	135540	4750	237090
1996	1050	133142	87	127648	5318	266108
1997	716	106558	93	99106	12116	217780
1998	970	126462	89	75800	5258	207520
1999	1214	104354	74	49600	5098	159052
1999 (new)	1214	104357	•	31	20060	124448
2000 (new)	1570	128929	-	29	20418	149376

Source: (Konukcu, p. 132. <http://aks.iujp.dot>).

The application of input-output analysis to the national economy including export and import of forestry allows to shed light on the links between exporting / importing capacity of the country. While the export/import rate of 97 sectors in the national economy is 88%, the export/import rate of forestry sector is 3%. Similarly, the shares of forestry sector's export and import in the total export and import of the national economy are respectively 0.0001 (one in ten thousands) and 0.003 (three in thousands). The results of input- output analysis including export/ import of forestry are summarised in table 11.

Table 11: Export/ Import quantities and rates of forestry and other sectors (1996).

	Exports (Million TL)	Import (Million TL)	Export/Import Rates (%)
Forestry	350,862	11,819,075	3
97 sectors	3,653,236,279	4,129,894,553	88

Source: Turker, 2005

These results come from the low share of export and import of forestry products in comparison with the other sectors. Geray explains it with the fact that the sector's production is mostly devoted to home consumption, the export opportunities are very limited and this characteristics of the sector might be only changed in a long period (Geray 1986). In another word, the products obtained from Turkish forests can not meet the home demand and this problem is expected to exist for a long period. For these reasons the supply needs are compensated by means of importing. As a whole although forestry products exchange with the rest of the world is dynamic as a whole in comparison with the other sectors forestry can not be included into the list of basic international trade sectors of Turkey (Geray 1993).

4.3. The role of international co-operation.

International co-operation plays very important role in industrial forestry development in Turkey and is a factor influencing demand and supply of forestry products. It extends on bilateral and multilateral base.

The co-operation of Turkish forestry sectors with similar sectors in other countries on bilateral basis is extending including not so much the countries of the Balkan region as countries with developed forestry sector. It results in extended exchange of scientists, ideas and other forms of knowledge from joint projects. Turkish-Finnish Forestry Project is a good example of successful bilateral co-operation. Intensive links are carried out with New Zealand and Chile, regarded as leaders in industrial plantations and providing experience indicative in many aspects to the other countries.

Turkey creates a good base for international co-operation by signing and adopting important international documents as the resolutions taken at Strasbourg, Helsinki and Lisbon Ministerial Conferences on the Protection of Forests in Europe, and establishing a National Follow-up Committee consisting of experts responsible for technical coordination of each resolution (CP2002, p.37), which directly affects industrial forestry sector.

This sector is also benefited by the participation of Turkey in the basic international programs related to forestry. For example, the responsibilities of the country coming Agenda 21 and Proposals for Action of the Intergovernmental Panel on Forests/Intergovernmental Forum on Forests (IPF/IFF) are included in to the Main Forestry Plan (1990–2009) (Anonymous 1988).

The country actively participates in such organisations as FAO, GEF, etc. FAO project “Industrial forestry plantation in Turkey” (FAO 2000) played very important role of establishing trials in the area of Marmara and Black Sea coastal zone. FAO funded also a project on the development of appropriate methods to be implemented for community forestry, directly related to the industrial forestry. Due to the government support in cooperation with such organisations as FAO a lot of provenances and trials have been established starting from 1970s. (See Tunçtaner (2004) for more detailed information).

Another FAO project “Fast Growing Broadleaves Forestry Plantations in Turkey (start 1983) helped to restructure industrial forestry of broadleaves based on the local species with introducing new exotic cultures and to extend the multipurpose broadleaves harvests (Gökdemir and Dağdaş 2004 a-b; Morandini 1983; Şimşek et al. 1996).

