

**American University in Kosova
Rochester Institute of Technology**

Strategies for Improvement of Kosova's Forest Resources

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Submitted as a Capstone Project Report in partial fulfillment of a Master of Science Degree in Professional Studies with Service Management, Project Management, and Infrastructure Development concentration at Rochester Institute of Technology, NY

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05 May, 2011

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Acknowledgment

First, I would like to thank everyone who helped and contributed to my final Capstone Project

I would like to express my appreciation to Mr. Brian Bowen for his professional guidance and his continuous advice throughout the Capstone Project.

I am particularly grateful to Mr. Armend Susuri Head of Marketing Unit in Privatization Agency of Kosova for his support during the time I have attended lectures.

I would like to convey my special gratitude to Mr. Adnan Basha, my mentor, whom helped and advised me during the whole duration of the project. His suggestions, ideas, and tips are vital and without his professional assistance this project will not be completed in such a professional manner.

I am especially grateful to my family for understanding me, showing moral support and encouragement since the commencement of my Master Studies. Finally, I would like to thank my wife Mala for her support and the patience showed during the duration of the studies till today.

Abbreviations

MAFRD	Ministry of Agriculture, Forest and Rural Development
DoF	Department of Forestry
KFA	Kosova Forest Agency
FAO	Food and Agriculture Organization
UN	United Nations
FRY	Federal Republic of Yugoslavia
UNMIK	United Nation Interim Administration Mission in Kosova
ARDP	Agriculture and Rural Development Plan 2007 - 2013
PSPFSD	Policy and Strategy Paper on Forestry Sector Development 2010 - 2020
MSA	Ministry of State Administration
Ha	10,000 m ²
Are	100 m ²
1 km ²	1,000,000 m ²

Executive Summary

This capstone project assesses the forest resources of Kosova which is known to have a problem with degraded forests and shrub forest. The degraded forests and shrub forest comprise about 40.9 % or 182,202 hectare of the total forest area. Illegal loggings, forest fires, pests and diseases contribute to the formations of wastelands in Kosova. About 14 % or 66,404 hectare of the total forests areas are barren forestlands.²

Following the work on this capstone project the following recommendation are being made:

- ◆ Reforestation / afforestation law shall be promulgated in accordance with the goals and standards that specify the methods and principles of Reforestation / Afforestation efforts. Process - based reforestation / afforestation law must include a plan for each harvested area with details on the procedures that will be used to reforest or afforest the forest area
- ◆ Forest restoration fund is necessary to be established in order to embark on a sustained programme of afforestation / reforestation that will serve for rehabilitation of degraded forest and shrub forests. The financial fund requires minimum of €1,070,625 annually for fiscal year.
- ◆ KFA should identify sites for reforestation / afforestation efforts of degraded forests and shrub forests, and barren forestlands. A detailed feasibility study and proper selection of forest areas will lead to the successful tree planting.
- ◆ The establishment of new nurseries in Kosova is necessary to carry out, since it will ensure a consistent supply of high quality seedlings. The establishment at least 2 (two) nurseries is required, since demand for reforestation stock will grow with the advent of programs.
- ◆ Preservation of the forest after seedling requires the establishment of compressive program in cooperation and coordination with the governing bodies of localities in order to assist and ensure the survival of species.

This strategy will include participation of state agencies and others, such as non - profit organizations and local government.

The goal of this project is to gradually transform the degraded forests and shrub forests into higher producing forests, with the aim of improving the wood productivity, an advanced forestland management and the environment benefits that they offer. A sustainable and standardized management of the reforestation / afforestation programs will contribute to watershed protection, biodiversity conservation, carbon sequestration, wood productivity, wood that could be used for fire needs, timber industry development and unemployment alleviation.

Another fundamental aim is that will give employment to labor in certain zones where marked unemployment is. Reforestation/afforestation efforts indicates a need for approximately 500 people per year in the establishment of forests plantations, which includes functions such as nursery work, seed processing, seed production, land preparation and planting. They have a significant impact on employment, especially in rural areas, due to its labor-intensive nature. This will create additional jobs and will foster the local economy.

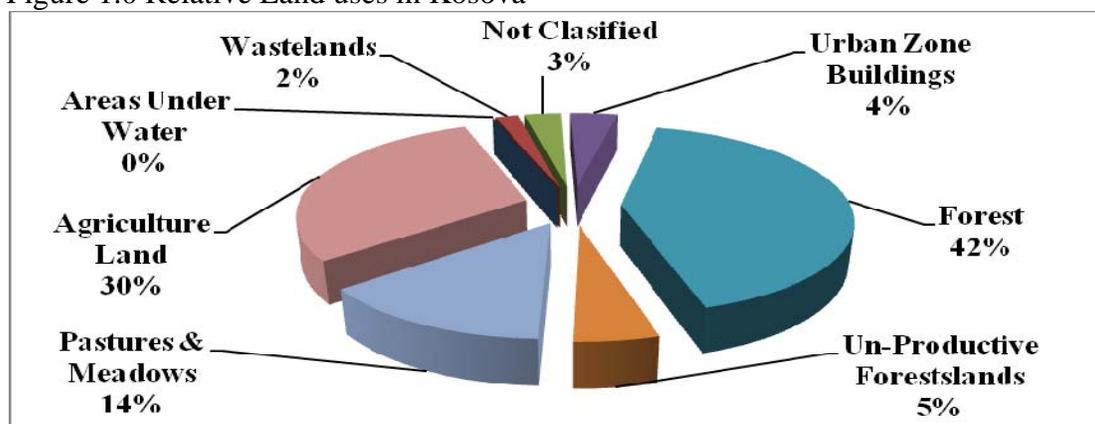
Chapter I

1.0 Timber Species and Quantities in Kosova's Forests

1.1 Forest Resources

Total surface area of Kosova is 10,877 km² or 1,087,700 ha. Forest and forestlands comprises 47 % or 512,714 ha, 31 % or 337,187 ha are classified as agricultural land, while 14 % or 152,278 ha are under pastures and meadows (see below figure 1.0).

Figure 1.0 Relative Land uses in Kosova



Source: Reference 1 - <http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Kosova/Kosova.htm>

Public forestland comprises 280,092 hectare or 54.6 %, while private forestland comprises 166,218 hectare or 32.4 % of total forest area. On public forestlands low forests originating from stool - shoots (coppice) constitute the major part, covering more than 82 %, while high forests originating from natural seeds are estimated at 18 %.

Table 1.0 Structure of Public Forestland and Private Forestland (ha)

No.	Public Forestlands	Area (ha)	%
1	High Forests - Seed Forest	51,038	18
2	Low Forests - Stool-Shoot (Coppice)	229,054	82
Total		280,092	100
No.	Private Forestlands	Area (ha)	%
1	High Forests - Seed Forest	14,740	9
2	Low Forests - Stool-Shoot (Coppice)	151,478	91
Total		166,218	100
No.	Public and Private Forestlands	Area (ha)	
1	Forests Area	446,310	
2	Non - Productive Forestlands	66,404	
Total		512,714	

Source: Reference 2 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova), 1981.

1.1 Main Species

Kosova's forests consist mainly of species such as oak, beech, and coniferous which are formed in a natural way through seeding. More than 60 % of the stands created through natural seeding are located on altitudes between 600 – 1,600 meters. At this height, the forest areas usually experiences an exceptional growth volume and can be used mainly as a source for fulfilling the industry's needs, technical wood of first and second class, and for firewood needs.

Table 1.1 Public Forest Areas by Species Class and Stand Structure (ha)

Species class	Stand structure					Total
	Under generation	Even - aged	Two - Storied	Uneven - aged	No data	
No trees	1,600	400				2,000 (1%)
Conifer		5,000	1,400	8,400		14,800 (5%)
Broadleaf	2,600	117,400	11,200	52,800		184,000 (66%)
Mixed		200	1,800	1,800		2,000 (1%)
No data					76,080	76,080 (27%)
Total	4,200	123,000	12,600	63,000	76,080	278,880 (100%)

Source: Reference 3 - "Kosova's Forest Inventory Report by FAO, 2002/2003", United Nation Food and Agriculture Organization, December 2003.

Referring the Table 1.1 public forests areas are dominated by broadleaved forests, created through natural seeding, accounting 66 % with main species being oak and beech.

Coniferous forests covering 5 % of the total public forests area are dominated by *Abies alba*, *Picea abies* and *Pinus* species. Private forests areas are dominated by broadleaved forests, created through natural seeding, accounting 92 % with main species being oak and beech. Coniferous forests covering 2 % of the total private forests area are dominated by *Abies alba*, *Picea abies* and *Pinus* species (*see below Table 1.2*).

The rest of 27 % constitutes mix forests and forests for which we do not have any information.

Table 1.2 Private Forest Areas by Species Class and Stand Structure (ha)

Species class	Stand structure					Total
	Under generation	Even - aged	Two - storeyed	Uneven - aged	No data	
No trees	1,800					1,800 (1%)
Conifer		2,200	200	1,800		4,200 (2%)
Broadleaf	4,600	108,400	10,800	45,800		169,600 (92%)
Mixed				800		800 (0%)
No data					9,520	9,520 (5%)
Total	6,400	110,600	11,000	48,400		185,920 (100%)

Source: Reference 3 - "Kosova's Forest Inventory Report by FAO, 2002/2003", United Nation Food and Agriculture Organization, December 2003.

In terms of forestlands, some autochthones species of leaves dominate:

oak (Quercus sp.), beeches (Fagus Silvatica), which are broadly expanded and have a very economic importance. Silver fir (Abies Alba), red fir or spruce (Picea Abies) and Scots pine (Pinus Silvestris) are conifer species that grow in a natural way in great elevations. In addition Black Pine (Pinus Nigra) is an important species which dominates in low altitudes.

1.2 Wood Volume in Forests

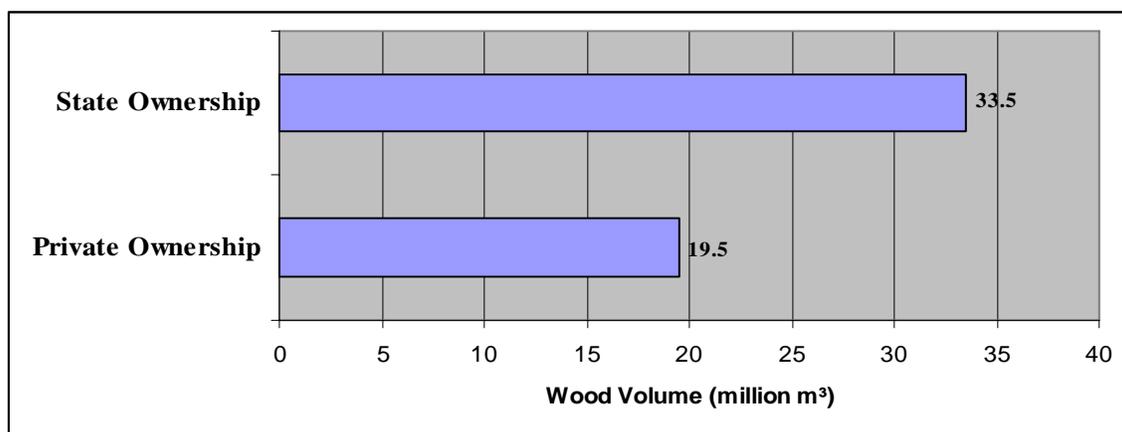
Existing forest information mainly stems from the period before and during the 1990's. Since all planning prior to the war period was carried out only on the public forestlands, one of the urgent actions identified was to validate data and reinstall capacity to conduct the forest resource assessments throughout Kosovo.