Turkey pays specific attention to the implementation of the IPF/IFF (Intergovernmental Panel on Forests/ Intergovernmental Forum on Forests) proposals for action. Project of National Forest Programme prepared by MOF in collaboration with FAO takes into consideration IPF/IFF proposals for action. The aim of the project is to renew and update Forestry Master Plan (covering 1990-2009 period), which is among the priorities of MOF. National Forestry Programme and Special Forestry Reports should provide significant contributions in the preparation of the new Forestry Master Plan (CP2002, p.32).

The Global Environment Facility (GEF) of the World Bank supported the project “In-situ conservation of Plant Genetic Diversity”, which helped to establish a system of genetic fund conservation of valuable tree species. The newly GEF project named GEF-III commenced in 2004 for the same aim mentioned.

One of the biggest challenges to Turkish forestry is the on-going process of accession to the EU, which actually started since the membership application of Turkey to the EU in 1987. Since that time there is a process of harmonisation of Turkish with EU forestry legislation. At present important role in this process plays "The National Program for Adaptation to European Union Legislation and Regulations" (2001), which includes revision of Forest Law 6831, harmonisation of legislation on manufactured forest products, establishment of adequate land cadastral information system, completing forests cadastral works, development of rural development strategies, in harmony with EU policy, and development of institutional structures for this purpose, establishment of Farmer's registration system including forest villagers, etc. It is expected to influence industrial forestry in terms of improved competitiveness and more efficient co-operation with the industrial forestry sectors of the other European countries.

4.4. Problems and barriers to entrepreneurship and supply of forestry products.

The presented above analysis indicates unambiguously that the present industrial forestry in Turkey is facing many challenges. The biggest challenge for the forests - the ever-increasing world demand of wood facing shrinking supply of timber - is a tendency, which affects also Turkey. With forests reserves and biodiversity close and in some aspects richer than the European ones, Turkey tries to give adequate responses to these challenges. Industrial forests in Turkey are growing to meet the modern economic and social challenges.

Following important challenges to the industrial forestry in Turkey can be formulated from the presented above analysis:

Increased demand and consumption is facing limited supply of forest products. This is a world tendency and Turkey is not exception of it. The rising industrial forestry and import try to complement the gap between demand and supply of wood for the industries and the local population. Three basic aspects of the challenges can be outlined:

- Effective restoration of forests after logging.
- Creation of new high productive forests.
- Improvement of existing wood producing cultures.

Significant research is carried out in direction of extending high productive forestry cultures including adapting of new forestry monocultures. Among the whole lot of example we could indicate the Program of Improvement of Poplar Plantation carried out by the Poplar and Fast Growing Forest Tree Research Institute in Izmit. It includes tree selection, hybridization, commercial cloning, provenance selection, etc. The aim is to create cultures suitable for the concrete climatic conditions of the country starting with irrigated areas and ending up with the dry regions.

The increased demand of forest product imposes priority of modernisation of forest production, paying special attention of all potential suitable areas for industrial plantations. Cadastre and corresponding incentives are used to attract the private producers as it is done in Chile and New Zealand. As a result, the creation of new plantations with high productive cultures is expected to accelerate significantly in the ongoing decade.

The need to foster further the structural improvement of industrial forestry is obvious. It started already with the genetic improvement of existing forests. According to the forestry experts to meet the challenges of the present and future industrial forestry there is a need to create a structure, which is close to the natural forests. This task can be solved by means of plantations formation combining the local and exported sorts of forests, which could adjust to the local climate allowing rapidly growing forests with reduced rotation period. This task is facilitated by the climate conditions of the country permitting to adapt high productive trees from the adjacent or more remote territories. It will require modernisation of the technical base with introducing new methods of transportation of logged wood in a way, which will minimise the disturbance of biodiversity.

Introducing economic incentives is the economic response to the challenges to industrial forestry.

This task is very difficult taking into account the long term period of investment in this sector. Only investors having interest in long term investment can be attracted to put their money in it. Pension funds, insurance companies, etc. can be used if corresponding incentives are introduced as it is already done in other sectors. It would impose adjustments to capital market in the country.

There are problems concerning the implementation deficit in providing government policy of stimulating the structural changes in forestry. Among the basic reasons reducing efficiency of the government policy we can indicate:

- Still high share of low productive long period rotation of industrial forestry plantations
- Increasing migration out of the mountainous areas reducing supply of adequate labour force for forestry.
- Insufficient confidence between state and private sectors concerning the support of private initiatives of forestry plantation extension.