Considering this urgent requirement, during the years 2002 – 2003, a country - wide forest inventory was conducted.³ The main findings and conclusions elaborated during the course of the inventory are summarized below:

The total standing volume of timber on public forestlands are estimated at 33.5 million m³. Out of this 25.9 million m³ are trees with diameter > 7 cm at breast height, while the remained of 7.6 million m³ are considered as trees with diameter < 7 cm.

On private forestlands the total standing volume of timber, is estimated at 19.5 million m³. Out of this 14.5 million are trees with diameter > 7 cm, while the rest of 5 million m³ contain trees with diameter of < 7 cm.

Figure 1.1 Timber Volume by Ownership Structure (million m³)



Source: Reference 4 - Policy and Strategy Paper on Forestry Sector Development 2010 – 2020, Ministry of Agriculture, Forest and Rural Development (MAFRD), January 2010.

Table 1.3 Timber Volume in Kosova, 2009 - 2010 (m³)

No.	Ownership	Area (ha)	m ³
1	Public Forests	280,092 ha	33,500,000 m ³
2	Private Forests	166,218 ha	19,500,000 m ³
Total		466,310 ha	53,000,000 m³

Source: Reference 4 - Policy and Strategy Paper on Forestry Sector Development 2010 – 2020, Ministry of Agriculture, Forest and Rural Development (MAFRD), January 2010.

Chapter II

2.0 Forests Management Structure

2.1 Administration & Institutions

In the letter advanced forest management is well established, but in practice so far the results are minor. Low budget allocation, lack of development strategy, uncompleted legal infrastructure and unsatisfied capacity building in the sector are some of the issues that are contributing to the situation.³

The main identified actors of Kosova's forestry sector are:

- Ministry of Agriculture, Forests and Rural Development (MAFRD)
- Department of Forestry (DoF) and
- Kosova Forest Agency (KFA)

The MAFRD is the highest authority in charge for forestry. Within the MAFRD the DoF and KFA are the bodies responsible for the policies and forests management resources.

Several stakeholders who have a role to represent and address the interest of the public related with a sustainable forest management through coordination's, advices and general support are as follows:

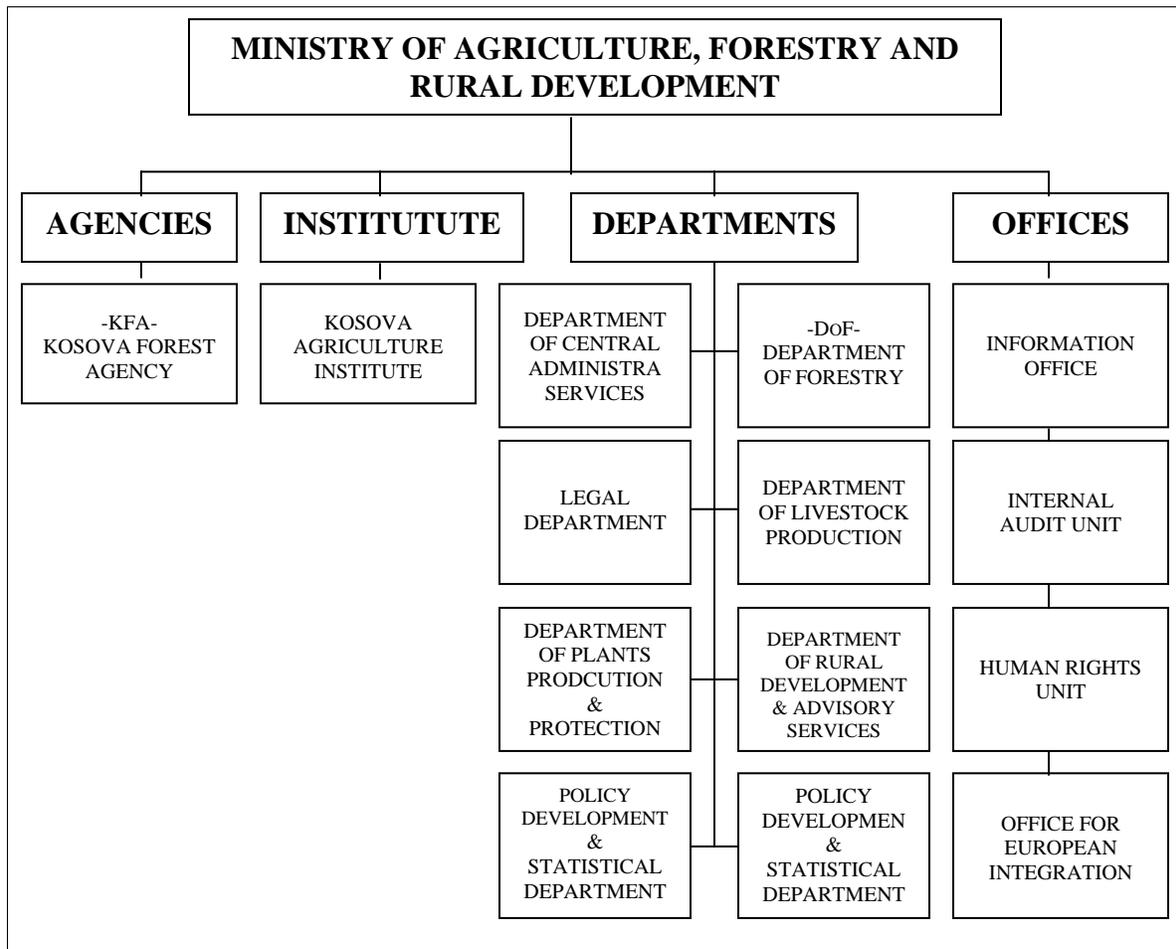
- NGO -s (as an, Association of the Wood Processors of the Kosova, Association of the Private Forest's Owners, Association of the Forestry Engineers, Era - association, Ecological Association Prizren, Association of the Hunters etc.)
- Private Operative Contractor
- Courts
- Kosova Police Service (KPS)
- Non - wood product collectors and
- Local community

2.2 Ministry of Agriculture, Forestry and Rural Development (MAFRD)

The Ministry of Agriculture, Forestry and Rural Development (MAFRD) is the highest authority in charge for Kosova's forests.

The law on forest states that the Ministry of Agriculture, Forestry and Rural Development (MAFRD) is responsible for management of the National Parks. It is, however, obvious that this ministry does not have full competence for its undertakings and would need to cooperate with other concerned ministries for fulfilling its mandate which is stated by the law.

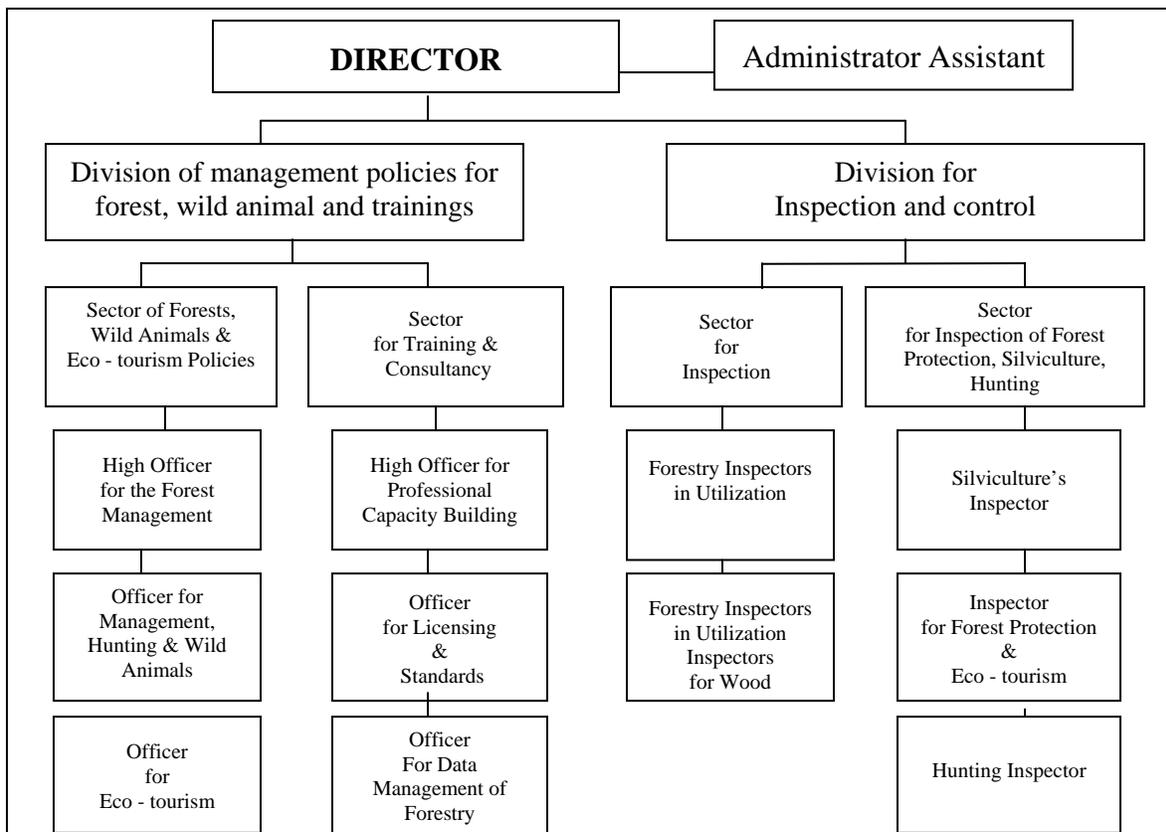
Figure 2.0 Ministry of Agriculture, Forestry and RD - Organizational Structure



2.3 Department of Forestry (DoF)

Within the MAFRD, the Department of Forestry (DoF) is in charge for setting forestry policies for public and private forests, development of management policies for the wild animals and eco - tourism, development of the educative, training and consultation systems in forestry, data management as well as monitoring and forest control.⁴

Figure 2.1 Department of Forestry (DoF) - Organizational Structure



Competences:

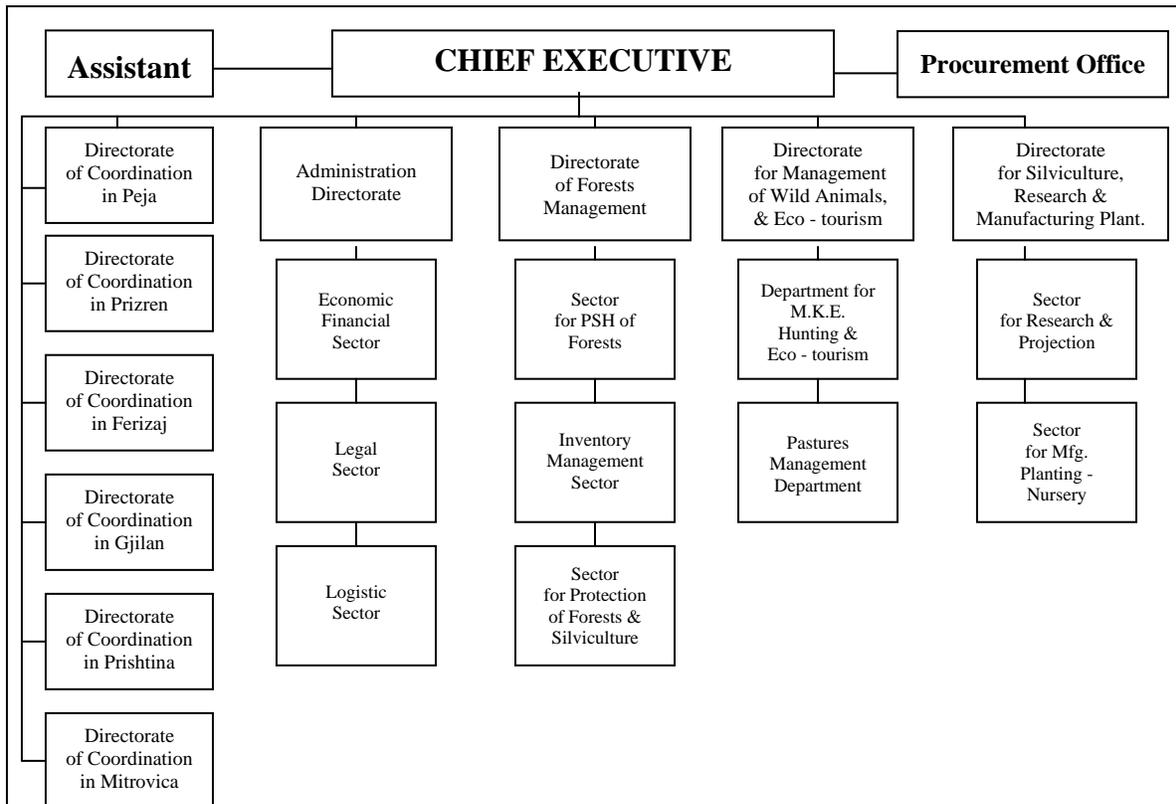
- Draw up the annual plans from the silviculture;
- Draw up the annual plans for the production field of classics nurseries and industrial too;
- Draw up the programs for the building of artificial forests;
- Draw up the program for care of natural and artificial forests;
- Research the possibility of share and of the gatherings of seeds in forests for main types of deciduous and coniferous;
- Research in forestlands the possibility of their transformation in more productive lands;
- Research the possibility of growth productivity of low forests, their transformation.

2.4 Kosova Forest Agency (KFA)

The KFA is an executive body of the MAFRD. Its organizational structure is build by sectors, offices and regional directorates.

By the law on the forests, the KFA is responsible for matters related to the regulation of private forests, administration of the public forests and national parks except for the issues that law in particular states that is in charge other authority.⁴

Figure 2.2 Kosova Forest Agency (KFA) - Organizational Structure



Competences:

Throughout inventory monitors the development of forest resources in Kosova;
 Reviews the applications submitted for the issuance of permits for cutting wood and non-wood;
 Issue the permission for cutting, select, marks trees for harvesting and gives permission for wood transportation;
 Supervise and monitor the work of harvesting and silviculture with the aim to ensure the contract requirements under permits and annual operational plans based on forest management standards works.

Legislation

Kosova forests management is based on international advanced standards, such as: precautionary, conservation of biological diversity, intergenerational equity and ecologically sustainable development. Those standards for the sector are assured by new law on forests.

During the period of year 1999s, were done permanent attempts to create and enforce laws and regulations promulgated in the country by two institutions, UNMIK and Kosova Assembly. In the legal framework of the existing laws in Kosova still are some laws passed before year 1989s by the Kosova Assembly and FRY which are accepted as applicable by current government.

The law that is in force and that directly affects the forest sector is *Law No.2003/3 on Forests*, formulated in cooperation with UN / FAO office in Prishtina.

Policies

The MAFRD during year 2006s had completed the work on the document “Agriculture and Rural Development Plan 2007 - 2013”. Eight development measures were identified and only one, Measure 5 - Improving Natural Resource Management, was applied to the forest sector.⁵

Another document that was completed and published from the MAFRD through inter-ministerial Working Group is the “Policy and Strategy Paper on Forestry Sector Development 2010 - 2020” which is appointed through policies and strategies to govern the future development of the Kosova’s forest sector. Suggested policies and strategies on this document are consistent with the existing legislation on forestry that set the stage for the major decisions concerning the sector for the next 10 years.

Chapter III

3.0 Kosova's Forest State

Destruction of forests can result from:

- a) Natural Consequences and
- b) Human Activities Consequences

a) Destruction of forests from natural consequences:

This phenomenon in nature is possible but is very rare. Natural phenomena that destroy forests are:

- Diseases and Pests
- Strong Winds
- Snow

b) The consequences of the human activities:

Long - term forest destruction stems as a result of human activities through:

- Illegal Logging and
- Forests Fires

The current forests condition shows that trees are not affected at large extent from diseases and insects. The reason is that companies that monitor and manage forest pests and diseases follow and react on them.

As a consequence of diseases in the last 40 years we had the appearance of insects from Family of Ispoides who has destroyed an area of 150 - 200 ha in the forests of Deçani. Appearance of diseases and pests in the future may be present because forest hygiene is not quite satisfactory. Other phenomena could affect the forests but on smaller scale.

3.1 Scope and Causes of Forest Degradation

Kosova has experienced a high level of deforestation and degradation during recent decades. The reason for this are varied, which includes: illegal logging, conflict of year 1998 – 1999s and forests fires.

Degraded forest is forest that has lost vitality, the possibility of natural renewal. The rate of growth is declined and now these forests are not able to use the potential of the land. Shrubs are plant vegetation with branches but without trunk. They differ from grass vegetation from their body structure and are recognized as short trees in the forests.

Table 3.0 Forest Areas According to the Form Cultivation (ha)

No	Forest Structure According to the Form Cultivation	Total (ha)	Public Forests (ha)	Private Forests (ha)	Forests Structure		
					Total %	Public Forests %	Private Forests %
1	High forests	65,778	51,038	14,740	14.7	18.2	8.7
2	Low forests	179,170	115,839	68,331	40.1	41.4	38.2
3	Degraded	81,639	33,954	47,685	18.3	12.1	28.8
4	Shrubs	100,563	64,811	35,752	22.6	23.1	21.5
5	Other Forests	19,160	14,450	4,710	4.3	5.2	2.8
Total		446,310	280,092	166,218	100	100	100

Source: Reference 2 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalističkoj autonomnoj pokrajini Kosova), 1981.

According to the Table 3.0 degraded forests and shrub forests comprise 182,202 hectare or 40.9 % of the total forest area.

Degraded forest in two sectors, both publicly-owned and privately-owned, constitutes of 81,639 hectare or 18.3 %, whilst shrub forests constitute of 100,563 hectare or 22.6 % of the total forest area. Degraded forests in the public sector, constitute of 33,954 hectare or 12.1 %, while shrub forests represent the area of 64,811 hectare or 23.1% of the total public forest area. Degraded forests in the private sector, constitutes of 47,685 hectare or 28.8 %, while shrub forests represent the area of 35,752 ha or 21.5 % of the total private forest area.

3.2 Illegal Logging

Forests had suffered from continues damage during the period from 1987 – 1999s and 1999 – 2010s. The forests areas at higher altitudes were subject of over - harvesting from the institutions that managed them during the period of 1987 – 1999s (Serbian government). Forests areas at lower altitudes were subject of more illegal logging from the population due to the low costs and easy access to them from period of 1999 – 2010s.

Poverty compounded by electric shortages on previous years has pushed the population during winter months to rely heavily on the wood burning for heating.

Table 3.1 Illegal Harvesting of Forests on Visited Forests Areas (ha)

Ownership	Area (ha)	Uncontrolled – illegal harvesting	
		ha	%
Public Forests	280,092	81,000	40
Private Forests	166,218	50,600	29
Total	466,310	131,600	35

Source: Reference 4 - Policy and Strategy Paper on Forestry Sector Development 2010 – 2020, Ministry of Agriculture, Forest and Rural Development (MAFRD), January 2010.

It was estimated that over 40 % of the public forests areas and 29 % of the private forests areas were subject to the illegal logging, within the period of 1999 – 2010s. These forests were cut with a purpose to maximize the commercial production and to obtain / ensure funds in the short term. By all standards, these figures are too high.

The inventories results of 2002 – 2003s also confirmed that the low forests especially publicly - owned were exposed to a heavily exploitation.

The lack of law forests implementation have resulted as very problematic in the practice, since this seems to be the main reason why the illegal forest harvesting is still attractive and is continuing sorely in Kosova. Based on the statements of the MAFRD representatives, the damage created by violators, usually is charged with unreasonable values of money so neither the created damage is covered, nor the violator has learned the “lesson”.

According to the KFA officials, when a person has been caught doing illegal harvesting, then the forester/ranger issues him/her a warrant to appear in court, and this case instead of being completed as soon as possible, the case lasts about three to four years to be completed.

3.3 Barren Forestlands

It was estimated that in Kosova there is a considerable area of barren forestlands, approximately of 66,404 hectare. Illegal loggings, forest fires, pests and diseases contributed to the formations of wastelands in Kosova. Some of these areas are eroded, but a majority part was estimated to be as suitable for afforestation.

Forestry expert engineers believe that about 60 % or 40,000 hectare of these forestlands is suitable for establishing new forests plantations.

Implementation of afforestation in barren forestlands will enable in the future: the stabilization of soil erosion, watershed protection, carbon sequestration and trees with higher productivity.

Chapter IV

4.0 Forest Structure Improvement

Degraded forests in stocks have 3,874,000 wood/cubic meters or 47.4528 wood/cubic meters per hectare, while shrubs in stocks have 1,699,000 wood/cubic meters or 16.8949 wood/cubic meters. The degraded forests and shrub forests provide low timber productivity compared to the highest forests, therefore the transformation of degraded and shrub forests into higher producing forests will contribute to trees with higher timber productivity.