The process of widespread all over the world deforestation is not avoided in Turkey. The basic reasons for deforestation are: rising industrial activity, illegal logging, fires, natural erosion, etc. A lot has been done to halt this process and there is a definite progress in protection of natural forests and the rise of industrial forestry. The clear-cut logging is in a process of replacement with sustainable use and extension of multicultural forests.

The summary of challenges and responses to the forestry sector concerning the demand and supply of forestry products is summarised in table 12.

Table 12. The challenges and the responses to forestry sector concerning the demand and supply of forestry products.

No.	Challenge	Response
1	Increased demand and consumption of forest products.	The drop of production compensated by the rise of import; plans to extend forestry by using new low-productive lands.
2	Increasing world competition.	Stimulating introduction of modern technologies in forestry sector and reducing the cost of production.
3	Deterioration of environment and natural forests.	Providing measure for afforestation and conservation of natural forests.

The presented analysis outlined some of the basic challenges to the industrial forestry in Turkey. Increasing demand of wood and insufficient supply augment the gap and pressure over the natural forests. To fill this gap a lot is to be done. The ongoing policy is aimed at reducing this gap by co-ordinating the link between the producers and the end-users of the wood. Much more detailed study is needed to reveal the whole complex of problems around the demand and supply exchange of forestry and related products.

5. The problem of “missing” information.

At present a lot of information necessary to carry out the complete estimation of economic integration of urban demand and rural supply of forestry goods is still missing. A great part of this “missing” information is of a primary origin and can be collected only from the local community.

The first thing needed for the successful completion of such a collection is to organise dynamic accounting of the natural resources (wood and non-wood resources creating actual and potential consumption) of the forests. It means to organise systematic collection of information of the volume of natural resources of the forests and their change over time. This accounting can be implemented by the local forest administration, although the methodology and the start up of the initial data base collection are to be steered by a competent research institution. Needless to say it has to be computer processed and accessible to the society.

At present the missing information can be classified into three basic groups: information that does not exist, inaccessible information and information that can not be located in the time available.

Information that does not exist

The basic information that does not exist to estimate more precisely the consumption of forestry wood and non-wood products is the representative data of the demand of these goods. To produce this information marketing research studies are to be organized. The following information is needed:

- Consumption (demand side) side of forestry products on the whole technological chain.
- Due to the expected high non-use values of forestry there is a need of valuation of various values created by the forests (general economic, option, existence, bequest, etc. values).

On the supply (production side) side it is desirable to collect information about the production, cost, profits, etc. concerning the whole technological chain of forestry. The indicated results of input- output analysis illustrate the need of more detailed study.

Part of the information does not exist for purely technical reasons. We call it “shadow information”. This is the information for example of collection medicine herbs, mushrooms, wild fruits, etc. for own consumption by the local population. At present mainly data for commercially produced and collected wood and non-wood products is available. It represents relatively small part of the whole “shadow” consumption of forestry products used by the local population. A lot of herbs are also collected by the tourists, which not necessarily belongs to the local population. All this “shadow information” remains outside the scope of research.

Inaccessible information

Principally a big part of the information necessary to estimate the supply aspects of forestry products (cost, prices, revenues) is not accessible. Some information which is privately owned is not provided for public access and its collection requires an explicit permission by the owners. Most of the private forestry industry firms prefer to hide high part of this information to avoid taxation. There are cases when such firms even export medicine herbs and other forestry wood and non-wood products without presenting information about the volume of their export.

Finally we expect that the further work within the COST program will allow collecting more information, which at present could not be composed for the available time.

6. Conclusions

The presented hitherto analysis is the first step in summarising the experience and preparing practical surveys for the need of the decision makers both in demand and supply sectors of forestry products. It was indicated that although the forestry sector does not have high share in the overall production in national economy, the environmental and ecological services of the forestry sector increase significantly its importance. Forestry sector supplies products used as inputs and final consumption both for the domestic demand and to a very limited degree for foreign demand. A significant part of the forestry sector’s total output goes into intermediate demand, which means that forestry supplies inputs to other industries. Meanwhile, particularly the foreword linkages of the forestry sector underline its strategic importance for the national economy.

Despite a number of studies on various aspects of the growth and development of forestry sector, its real effect on the national economy still remains hidden. There are many reasons for it, including the difficulties due to lack of understanding, information and suitable methodology to expose its real potential in national economic records. According to some studies only 42% of the values of wood forest products are reflected into forestry sector and national balance sheets. For the non-wood forest products it accounts for 8%, for hunting 3.4% and for recreation 0.2%. In other words, the values of the such components of total economic values of forestry sector in Turkey as grazing (21%), carbon storage (14.8%), pharmaceuticals (10.5%) and biodiversity conservation

(0.1%) are not transferred into the sectoral and national balance sheets (Türker, MF, Pak, M, and Öztürk, A., 2002).

In short, while only 53.46% of forestry sector outputs can be calculated as positive externalities in national balance sheets, the rest of the positive externalities with a share of 46.4 % are not included. These figures, albeit arguable, indicate that the share of forestry sector in national economy indicated in the official statistics is lower than its real value. If the real effects of forestry sector can be calculated and reflected into national economic sheets, it is clear that all of the figures of forestry sector related to production, income, employment, sectoral linkages, etc. would be higher.

Such a revision of the general vision of the importance of forestry sector would allow to outline its real share and to demonstrate its vital role as supplier of a lot of valuable natural resources for the national and international economies. Producing more precise monetary valuation of the role of forestry sector would support the need for more intensive investments allocated in forestry sector. It would allow to include in an adequate way the demand and supply of forestry products in the national strategy and policy of sustainable development of the country.

Annexes

Table 1A. Basic indicators of forestry in Turkey (2004)

Situation / Activity	Measure
Forest Area	20.763 .000 Ha
(Private forests)	(18.482 ha)
Productive Forests	10.027 .000 Ha
Degraded Forests	10.736 .000 Ha
Forest Land Use (Public land)	20.745 .000 Ha
Exploitative Forests	16.650 .000 Ha
Protected areas	4.095 .000 Ha
National and Natural Parks, Nature Protection Areas	864 .000 Ha
Conservation Forest (Mainly erosion control)	3.231 .000 Ha
Growing Stock (Public)	1.201.204.000 .000 m ³
Annual Wood Increment (Public)	34.270 .000 m ³
AAC (Public)	17.878 .000 m ³
Total Wood Production (2000)	27.940 .000 m ³
Industrial Wood	9.940 .000 m ³
Public Share	7.360 .000 m ³
Private Share	2.580 .000 m ³
Firewood (Legal + illegal)	18.000 .000 m ³
Round wood Export	5 .000 m ³
Round wood Import	1.214 .000 m ³
Afforestation (Cumulative)	1.763 .000 Ha
Energy Forest Establishment (Cum.)	552 .000 Ha
Erosion Control (Cum.)	419 .000 Ha
Range Improvement (Cum.)	96 .000 Ha
Seedling Production (Million Unit) (Cum.)	
Per Capita Total Forest Area	0.32 Ha
Per Capita Productive Forest Area	0.15 Ha
Per Capita Growing Stock	17 m ³
Per Capita Wood Consumption	0.45 m ³
Per Capita Industrial Wood Consumption	0.17 m ³
Ratio of Productive Forests to T. Land area	13 %
Ratio of Protected Areas to total Forest Area	19.7 %
Share of Forest Area to Protect Biological Diversity	3.9 %
Ratio of Net Felling to Annual Increment	91 %
Share of Firewood in Total Wood Production	64 %
Forest Road Density	6.3 m/Ha
Share of the Forestry Output in GNP	0.4 %
Forestry employment (Million man-day)	
Number of Forest Engineers employed by Ministry	3813 Numbers
Number of people died in forest fires (Cumulative)	74 Numbers
Share of Forestry in T. Fixed Investments (Public)	0.8 %
Share of Forestry investments in GNP.	0.06 %
Num. of Faculties offering forestry education and students	9 - (3400) Numbers
Number of teaching staff in Faculties.	147 Numbers
Num. of Forestry Research Centres and researchers	11-182 Numbers

Source: Konakcu M., 2001, Forests and Turkish Forestry. Yayin No. DPT: 2630, Eylul, p. 44.