Table 4.0 Wood Volume of Degraded and Shrubs Forests

No.	Forest Structure in the Form of Cultivation	Public and Private Forest (ha)	Public and Private Wood Productivity (m ³ / ha)	Total Volume Mass (m ³)
1	Degraded Forests	81,639	47.4528	3,874,000
2	Shrub Forests	100,563	16.8949	1,699,000
Total		182,202	64.3477	5,573,000

Source: Reference 2 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova), 1981.

Annual growths of degraded forests in both sectors, publicly owned and privately owned covering the area of 81,639 hectare is estimated at 144,767 wood/cubic meter per year. Annual growths of shrub forests in both sectors, publicly owned and privately owned covering the area of 100,563 hectare is estimated at 89,233 wood/cubic meter per year. Annual average growths of degraded forests on 1 hectare is estimated at 1.28 m³ per ha.

Table 4.1 Annual Growths of Degraded and Shrubs Forests

No.	Ownership	Forests by Type of Forest Cultivation	Area (ha)	Annual Growth (m ³)	Total (m ³)
1	Public	Degraded Forests	33,954	1.82	61,796
2	Private	Degraded Forests	47,685	1.74	82,971
Total			81,639	1.77	144,767
1	Public	Shrub Forests	64,811	0.93	60,274
2	Private	Shrub Forests	35,752	0.81	28,959
Total			100,563	0.89	89,233

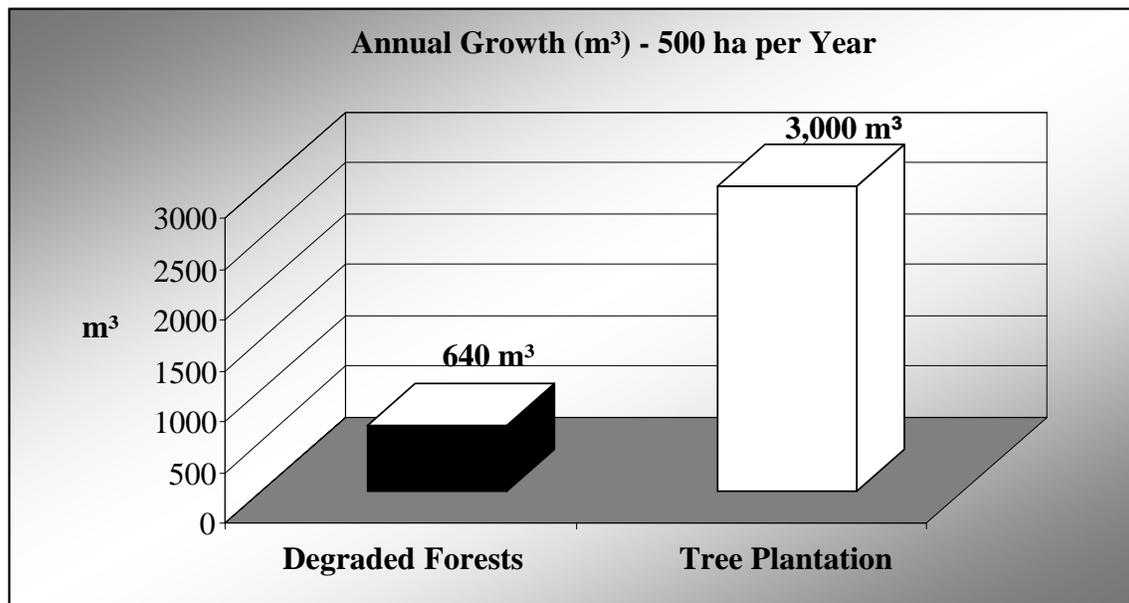
Source: Reference 3 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova), 1981.

Reforestation of degraded and shrub forests with species such as: oak, black pine, white pine, white fir, douglazio and hormoqi in our terms (land quality, atmospheric conditions etc) yields an average annual growths between 5 and 6.5 wood/cubic meter per hectare.² Hence, knowing the annual average growth of degraded forests (1.28 wood/cubic meter per hectare) and the type of plant species proposed above, whose yields annual average growth (6 wood/cubic meter per hectare), results that reforestation are an important mean that influence the creation of forests resources with higher timber productivity.

$$500 \text{ hectare} * 1.28 \text{ wood cubic meter} = 640 \text{ wood cubic meter / year}$$

$$500 \text{ hectare} * 6 \text{ wood cubic meter} = 3,000 \text{ wood cubic meter / year}$$

Figure 4.0 Annual Growths of Degraded and Shrub Forests vs. Planted Species



Source: Reference 3 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova).

Figure 4.0 clearly reflects that new forests plantations affects the creation of forests resources, thus yielding timber annual growths of 468 % higher ($3,000 \div 640 = 4.6875 * 100 = 468 \%$) compared to the degraded forests that currently yields per year.

Reforestations have an enormous potential for increasing the timber productivity and that's why have become extremely necessary to cater to the ever - increasing demand for firewood and other wooden products.

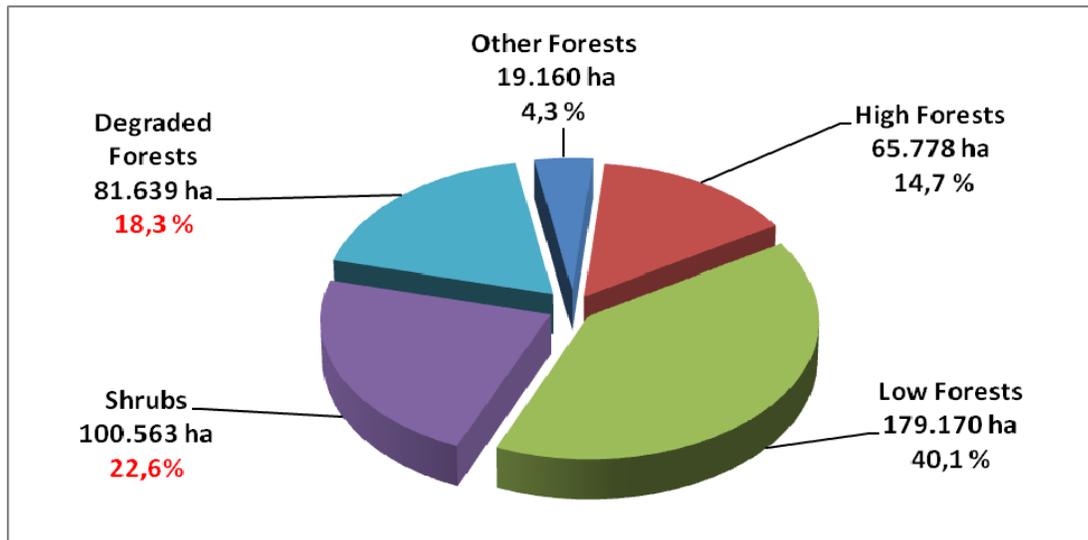
4.1 Reforestation of Degraded and Shrub Forests

Reforestation carries a significant potential for yielding benefits and if properly managed, it may provide long - term sustainable economic benefits to the country.

Aim and goal of Reforestation

The reforestation programs aims to promote the forests melioration, an economic growth, biodiversity conservation, improvement of the ecosystem services while on the other side will serve as an alternative source of wood.

Figure 4.1 Kosova Forests According to the Cultivation Form (ha)



Source: Reference 3 - Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova), 1981.

According to the Figure 4.1 Kosova's forests comprise about 182,202 hectare or 40.9 % of degraded forests and shrub forests. Based on the forestry expert's interviews it was estimated that about 60 % or approximately 100,000 hectare are in a suitable condition for the reforestation efforts.

Reforestation programs attempt to acquire a surface of 100,000 hectare of degraded forests and shrub forests, both, publicly-owned and privately-owned.

4.2 Afforestation of Barren Forestlands

There is a considerable area of barren forestlands such as 66,404 hectare, of which 60 % or 40,000 hectare was considered to be suitable for afforestation.

Afforestation envisage to be realized by establishing new plantations (forest stands established by planting or / and seeding) from which pine saplings, fir, oak, beech and hormoq were considered as the most suitable species for plantations.

Aim and goal of Afforestation

The afforestation of these forestlands will contribute to: stabilization of soil erosion, watershed protection, carbon sequestration and expansion of the forests areas.

The supply of firewood and wooden products from afforested areas will prevent the over-exploitation and destruction of our indigenous forests.

Afforestation programs attempt to acquire 40,000 hectare of barren forestlands which are going to be implemented through stages over the following years. A future plantation program shall be based upon state of the art technology and knowledge, growths models and proper tending protection schemes shall guide the work. The planting shall be established on good quality bare forestlands where their existence is not put at risk by the external factors.

Benefits

- ◆ **Production of Oxygen** – through process of photosynthesis the plants conserve energy of sunlight and CO₂, which as a product yield the oxygen and organic substances. Forests effectively influence the production of oxygen and store carbon. So, properties with great wood resources are far more valuable than properties without any woods.

- ◆ **Carbon Sequestration** – Planting seeds and as they are grown, effectively will sequester a significant amount of atmospheric carbon. Increased carbon storage can be achieved by augmenting the land area covered in forests and / or by increasing the density of forests.
This is so important that some countries actually pay to have grown trees.

- ◆ **Erosion** – is significantly reduced as the plantations of trees prevent numerous rain flows. Planting the trees in the dry - areas attracts rainfall, in addition trees yields together spots that prevent the erosion of soil. Roots of trees/plants hold the soil. Thus, when more trees are planted their roots don't allow the soil to be blown or washed away and prevent soil erosion.

- ◆ **Timber Supply** – is often increased by selected reforestation materials. The fast growing trees directly affect the wood supply, by increasing future wood volume. In addition, implementation of reforestations programs will directly influence on mitigation of firewood demand and other wood products.

- ◆ **Jobs** – The establishment of planting seeds generates employment. The process of establishing plantations is a rotation which involves various activities such as: seed processing, seed production and land preparation. Many rural workers will have the opportunity to be employed because planting millions of seeds will be needed.

- ◆ **Industry** – Planted seeds are important for producing wood products. The economic benefits of wood production are obviously and that's the main reason for most new plantation establishment. Plantations are specialized in wood production and that is what they are best for. From long - term perspective, the establishment of new plantations will have positive effects on the wood industry and other wood products in the future. More wood resources are meant to offer more possibilities and flexibility for wood - using industries; adding industrial value in the forestry sector.

- ◆ **Income** – Reforestation projects that are well - run can provide a good source of income. Increased incomes from sales of wood products, tree seedlings and local medicines and supply material for houses are just few of the factors that contribute to the economy's country. As these forests reach the time for harvesting, wood import can be reduced; less dependency on imports will generate a larger export income.

The implementations of reforestation / afforestation programs are very important for the forest sector in Kosova. These programs should be accompanied and directed by the law appointed from MAFRD in order to be successful during their activities.

According to the document "Strategy for Development of Forestry 2010 - 2020" for the next 10 years is planned afforestation of 5,000 ha or approximately 500 ha per year.