Table 2A. Revenues and investments in forestry sector.

Years	Current prices			At 2000 prices			
	Revenue	Investment	% share	Revenue	% increase	Investment	% increase
1980	30,444	3,617	11.9	291,609,195		34,645,594	-
1981	41,039	7,096	17.3	273,229,028	-6.3	47,243,675	36.4
1982	58,945	10,490	17.8	309,910,620	13.4	55,152,471	16.7
1983	97,046	16,466	17.0	395,621,688	27.7	67,125,968	21.7
1984	169,084	22,703	13.4	459,217,816	16.1	61,659,424	-8.1
1985	225,183	31,626	14.0	432,960,969	-5.7	60,807,537	-1.4
1986	351,878	52,805	15.0	484,546,957	11.9	72,714,128	19.6
1987	510,855	102,045	20.0	487,550,105	0.6	97,389,769	33.9
1988	720,037	150,213	20.9	348,180,368	-28.6	72,636,847	-25.4
1989	1,174,864	239,381	20.4	392,812,866	12.8	80,036,444	10.2
1990	1,686,374	279,440	16.6	372,662,866	-5.1	61,751,967	-22.8
1991	2,431,935	379,785	15.6	303,369,967	-18.6	47,376,004	-23.3
1992	4,239,646	202,292	4.8	334,602,350	10.3	15,965,337	-66.3
1993	6,885,267	391,032	5.7	311,868,056	-6.8	17,711,788	10.9
1994	11,746,648	401,106	3.4	263,263,834	-15.6	8,989,518	-49.2
1995	27,916,104	1,351,716	4.8	370,526,109	40.7	17,941,116	99.6
1996	44,152,649	3,506,533	7.9	320,410,166	-13.5	25,446,465	41.8
1997	70,784,946	4,069,337	5.7	270,133,504	-15.7	15,529,633	-39.0
1998	112,103,682	5,259,250	4.7	247,525,941	-8.4	11,612,471	-25.2
1999	151,841,682	6,021,648	4.0	216,374,393	-12.6	8,580,848	-26.1
2000	227,601,438	11,036,568	4.8	227,601,438	5.2	11,036,568	28.6

Table 3A. Industrial wood production and consumption data, 1995-2004 (1000 m³).

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Production	10984	10548	10146	10315	10442	10590	10078	11305	10670	11496
State	8046	7529	7046	7148	7242	7328	6778	8005	7320	8196
Private	2938	3019	3100	3167	3200	3262	3300	3300	3300	3300
Consumption	11535	11602	11650	11542	12051	12784	11008	12453	12190	13000
GDO	7743	7413	7451	7104	7351	7642	6778	8109	7420	7950
Private	2938	3019	3100	3167	3200	3262	3300	3300	3300	3300
Import-Export	854	1170	1099	1271	1500	1880	930	1044	1398	1750

Sources: Ormancılık Özel İhtisas Komisyonu Raporu (DPT, 2001) ve Orman Genel Müdürlüğü verileri, 2005

Table 4A. Production of Wood Raw Material in Turkey (1000 m³) Public and private sectors (1962-2000).