4.3 Wood Consumption in Kosova

The exact amount of firewood consumption in Kosova is not known for sure.

In the following we have presented some statistics drawn from surveys made from institutions in Kosova and included the KFA officials opinion regarding this phenomenon.

Table 4.2 Firewood Consumption 2004 – 2009 (m³)

Year	Firewood Utilization (Private Forests Properties)	Realized Firewood Harvesting (KFA)	Import	Total
2004	434,336	169,394	32,450	636,180
2005	400,480	205,085	32,500	638,065
2006	328,154	204,280	31,210	563,644
2007	482,945	171,910	29,120	638,975
2008	451,735	221,797	27,990	701,522
2009	485,236	271,255	29,325	785,816
Total	2,582,886	1,243,721	182,595	4,009,144

Source: Reference 8 - MSA, Statistical Office of Kosova, <http://esk.rks-gov.net/eng>

Referring to Table 4.2 the average firewood usage in the last 6 (six) years (2004 – 2009) in Kosova was at 430,481 m³. According to the Statistical Office of Kosova the situation of firewood usage is analyzed by a questionnaire of 4,200 households and 300 large farms. A questionnaire included only agriculture households that ensure wood from their private forests properties.

The recent assessment of 2008s from students of University of Prishtina in cooperation with Fachhochschule Salzburg (FHS) states that the firewood consumption in Kosova as primary energy source is estimated to be 1.5 million m³.¹⁴

Another opinion from the KFA officials shows that the firewood usage in Kosova reaches no more than 1,000,000 m³ per year. Result was that Kosova approximately has around 335,000 families, where about 50 % of them as heating source use firewood and the rest of the families use other alternative energy sources³. It was estimated that per family are needed approximately 6 m³ of wood.

$$[(335,000 * 50 \% = 167,000 \text{ families} * 6 \text{ m}^3 \text{ per family} = \underline{1,002,000 \text{ m}^3})]$$

However, other evaluations regarding the firewood usage exist, such as the evaluations made by another study, which was published almost 30 years ago.” This assessment assumed that the firewood usage in Kosova reaches approximately 1 million m³ per year. ²

Although there are various studies about firewood consumption in Kosova, we thought to get the average which results at 1.3 million m³ per year. Therefore, we find out that in a sustainable way the responsibility institutions are not able to fulfill the needs of the population with firewood.

Table 4.3 Annual Planned Harvesting, 2004 – 2009 (m³)

Year	Public and Private Forests		
	Planned Harvesting	Technical wood	Firewood
2004	247,416	23,559	169,394
2005	250,169	23,931	205,085
2006	265,348	26,560	204,280
2007	240,304	20,332	171,910
2008	240,250	18,453	221,797
2009	290,500	19,245	271,255
Total	1,533,897	132,080	1,243,721

Source: Reference 7 - Data for Forestry Sector, Kosova Forest Agency (KFA) / Information Office, 2010.

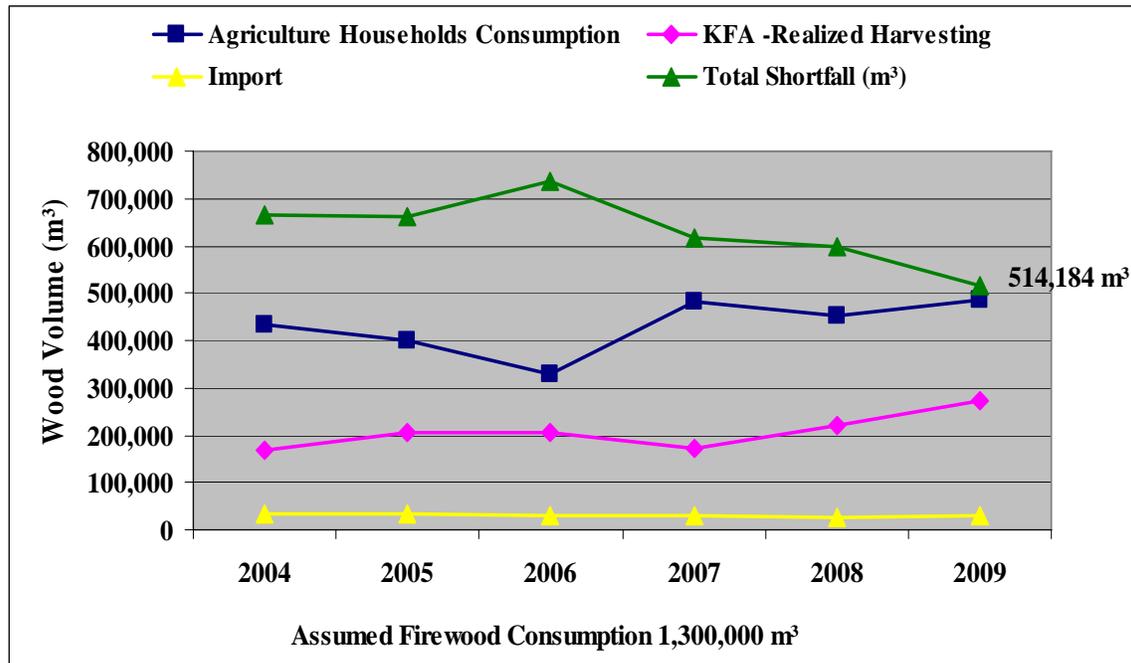
The management plans of the KFA shows that realized harvesting for firewood in 2009s was at 271,255 m³ (Table 4.3). If we calculate and see the performance of firewood usage in 2009s, flows that about 514,184 m³ wood falls short of meeting the population needs.

$$1,300,000 \text{ m}^3 - 785,816 \text{ m}^3 = \underline{514,184 \text{ m}^3}$$

Note: “Wood that is imported from Serbia mostly is not registered, therefore is not included on these calculations. It is presumed that approximately 100,000 m³ of firewood is imported from Serbia, but without comprehensive and accurate data from Customs Dept. it is impossible to know the exact amount of firewood being imported”.³

By knowing the firewood consumption, annually logging carried out and import, below we have reflected on figure and made the comparison between the firewood consumption and productivity that was performed in the last 6 (six) years.

Figure 4.2 Firewood Consumption and Productivity, 2004 – 2009 (m³)



Source: Reference 8 - MSA, Statistical Office of Kosova, <http://esk.rks-gov.net/eng>

The results show that Kosova is in a critical situation concerning the firewood supply. The lack of energy resources is leading to illegal cutting by the citizens of Kosova. A part of this lack stems to be ensured by illegal activities while the remained part is ensured by private owners of private forests which do not require permits for harvests, and from villagers who ensure wood by harvesting forest clusters from their own agricultural lands.

To guarantee a stable development, these problems have to be solved by forest management and reduced energy consumption. However, the balance of 514,184 m³ will have to be made up from imports and/or, by using the annual increment of the forest at a 100 % capacity, and only then with the aid of reforestation programs Kosova will be able to just about to meet the firewood needs of the population.

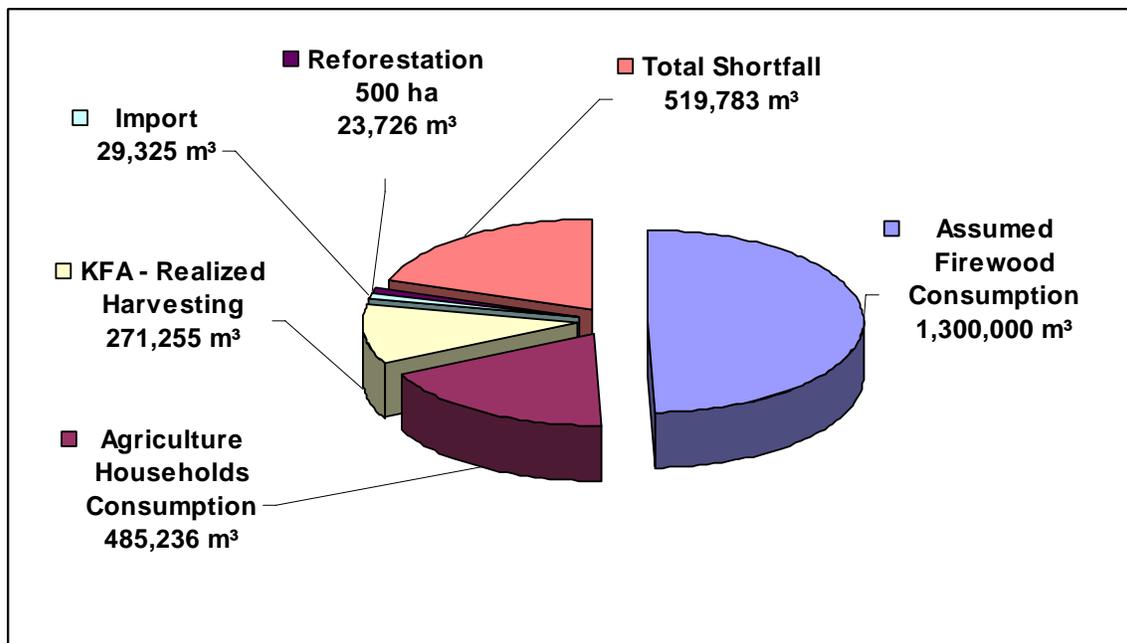
Impact of Reforestation Programs

Implementation of reforestation programs on 6,000 hectare on degraded and shrub forestlands for the next 10 years will enable to benefit Kosova's about 284,712 wood/cubic meter, [(6,000 hectare * 47.452 wood cubic meter = 284,712 wood cubic meter)], (knowing that per 1 hectare of degraded forests is extracted 47.452 wood cubic meter).²

If we calculate how much will be the amount of wood that would be yielded per year, then we will have:

$$500 \text{ hectare} * 47.452 \text{ cubic meter} = 23,726 \text{ cubic meter}$$

Figure 4.3 Firewood Consumption vs Productivity, 2009 (m³)



Source: Reference 8 - MSA, Statistical Office of Kosova, <http://esk.rks-gov.net/eng>

The figure 4.3 obviously shows that reforestation programs affect the alleviation of firewood needs. But, influence of reforestation will depend on the annual firewood consumption. If annual firewood consumption is higher, then impact of the reforestation will be in a smaller percentage, and vice versa.

Note: Reforestation programs have a potential for a greater involvement of the forests areas. Kosova consists of 30 municipalities, and if programs of reforestations would include 5,000 hectare per year (forestlands assigned to this project) then each municipality will falls to reforest 166 hectare per year. The proposal of this view is feasible.