Year	Logs	Wire P	Mining P.	Pulpwood	Chipwood	Packing W	Total	Private	Firewood
1962	2192	32	505			150	2879	124	
1967	3418	40	386			250	4094	306	
1972	4940	39	563			460	6002	597	
1977	5824	161	545	976	454	470	8430	1157	28000
1978	6295	162	539	987	460	376	8819	1200	28000
1979	5680	157	537	1032	620	466	8492	1294	28000
1980	5557	116	601	880	543	590	8287	1360	28000
1981	5703	118	638	1116	720	500	8795	1617	28000
1982	4470	71	470	935	908	577	7431	1430	28000
1983	4725	96	491	1281	1183	668	8444	1550	26500
1984	5148	114	499	1462	1213	751	9187	1590	24500
1985	5092	264	530	1572	1184	665	9307	1900	24500
1986	5016	243	608	1480	1450	771	9568	2034	24500
1987	5074	190	567	1470	1293	732	9326	2060	24250
1988	4940	150	554	1520	1453	750	9367	2061	24000
1989	4800	60	518	1882	1524	760	9544	2100	23400
1990	4810	60	513	923	1652	800	8758	2200	22500
1991	4610	99	465	1043	1640	780	8637	2142	21000
1992	4747	122	440	1149	1645	860	8963	2492	20800
1993	4710	126	378	1470	1660	954	9298	2432	19600
1994	4511	114	449	1577	1600	950	9201	2489	19200
1995	5150	134	497	1558	1950	1220	10509	2486	18700
1996	4912	89	436	1568	2050	1293	10348	2803	18500
1997	4700	53	444	1369	2110	1334	10010	3036	18300
1998	4667	36	483	1588	1990	1300	10064	3014	18100
1999	4505	90	456	1610	1791	1183	9635	2570	17800
2000	4723	156	414	1538	1893	1216	9940	2580	18000

Note : 1) About 80 per cent of the total industrial roundwood comes from coniferous species.

Kaynaklar: 1) OGM, DPT

Sources: 1) General Directorate of Forestry (OGM), State Planning Organization (DPT)

Acronyms and Abbreviations

AAT (ETA)	Allowable cut.
ARD	Associates in Rural Development, Inc.
IUCN	International Union for the Conservation of Nature and Natural Resources
MoE	Ministry of Environment
MoF	Ministry of Forestry
GEF	Global Environmental Facility
SSI	State Statistical Institute
USAID	United States Agency for International Development

References

- Anonymous 2005: Orman Ürünleri ve Orman Ürünleri Endüstrisi Çalışma Grubu Raporu (6. Grup). Preliminary Report for "Forestry Production and Industry of Forestry Products". 1. Çevre ve Ormancılık Şurası, (21-25 Mart 2005, Antalya).
- Anonymous 1988: Ormancılık Ana Planı-1990-2009, Tarım Orman ve Köyişleri Bakanlığı-Orman Genel Müdürlüğü-Araştırma Planlama ve Koordinasyon Dairesi Başkanlığı Yayın Nu.: 3, Ankara, 176 pp..
- Anonymous 1999: Report. National Poplar Commission of Turkey (1996-1999), Ankara.
- Anonymous 2000 a: FAO 2000-Global Forest Resources Assessment, Forestry Paper 140, Rome.
- Anonymous 2000 b: Orman Ağaçları ve Tohumları Islah Araştırma Müdürlüğü 1999 Yılı Çalışma Raporu ve 2000 Yılı Çalışma Programı. Çeşitli Yayınlar Serisi Nu.: 2, Ankara.
- Anonymous 2000 c: Sekizinci Beş Yıllık Kalkınma Planı. Türkiye-Avrupa Birliği İlişkileri Özel İhtisas Komisyonu Raporu, DPT Yayın Nu.: 2545, ÖİK: 561 Ankara, 224 pp..
- Anonymous 2001: Sekizinci Beş Yıllık Kalkınma Planı. Ormancılık Özel İhtisas Komisyonu Raporu, DPT Yayın Nu.: 2531, ÖİK: 547, Ankara, 539 pp..
- Bann, C. and Clemens, M., 2001: Türkiye'de Orman Kaynaklarının Yönetimi ve Ormandan Faydalanma İle İlgili Dışsallıklarda Alt Sınır (Minimum) Değerlerinin Tahmini ve Bu Bilgilerden Yararlanılması Konusunda İlgili Öneriler (Ormancılık Sektör İncelemesi Küresel Örtüşme Programı Çalışması Final Raporu). T. C. Orman Bakanlığı-Dünya Bankası, Nisan 1999, Baskı: İksir Tanıtım Ltd. Şti., Ankara, 65 pp..
- Cakır, 1986. Regional planning and importance of forestry sectors : The case of Bolu Regional Forest Directorate (Bolgesele planlama ve ormancılık sektörlerinin önemi: Bolu Bolge Mudurlugu ornegi), unpublished Ph.D. thesis, Istanbul University Graduate Institute of Sciences, 200 pages, Istanbul, Turkey.
- Cengiz, Y. et al., 2002: Kızılçam Orijin Denemelerinin 10 Yıllık Sonuçları: Orijin-Çevre Etkileşimi ve Tohum Transferi Üzerine Etkisi «Results of provenance study at age 10 on *Pinus brutia*: Provenance-site interactions and defining breeding zones». Orman Bakanlığı Yayın Nu: 158, Batı Akdeniz Ormancılık Araştırma Müdürlüğü Yayın Nu.: 016, 144 pp..
- Çevre Ormancılık Şurası, 2005, Orman Ürünleri Endüstrisi Komisyon Raporu, p. 1.
- Dagdas, S., 2002: Fourteen year old results of Turkish red pine (*Pinus brutia* TEN.) Provenance test in Central Anatolia (Ankara) (Some recommendations for fast-growing plantations). Management of Fast Growing Plantations, International IUFRO Meeting, (11-13 September 2002), Proceedings, Ministry of Forestry, Poplar and Fast Growing Forest Trees Research Institute, Izmit-Turkey, p. 250-260, 335 pp.

- Dagdas, S., 1998: Türkiye’de Merkezi Yönetimin Taþra Kuruluþları-“Ormancılıkta Bölge Kuruluþlarının Yeniden Düzenleme Çalıþmaları”, Türkiye ve Ortadoðu Amme Ýdaresi Enstitüsü-Kamu Yönetimi Lisansüstü Uzmanlık Programı, (Yüksek Lisans Tezi (Thesis of Master of Arts)), 116 pp.
- Die, 2001. The Input-output structure of the Turkish economy, State Statistics Institute, publication no. 2488, Ankara, Turkey.
- Diner A & Koçar S. 1999: “I-214” Melez Kavak Aþaçlandırmalarında Ara Tarımın Kavakçılık Ekonomisine Etkileri. Kavak ve Hızlı Gelişen Orman Aþaçları Araştırma Enstitüsü, Teknik Bülten No: 189, İzmit.
- Gökdemir, Ş. & Dağdaş, S.; 2004 a: İç Anadolu Bölgesinde Çoğul Amaçlı Aþaçlandırmalarda Kullanılabilecek Yapraklı Türler: Onyediy Yıllık Sonuçlar-I (Species tests of the broadleaved tree species to be used in multipurpose plantations in Central Anatolia- (*Seventeen-year old results*), Orman ve Ekonomi Dergisi, Yıl: 3, Sayı: 15 (Mayıs-Haziran 2004), 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara
- Gökdemir, Ş. & Dağdaş, S.; 2004 b: İç Anadolu Bölgesinde Çoğul Amaçlı Aþaçlandırmalarda Kullanılabilecek Yapraklı Türler: Onyediy Yıllık Sonuçlar-II (Species tests of the broadleaved tree species to be used in multipurpose plantations in Central Anatolia- (*Seventeen-year old results*), Orman ve Ekonomi Dergisi, Yıl: 3, Sayı: 16 (Temmuz-Ekim 2004), p. 19-25, 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara
- Görcelýođlu, E., Kurtođlu, A., and Özgen, Y., 1998: Cumhuriyetimizin 75. Yılında Ormancılık Sempozyumu Bildiri Kitabı, 21-23 Ekim 1998, Ý.Ü. Yay. Nu.: 4187, Ý.Ü. Or. Fak. Yay. Nu.: 458, p. 117-124, İstanbul, 810 pp..
- Morandini, R., 1983: TUR/82/003 – Fast-Growing Broad-leaved Forestry Plantations in Turkey-Consultancy on Genecology. İzmit, Ankara, Rome, 52 pp..
- Kayacan, 2004. Economic impact analysis of forest-related goods and services (Orman kaynaklarına ilişkin mal ve hizmetler kapsamında ekonomik etki çözümlemesi), unpublished Ph.D. thesis, Istanbul University Graduate Institute of Sciences, 220 pages, Istanbul, Turkey.
- Konakcu M., 2001, Forests and Turkish Forestry. Yayın No. DPT: 2630, Eylül,
- Şimşek, Y., Tosun, S., Atasoy, H., Usta, H. Z., Uğurlu, S., 1996: Türkiye’de Çoğul Amaçlı Aþaçlandırmalarda Kullanılabilecek Yapraklı Türlerin Tesbiti Üzerine Araştırmalar – (*A study on determination of the broad-lived tree species to be used in multipurpose plantations in Turkey*). Ormancılık Araştırma Enstitüsü, Teknik Bülten Serisi No: 260, Ankara, 77 pp..
- T.C. Çevre ve Orman Bakanlığı, 2004: Ulusal ormancılık programı. Türkiye ulusal ormancılık programının hazırlanması projesi (TCP/TUR/0066 (A)), T.C. Çevre ve Orman Bakanlığı-FAO, Ankara.
- T. .C. Orman Bakanlığı (The Republic of Turkey - Ministry of Forestry), 1999 a: Osmanlı Ormancılığı ile İlgili Belgeler-I (Documents on Ottoman Forestry. At the 700th anniversary of the Foundation of Ottoman State”). Orman Bakanlığı Yayın Nu.: 094, Printed by: GIPTA A.Ş., ISBN 975-8273-20-5, Ankara, 241 pp..