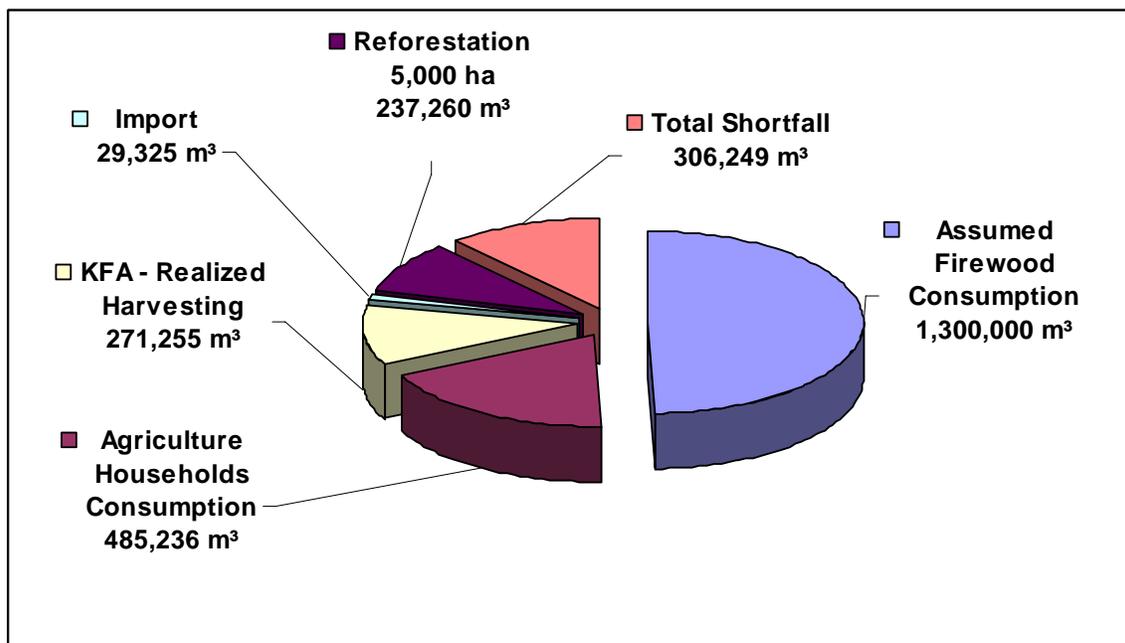
So, if reforestation programs would include 60,000 ha of degraded and shrub forestlands, on the following 10 years Kosova would be able to ensure sufficient wood supplies, of:

$$60,000 \text{ hectare} * 47.452 \text{ cubic meter} = \underline{2,847,120 \text{ cubic meter}}$$

If we calculate how much will be the amount of wood that would be yielded per year, then we will have:

$$5,000 \text{ hectare} * 47.452 \text{ cubic meter} = \underline{237,260 \text{ cubic meter}}$$

Figure 4.4 Reforestation on Degraded and Shrub Forests – 500 ha per year



Source: Reference 8 - MSA, Statistical Office of Kosova, <http://esk.rks-gov.net/eng>

Chapter V

5.0 Forests - Impact in Economy and Society

5.1 Economic Importance of Forests

Industrial wood, paper and other related manufacturing industries are the greatest leaders in the world, showing a great potential competitive. The forest industry has developed “super trees” which mature rapidly to a commercially harvestable size for these tree farms or plantations. Forestry industries plant more trees than they harvest.

The amount of area reforested with the fast growing species is as important to the economic feasibility of improvement activities which lead to increasing the size of timber productivity in general.

Economic are almost proportional to the size of the afforested area and doubling the area with new plantations will probably double also the economic returns.

Table 5.0 Benefits of Planted Forests

Economic – Production	
Wood Industrial Wood Firewood	Material support for other functions Wood for building and industry Processed wood products Industrial and domestic use
Other Raw Materials Wood-derived chemicals Other chemicals from the ecosystem Decorative plants Other non-wood products	Various chemical substances; tannin, latex Source of leisure and hunting activities Production of specific plants, Christmas trees, Direct forest supply (holly etc) Gathering for domestic or commercial use (mushrooms, small fruit, honey etc)

Source: Reference – 10 Benefits of Planted Forests: Social, Ecological and Economic.

<http://www.maf.govt.nz/mafnet/unff-planted-forestry-meeting/conference-papers/benefits-of-planted-forests.htm>

5.2 Wood Significance for the Kosova's Economy

Wood - based forest products played an important role in Kosova's economy in the past. A large - scale forest industry was established in Kosova after the Second World War but was hampered by weak forest management and inefficient production.

Besides use for heating purposes, Kosova's forests represent an important contribution for the timber industry and economic familiar needs. Until 1989s this sector was estimated among the most important exports compared to the other exports sectors.¹⁰

Sustainable forest management (SFM) requires the balancing of economic, environmental, and social objectives. The linkage between SFM and timber economics lies in the desire to achieve a sustainable flow of economic goods from forests and to maintain healthy forests capable of providing benefits into the future.

The wood sector is also an important employment provider in Kosova, the livelihood of between 8 and 10 percent of the population depends upon the forestry and wood industries.¹²

“Steps to be taken”

The government and MAFRD should take charge of the meliorative programs of degraded forests, shrub lands and afforestations of barren forestlands areas.

This strategy would help to prevent further exploitation and destruction of natural forests.

If forest management were rationalized, firewood production and other wood production could be made more economically efficient and less environmentally damaged.

5.3 Wood Supply and Wood Processing Industry

The wood supply can be improved by improving the forest structure and their state. In addition, existing forests can be managed more intensively through silvicultural forms. Taking into consideration these issues, an expansion of the forest area through afforestation might play an important role in increasing the overall wood supply.

Kosova has a long wood processing tradition. Its soils are generally nutrient - rich providing a very good growth medium for natural plants and trees.

According to the Ministry of Trade and Industry (MTI) there are 1,480 enterprises registered as wood processors in Kosova. The Association of Wood Processors accounts for some 80 of the most important companies, employing over 1,800 workers.¹² The wood processing sector in Kosova has largely based its production on domestic raw materials, mainly small companies whose main activity is sawn wood production, followed by window and door production. The vast majority of wood processing and furniture manufacturing companies are privately owned with.¹³

State – owned Enterprises now are under the Privatisation Agency of Kosova (PAK) and are working at very low capacity because they have been cut off from their sources of raw material and market network.

“Authors of the FAO-s forest sector study estimated that after the state forest industries are privatized and the supply of wood from the forests is predictable, 4,800 people will be employed directly in the forestry sector.”¹⁰

Above statement indicates that there is a great potential for increasing the activities in Kosova wood processing industry.

5.4 Annual Growth, Wood Volume and Market Value

Table 5.1 Wood Volume According to Annual Growth - “Oak – Forests & Fir – Forests” (m³ / ha)

Age	Cluster Top					Wood Volume from Thinning	Total	Total Growth		
	Number of Trees	Surface Base Metric	Diameter	Height	Volume			Average Growth	Actual Growth	%
		m ²	cm	m	m ³					
Oak - Forests										
40	2,480	19.5	10	11.2	81	2	83	2.1	6	7.4
50	1,500	22.4	13,8	13.9	138	10	148	3	6.6	4.8
60	1,050	24.6	17,2	16.2	187	15	214	3.6	6.5	3.5
Fir - Forests										
40	4,500	30	9.2	10.6	138	10	148	3.4	16.8	15.4
50	2,400	39.7	14.4	15.4	306	56	372	6.1	13.5	7.6
60	1,520	45	19.4	19	441	73	360	7.3	11.8	3.6

Below data represents the annual growths of trees per hectare and their market value:

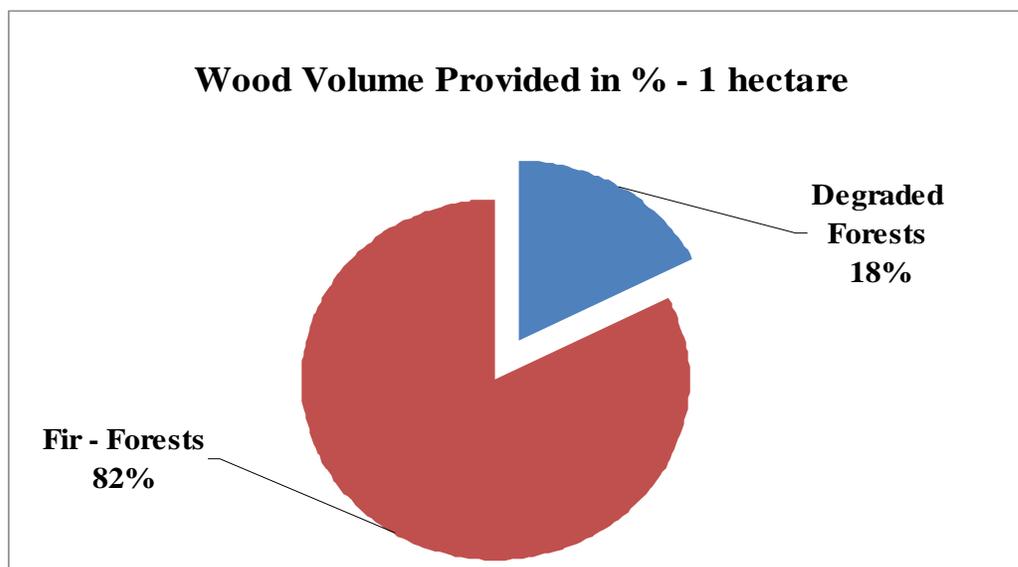
1. Wood volume of degraded forests at the maturity of 60s will be at 77 cubic meter per hectare - can be used mainly for heating purposes.
2. Wood volume of maintained oak – forests at the maturity of 60s amounts up to 214 cubic meter per hectare - can be used for industry.
3. Wood volume of fir – forests at the maturity of 60s amounts up to 360 cubic meter per hectare - can be used for industry needs.
 - i) A cubic meter of wood for burning purposes in the market costs €30.
 - ii) A cubic meter of industrial wood in the market costs €100.

By comparing the wood volume yielded from degraded forests, fir – forests, oak– forests and knowing their value in the market per “m³”, flows that the need for improving the degraded forests is very advantageous for the country economy and the forestry sector in general.

Wood volume of degraded forests at the maturity of 60s will be at 77 m³ per hectare
The wood volume of fir – forests at the maturity of 60s will be at 360 m³ per hectare

Above data clearly represents that fir – forests have great potential to yield a high wood volume. On the following we have compared the wood volume that degraded forests and fir – forests yields per hectare.

Figure 5.0 Wood Volume Yielded by Degraded Forests and Fir-Forests, (% - 1ha)



The establishment of new forests plantations will enable in the future year’s wood with higher productivity. Hence, the amount of trees that would be obtained from the establishment of planting on degraded and shrub forestlands will impact the alleviation of firewood demand in the country.

5.5 Reforestation Costs and Benefits

Return rate of the reforestation / afforestation programs can be determined by calculating the amount of wood volume which is expected from the establishment of tree planting.

Costs of reforestation / afforestation in 500 hectare are presented in Appendix – A and Appendix – B. The financial analyses presented below are based on the data of Appendix – A, taking into consideration that are more expensive.

Reforestation costs includes: preparation of land area, planting, stock, labor and care of forests. Reforestation costs for 1 hectare are estimated at €2,141 (see Appendix – A):

$$500 \text{ hectare} * €2,141 = \underline{€1,070,625}$$

Table 5.2 Timber Value by Type, Product and Price (m³/ha)

Type of Species	Wood Volume (cubic meter per ha)	Price per cubic meter (€)	Total (€)
Degraded Forests	47.452	30	1,423
Fir-Forests	360	100	36,000

If we invest today €1,070,625 in improving the forests state, we must look at this case how much is the expected profit from this investment. By calculating the amount of wood that we expect to receive at the maturity of 60s in area of 500 hectare we will have:

$$500 \text{ hectare} * 360 \text{ wood cubic meter/hectare} = 180,000 \text{ wood cubic meter}$$

Net wood volume that can be used for industry purposes stands at 70 % of the gross wood amount, which in our case for 500 hectare is 126,000 cubic meter (remained part of 30 % can be used for briquette or otherwise disposed of), so:

$$180,000 \text{ wood cubic meter} * 70 \% = 126,000 \text{ wood cubic meter} * €100 = \underline{€12,600,000}$$

The price paid for industrial timber is likely to be increased in the future, due to increased activities in this sector. Large returns will be provided due to the high price paid for each cubic meter of timber.

If the present value (PV) expected from (€12,600,000) is greater than the investment made of (€1,070,625) then the project should be undertaken and implemented. It is important to know also what the value today is of (€12,600,000) that is expected after 60 year of tree establishment (harvest time), and is it worth it more than the investment made. In this case “C₁” represent the expected value of profit after 60s (€12,600,000) and “r” discount rate of 8%, (we get 8 % due to the risks related with forestry which may be as a result of destruction of wood, such as: insects, diseases and forests fires).

$$PV = \frac{1}{1+r} * C_1 \text{ -----> } PV = \frac{1}{1.08} * €12,600,000 = €11,666,666$$

Net Present Value (NPV) shows the difference between the market value of the investment made and its cost. NPV is founded when the present value of future cash flow from (€11,666,666) is deducted from the initial investment, which in our case is (€1,070,625).

Represent today investment in period (0) and outlet money that is marked with - €1,070,625

$$NPV = C^0 * \frac{C_1}{1+r}$$

C₁

The profit of 60 years waiting period.

$$NPV = - €1,070,625 + \frac{€11.666.666}{1.08} = - €1,070,625 + €10,802,469 = \underline{\underline{€9,731,844}}$$

For this investment it is important also the information of return rate on invested capital. The return rate of invested capital is expressed through the investment profit ratio and in our case is:

$$\text{Returns} = \frac{\text{returns}}{\text{investment}} = \frac{€9.731.844 - €1.070.625}{€1.070.625} = 8.09 \%$$

These economic indicators reflect that the reforestations programs can be a successful investment of long - time period after that NPV has positive actual value even using conservative prices of industrial wood and the return rate is 8.09 %.

Chapter VI

6.0 Law Implementation for Forests Improvement

Appropriate forest management which is meant to be developed under the new Forest Policy would be an important tool in curbing forest degradation in Kosovo and making through head the program through reforestation and afforestation.

The law should cover the melioration of land for improvement of crop production, reforestation / afforestation for land protection, organizing and making headway with land management under a far reaching program.

Ministry of Agriculture, Forestry and Rural Development (MAFRD) thorough implementation of reforestation / afforestation program should take into account activities by setting:

6.1 Objectives¹⁷

- a) The Ministry of Agriculture, Forestry and Rural Development (MAFRD) should adopt a boost to the annual reforestations, increase surface of forests and improve the wood quality production by taking into account the objectives as follows:
- i. The programs of reforestation should comprise 100,000 hectare of the degraded forestlands and shrub forestlands
 - ii. The programs of afforestation should comprise approximately 40,000 hectare of barren forestlands.
 - iii. The reforestation and afforestation of forestlands should ensure that are sustainable and could influence the improvement of the forests.
 - iv. Growth or expansion of practices must occur when it's necessary to improve long - term productivity of wood resources and non - wood, in order to meet the future needs of the state.

b) Steps those are seen necessary and important to be taken during the implementation of programs:

- i. Promote companies, associations, community groups and cooperatives involved in reforestation activities with mechanisms for land processing and for the establishment of new forest plantations
- ii. Promote the development, creation, and improvement of forest industry in order that products of reforestation are used as raw material.
- iii. To study, investigate and promulgate all forms of reforestation and the means to accomplish same
- iv. More modern nurseries should be opened in order to improve the quality production of seeds for the reforestation / afforestation efforts.

6.2 Main Characteristics

a) Plantation

- i. Presentations of less than 50 ha will not have a professional endorsement
- ii. In order to enrich forest resources, to protect the forests and to ameliorate the climate, seeds shall be planted in areas of:
 - o Degraded Forests,
 - o Shrub Forests and
 - o Barren Forestlands
- iii. All wood that is harvested within the project should be exempt from most taxes, including export taxes
- iv. Equipment including vehicles, heavy equipment, and any other direct investment in the project are exempt from taxes and can be brought into the country without any tax.

b) Reforestation

The purpose of the regulation is to set standards, to ensure timely replacement and maintenance, forest trees grow and the following operations to be covered:

- i. Reforestation must acquire a surface of 100,000 ha of degraded forests and shrub forests that are suitable for reforestation, both publicly-owned and privately-owned
- ii. By re - establishing seeds to provide a sustainable source of wood for the future of inhabitant's needs and industrial needs
- iii. Reforestation shall use costs associated with reforestations including: site identification, acquisition, preparation, maintenance of existing forests, and specified goals
- iv. Reforestation should be done with a careful plan, by assessing and preparing the surface, by considering the state of the planting, the present seeds, terms of type, soil and other pests
- v. By choosing the appropriate area based on the methods or combination of methods, including mechanical, manual, and chemical methods
- vi. Costs which will depend on the site conditions, existing methods, plant used and the amount of waste that may enter.

c) Afforestation

Afforestation programs should cover more than 40,000 hectare of barren forestlands by relying to the following points:

- i. Plantation of seeds shall be established on barren forestlands of good quality were the existence is not put at risk by external factors
- ii. The afforestation should be made on barren forestlands with a fast growing broadleaves that will lead to the high annual increments
- iii. A future plantation program shall be based upon state of the art technology and knowledge, growths models and proper tending protection schemes shall guide the work.

6.3 Type of Species Allowed for Reforestation/Afforestation

Kosova Forest Agency (KFA) will determine whether the tree species are acceptable for afforestation, for seed sapling by relying on the following criteria's:

- i. Species must be ecologically suitable for the country planting
- ii. Species should be capable for producing wood products in size and quality, production of old furniture's, pieces of pulp or other commercial forest products and
- iii. Species should be marketable in the foreseeable future.

6.4 Availability of Funds

Realizing the urgency of reforestation and afforestation programs a special tax should be approved and implemented in forests law. This earmarked fund will have a meant to provide and ensure the continuity of the reforestation / afforestation works.

- (i) The government should promote the reforestation / afforestation programs through:
 - Various subsidies
 - Credit financing and
 - Donors / Grants.

- (ii) The government should create a tax which will be streamered in forests restoration fund with the aim to ensure the continuity of reforestation / afforestation work, through:
 - Additional tax for heavy a vehicles that affect the environment pollution
 - The legislation should be established to raise funds by putting tax revenues over the harvests of wood products
 - Among the multiple sources there are General Appropriations as:
 - Income from forestry (the sale of forest products, etc.)
 - Forest - related taxes (eg, taxes on forest harvesting and processing of forest products), eco - tourism, hunting
 - Income from processing wood products
 - Penalties, fines and confiscations.

The fund should be designed to encourage public sector institutions to embark on a sustained programme of afforestation and reforestation that will rehabilitate degraded and shrub forestlands, and increase timber production.

7.0 Discussion and Recommendations

As known from Chapter I the forest area of Kosova is quite rich, comprising about 47 % of the total surface area. However, about 40.9 % of forest area is made up of degraded and shrub forests, indicating that in terms of quality and timber mass production it's actually not very rich.

Forests have suffered from continuous damage over the past decades. High production forests were the subject of over harvesting by the institutions that managed them during the period of 1987 - 1999s (Serbian government). Forests in low elevation have been subject to illegal logging after the 1999s conflict which led to the degradation of forest and shrub forest. Since degraded and shrub forests provide low timber productivity, the need for improving these forests is required. The transformation of these forests into higher producing forests is known as a particular method for achieving trees with higher timber productivity. In this context, the implementation of reforestation / afforestation will help to manage the forest resources sustainability and equitability, including between 500 and 5,000 hectare per year of the total 100,000 hectare provided in this project.

Moreover, firewood consumption in Kosovar households is quite high, approaching of 1.3 to 1.5 million m³ per year. So far, the responsible institutions have failed to materialize the capacity to meet these requirements. While degraded and shrub forests are meant to be cut and replace with new seedlings (trees), to continue the reforestation process, this will enable to create a large surplus of wood, (knowing that per 1 hectare is extracted 47.4528 m³ of wood). If reforestation programmes would include 5,000 hectare per year of degraded and shrub forestland, Kosova would be able to ensure sufficient wood supplies of approximately 237,260 m³ per year, [(5,000 hectare * 47.4528 m³ = 237,260 m³)]. As known, the alleviation of firewood shortage is one of the major challenges, and with the aid of reforestation Kosova will be able just to meet the firewood needs of population.

As well the supply of firewood and wooden products in general will be improved with the expansion of forest areas. By planting trees and creating forests, many of the

commercial needs of Kosovars will be fulfilled, while not destroying what is left of the forests. The afforestation of 40,000 hectare of barren forestlands (involved on this project) would enable in the future the stabilization of soil erosion, watershed protection, carbon sequestration and trees with higher productivity. The process of planting trees in empty lands helps promote the fast propagation of trees for the wooden products. Hence, taken into consideration the following trend of high prices of the industrial timber produced in Kosova, in the future may become also as an important source of trade and the economy in general.

While these projects are aimed at the preservation of forest's natural resources, they will serve as a tool to reduce unemployment in Kosova. The process of establishing forests plantations is a rotation which involves various activities such as: seed processing, seed production and land preparation. Many rural workers will have the opportunity to be employed because planting millions of seeds will be needed. The process of establishing forests plantations normally requires about 50 workers per one hectare, but this may change - depending on the skills of the workers. This act is with a great importance, since it will improve the purchasing power of rural people, primarily semi or un - skilled work to people living in rural places.

As well, reforestation / afforestation activities provide environmental and social benefits. They reduce the land degradation and sustain biodiversity density in general. Forests positively influence the environment by producing oxygen and storing carbon. By the process of photosynthesis, trees capture and store carbon dioxide from the atmosphere, helping to reduce quantities of this greenhouse gas and mitigating the effects of climate change. Trees also regulate local temperature by providing shade, cooling both the soil and the air below the upper branches.