- T. .C. Orman Bakanlığı (Ministry of Forestry), 1999 b: Ministry of Forestry Research Master Plan-2000-2005. Policy and Strategy for Forestry Research and Development, Ankara, May 1999, 28 s.
- Toksoy, D., Gümüő, C., and Ayyıldız, H., 2003: Türkiye’de Orman Kaynaklarının Durumu ve Tıbbi Bitkilerin Ticareti Üzerine Bir Deęerlendirme. Orman ve Ekonomi Dergisi, Yıl: 2, Sayı: 8, p. 7-14, 32 pp., Dizgi ve Baskı: Berkay Matb., Ankara.
- Tulukcu, M., Tunctaner, K. and Toplu, F., 1987: Marmara ve Batı Karadeniz Bölgelerinde Halepçamı (*Pinus halepensis* Mill.) ve Kızılçam (*Pinus brutia* Ten.) Orijinlerinin Karşılaştırılması Üzerine Arařtırmalar. Kavak ve Hızlı Geliően Tür Orman Aęaçları Arařtırma Enstitüsü Yayınları, Teknik Bülten Nu.: 137, İzmit, 33 pp..
- Tunctaner, K., Tulukcu, M., and Toplu, F., 1985: Türkiye’de Endüstriyel Aęaçlandırmalarda Kullanılabilecek Sahilçamı (*Pinus pinaster* Ail.) Orijinlerinin Seçimi Üzerine Arařtırmalar. Kavak ve Hızlı Geliően Tür Orman Aęaçları Arařtırma Enstitüsü Yayınları, Yıllık Bülten Nu.: 21, İzmit.
- Tunçtaner, K. Sustainability of Industrial Forest Plantations in Turkey, <http://search.yahoo.com/search?p=industrial+forestry+research+Turkey&ei=UTF-8&fr=FP-tab-web-t&fl=0&x=wrt> access date 02/10/2004.
- TurkishPress.com <http://www.turkishpress.com/turkishpress/news.asp?ID=21833> (access date 20/10/2004)
- Türker, M. F, PAK. M., Öztürk, A., The review of non-wood forest products management in Turkey from the point of five year development plans and Forestry main plans.
- Türker M. F. Determination of Importance of Turkish Forestry Sector in National Economy Using Input-Output Analysis (Forthcoming publication)
- WANA NARS Study (1999) Turkey.
<http://ekutup.dpt.gov.tr/ormancil/konukcum/forest.html>