Therefore, there is a need for a comprehensive approach to afforestation and reforestation, which should consider carbon sequestration, biodiversity conservation, soil protection, as well as the sustainable provision of raw material for forest industries and other goods and services in a balanced way. However, reforestation / afforestation

activities provide a wealth of social benefits as well, such as: employment, tourism, fuel wood and empowerment of local community - inclusion / consultation.

Recommendations

This capstone project provides strategies for improving the forest resources of Kosova. There are total 6 recommendations that derive from this project listed here in order of importance.

- **Reforestation / afforestation law** - The Minister of the Agriculture, Forestry and Rural Development shall promulgate a law in accordance with the goals and standards that specifies the methods and principles of Reforestation / Afforestation. The law shall apply to publicly - owned and privately - owned forests which will require replanting / planting with native species on degraded forests and shrub forests, and barren forestland. Process - based reforestation / afforestation law shall include a plan for each harvested area with details on the procedures that will be used to reforest or afforest the forest area, such as: site preparation methods, acceptable stocking and spacing for native species and mixed forest tree species etc.
- **Forest restoration fund** – providing a reforestation / afforestation activity is necessary to be established by the Kosova government. The financial fund requires at least €1,070,625 annually for fiscal year. The fund will have to be accomplished through donations from domestic and foreign legal and natural persons and foreign countries, additional taxes for heavy vehicles that affect the environment pollution and from fines, penalties, or damages collected as a result of forest offences or injuries to the public / private forests. Amounts must be deposited into a special fund and be available for the operations of reforestation / afforestation activities, and restoration treatments consistent with the strategy during the same fiscal year.
- **Select sites to be reforested / afforested** - Kosova Forest Agency (KFA) must identify an area of approximately 100,000 hectare of degraded forests and shrub forests, and 40,000 hectare of barren forestlands, both, publicly-owned and

privately-owned. A detailed feasibility study of selected forest areas is necessary to be conducted in order to ensure the success of the tree planting. Each site has unique soil and other environmental characteristic that must be considered when selecting the area. Selection of suitable forest areas is one of the most fundamental factors in the species growth at vacant lands. Proper selection of forest areas will lead to the successful reforestation and afforestation.

- **Establishment of new nurseries** - Government should support the establishment of new nurseries in the country. At least 2 (two) nurseries should be established in order to ensure a consistent supply of high quality seedlings, of desirable forest species, at an economical price. Demand for reforestation stock will grow with the advent of programs. Seedling production from the state nurseries could peak with over a million seedlings distributed during seasonality. The establishment of nurseries can be permanent or temporary, depending upon the duration of reforestation / afforestation programs.
- **Preservation of forest after seedling** – Kosova’s government shall establish a program of cooperation and coordination with the governing bodies of localities to assist in preservation of the reforested / afforested areas. A preservation strategy shall be adopted that specifically identifies the areas of which are considered best suited for long - term preservation. Such species will require protection after they are planted. The decentralized protection system will ensure the survival of species.
- **Support private sector** - Kosova's government should support the private forest sector, promote the establishment of associations that represent the interests of private forests owners and work on forests state improvement of privately-owned. Raise awareness and build capacity among private forest owners and proceed with implementation of a private sector forest plantation development program that will expand the area of commercial forests throughout the high forest.

List of References

1. Country Pasture/Forage Resource Profile-Dr. Sc. Muhamet A. Kamberi, March, 2009
Post: <http://www.fao.org/ag/AGP/AGPC/doc/Counprof/Kosova/Kosova.htm>
2. Studija (sumski resursi kao sirovinska osnova za razvoj industrijske prerave drveta u socijalistickoj autonomnoj pokrajini Kosova), 1981.
3. Kosova Forest Inventory, Report from United Nation – Food Agriculture Organization (FAO) 2002 / 2003, December 2003.
4. Policy and Strategy Paper on Forestry Sector Development 2010 – 2020, Ministry of Agriculture, Forestry and Rural Development (MAFRD), January 2010, Prishtina.
5. Rural Development Plan in Kosova 2009 – 2013, Ministry of Agriculture, Forestry and Rural Development (MAFRD), 26 November 2009, Prishtina.
6. Kosova's Government, Ministry of Agriculture, Forestry and Rural Development.
Post: <http://www.ks-gov.net/mbpzhr/>
7. Data for Forestry Sector, Kosova Forest Agency (KFA) / Information Office, 2010.
8. Ministry of State Administration (MSA), Statistical Office of Kosova, 2010.
Post: <http://esk.rks-gov.net/>
9. Istrazivanja i razvoj cetinara uvodjenjem optimalnih bioloskih resenja iprorede njihov uticaj na dalji razvoj i produktivnost, Zaversni Izvestaj Pec 1985.

10. Benefits of Planting Forests: Social, Ecological and Economic.
Post: <http://www.maf.govt.nz/mafnet/unff-planted-forestry-meeting/conference-papers/benefits-of-planted-forests.htm>
11. Kosova Biodiversity Assessment, Final Report submitted to the United States Agency for International Development, May, 2003.
Post: http://pdf.usaid.gov/pdf_docs/PNACT349.pdf
12. Ministry of Trade and Industry (MTI), Wood Processing Industry, 2008.
Post: <http://www.eciks.org/english/publications/wood-Kosova.pdf>
13. Investment Promotion Agency. A Strong Tradition in Forestry and Wood Processing.
Post: <http://www.invest-ks.org/?cont=14>
14. Estimation Firewood Usage in Kosova. Perspective for Future Development
Post: http://conference.fh-salzburg.ac.at/fileadmin/files/documents/presentations/Poster_08_Bajraktari.pdf
15. "Rural Development Report in Kosova"- Riinvest Institute for Development Research, Prishtina 2004.
16. Forest Management Assessment of Kosova in State-Owned Forests, USAID | Report.
17. Panama Reforestation Incentive Law, LEGISLATIVE ASSEMBLY LAW 24.
Post: <http://www.fenixpanama.com/panama-reforestation-incentive-law.html>
18. Ministry of Environment and Spatial Planning (MESP), Kosova State of the Environment Report, April 26, 2003.
Post: http://enrin.grida.no/htmls/Kosova/Kosova_SOE_part1.pdf
19. Definitions and Basic Principles of Sustainable forest Management in Relation to Criteria and Indicators. FAO Forest Resources Assessment 2000 definitions.
Post: <http://www.fao.org/docrep/003/x6896e/x6896e0e.htm>

20. Law Nr. 2003 / 3 Kosova Forests – Kosova Assembly.

21. Srednjiorocni Plan Razvoja 1986 – 1990, Pristina 1988.

- Appendix I -

Glossary

Forest: Means a biological community dominated by trees or other woody plants covering a land area of 40 are or more. Forest includes an area that has been cut but not cleared of trees or other woody plants.

Reforestation: Is a process of restoring and recreating areas of woodlands or forests that may have existed long ago but were deforested or otherwise removed at some point in the past.

Afforestation: Is a process of planting trees, saplings or seeds on non - forest land, the process of creating a forest on land where there is no forest or where no forest has existed for a long time.

High Forest: Over low forest where a high forest is a forest whose trees originate from individual seeds and which by its structure is intended primarily for the commercial production of high quality timber.²⁰

Low Forest: Is a forest whose individual trees consist predominantly of coppice and macchia shoot-trees whose growth originates from root suckers, stumps and similar vegetative propagation, and which is intended primarily for the production of residential firewood and other low value wood products.²⁰

Shrub and Bushy Land: Woody perennial plants, generally of more than 0.5 m and less than 5 m height, and often without a definite stem and crown. "Trees outside the forest" are excluded.¹⁹

Forest Degradation: Impoverishment of standing woody material mainly caused by human activities such as over-grazing, over-exploitation (for firewood in particular), repeated fires, or due attacks by insects, diseases, plant parasites or other natural causes.

Ha - Land area equal to 2.54 acres.

- Appendix II -
Reforestation Costs - 500 hectare

No.	Work Description	Costs (€) 1 ha	Costs(€) 500 ha
1	Cutting of indigenous vegetation of degraded forest for meliorative afforestation. (8 workers * €18)	144	72,000
2	Sooty roots of native forest with tractors equipped with adequate equipment for blackening the roots. Tractor with Accessories. (3 work hours * €100)	300	150,000
3	Site clearance of the material that prevents the establishment of new forest culture. (4 workers * 15 €)	60	30,000
Material and Services:			
Planting material, classical seedlings, age 2 +2 or produced seedlings under the system "Nysula".			
Type of Seeds: White pine; Duglazia; Horomoqi; Oak; Red; Oak.			
4	Value of the seed per (ha). (2,500 piece * €0.20)	500	250,000
5	Seeds transport from nursery up to a temporary warehouse. (€0.02)	50	25,000
6	Storage of planting material.	10	5,000
7	Transport of workers and of the materials from site collection up to the point. (41 * €1.5)	61.5	30,750
8	The value of chemicals for destroying the possibility of renewal of the remained trees.	40	20,000
9	Labor cost - Eliminate the possibility of branch renewal.	20	10,000
Afforestation			
10	Opening holes for seeds dimensions 40 * 40 * 40 cm. Daily rate for a worker - 60 holes. (30 workers * €15)	450	225,000
11	Collection of seeds in the previously opened holes. (17 workers * €15)	255	127,500
Care of Forests Culture			
12	Fulfillment of culture with seeds in quantities of 15 %.	75	37,500
13	Labor costs.	105.75	52,875
14	Tillage. (4 workers* €15)	60	30,000
15	Professional - Supervision of work.	10	5,000
Total		2,141.25	1,070,625

- Appendix III -
Afforestations Costs - 500 hectare

No.	Work Description	Costs (€) 1 ha	Costs (€) 500 ha
1	Site clearance of the material that prevents the establishment of new forest culture. (4 workers * 15 €)	60	30,000
Material and Services: Planting material, classical seedlings, age 2 +2 or produced seedlings under the system "Nysula". Type of Seeds: White pine; Duglazia; Horomoqi; Oak; Red; Oak.			
2	Value of the Seeds per (ha). (2,500 piece * €0.15)	375	187,500
3	Seeds transport from nursery up to a temporary warehouse. (€0.02).	50	25,000
4	Storage of planting material.	10	5,000
5	Transport of workers and of the materials from site collection up to the point. (41 * €1.5)	61.5	30,750
Afforestation			
6	Opening holes for seeds dimensions 40 * 40 * 40 cm. Daily rate per worker - 50 holes. (50 workers * €15)	750	375,000
Total		1,306.50	653,250
Care of Forest Culture			
7	Fulfillment of culture with seeds in quantities of 15 %.	56.25	28,125
8	Labor costs.	112.50	56,250
9	Tillage. (4 workers* €15)	60	30,000
10	Professional - Supervision of work.	10	5,000
Care of Forests Culture		238.75	119,375
Total		1,545.25	772,625